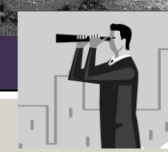

Scenario Planning is designed to assess the potential impacts of changing conditions and outcomes and performance goals of various land use, economic development and infrastructure investments. Nashua Regional Planning Commission examined alternative scenarios related to population trends, land use development patterns, travel demand, economic impacts, and climate change. NRPC utilized the scenario planning results to help identify regional issues, trends, goals, and priorities that were incorporated throughout the regional plan's many chapters

Adopted December 17, 2014

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Introduction

Scenario Planning is designed to assess the potential impacts of changing conditions and outcomes and performance goals of various land use, economic development and infrastructure investments. Nashua Regional Planning Commission utilized data collected through the planning process to project alternative scenarios related to population trends, land use development patterns, travel demand, economic impacts, and climate change and their potential impacts on the Region and its communities.

Nashua Regional Planning Commission prepared several population forecasts based upon varying future migration scenarios. Because fewer people have moved to the region in the last few decades than historically, there are a large number of aging baby boomers, and the region expects deaths to soon outpace new births, the region is on the precipice of a demographic shift. The scenarios test what would be the impact of an optimistic uptick in migration compared to a continued decline or stagnant levels of people moving out of the region.

The land-use modelling exercise conducted by NRPC was intended to conceptualize the near-term growth potential in our region. This analysis examines whether the region's existing land-use regulations are consistent with desirable growth as described by values and priorities identified in the NRPC Regional Plan update, and as measured by a common set of impact indicators that examine the relationship between growth and demand for resources. The base scenario is compared with an alternate scenario that mimics local goals of increased environmental preservation. The ultimate goal is to provide information to our communities to help inform land-use decision-making.

Additionally, NRPC utilized its travel demand model to evaluate the impacts of transportation infrastructure improvements on traffic patterns and air quality. The process results in future traffic forecasts are based on anticipated future land use patterns, population projections, projected housing units, employment, and school enrollment. Scenarios were developed for the no build condition and two future or build conditions for the years 2025 and 2040. The build condition networks include planned projects that have been identified as long term needs for the region through past planning efforts.

New Hampshire Economic and Labor Market Information Bureau utilized its REMI econometric model to simulate the impact to regional economy due to changes in sector employment. One concerned identified in the planning process is the ability to attract young talent to the region. There is also a large concentration of highly educated baby boomers living in the region that may retire in the next decade. The question posed in this scenario is "what will happen to the region if the high tech companies in the region are not able to attract younger workers to replace the current experienced workers?"

Nashua Regional Planning Commission examined alternative scenarios related to population trends, land use development patterns, travel demand, economic impacts, and climate change.

The Southern New Hampshire Climate Assessment was prepared by Carbon Solutions New England and the University of New Hampshire Sustainability Institute for NH's regional planning commissions. It provides decision-relevant information as municipalities and the region face challenging choices regarding future investments. The report reviews historic changes in temperature and precipitation and evaluates high and low emissions future scenarios, estimating weather impacts for the next 100 years.

NRPC utilized the scenario planning results to help identify regional issues, trends, goals, and priorities that were incorporated throughout the regional plan's many chapters.

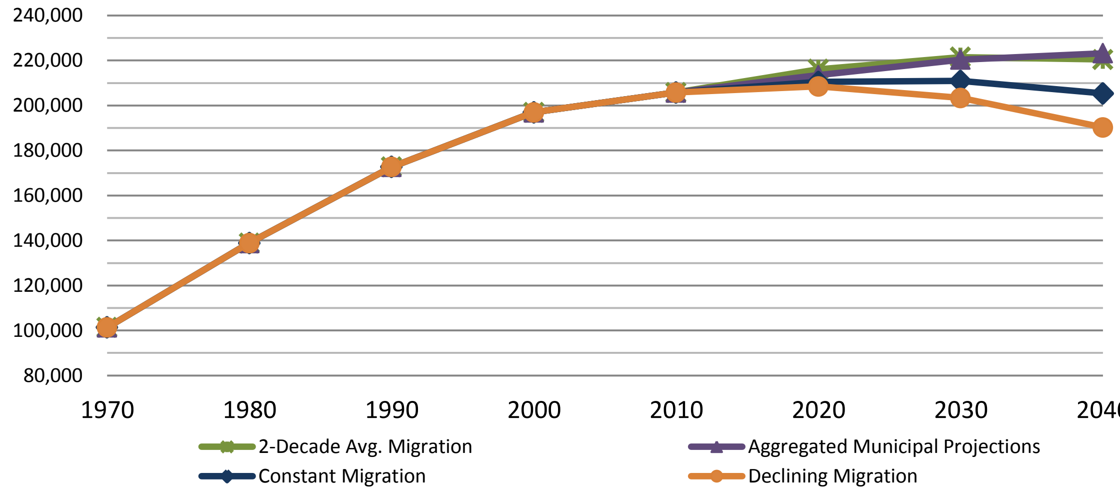
Population Projections

Overview

The population projection for the Nashua Regional Planning Commission (NRPC) was conducted using the Cohort Component Method. This method approximates an aging forward of the current population in 5 year age brackets or cohorts. For example, those aged 0-5 in 2010 will be between 30 and 34 years old in 2040. The projection process is based on 5 year increments and factors in average survival rates or statistical probability that a person in each age bracket will survive to the next five years. New births are approximated based upon current fertility rates and added in each five years along with the estimated number of persons moving into the region (net migration). Each of the inputs to the model is discussed in more detail below.

The selected population projection scenario for the NRPC region is based upon individualized projections prepared for each of the thirteen communities. This allowed for factoring in local conditions, opportunities and constraints such as limited land for development or slow growth as well as anticipated growth or known developments under way. The results of the 13 municipal projections were then aggregated to the regional level. These results were compared to a separate regional projection calculated using the average net-migration of the last two decades. The results of the two model runs were very similar. The aggregated municipal projection had a slightly lower projected population in the first decade as would be expected given current low growth rates, but a slightly higher 2040 projection, assuming a recovery in the State and region's economy.

Comparison of Population Projection Alternatives



Source: U.S Census Bureau, NH DHHS, NRPC Computation

Additionally, in reviewing the historic net-migration trends for the region, it became apparent that there was a notable decline in the number of individuals moving into the region over the last four decades. As a result, NRPC prepared two additional projection scenarios; both asked "what if" migration trends do not stabilize in the region. What if migration remained constant or continued to decline? How would this impact the region's overall population? These projections, termed here the "doomsday" projections, were calculated only at the regional level and not for each of the municipalities.

Methodology

Both the individual municipal projections and the regional "doomsday" projections utilized the same five step methodology as outlined below.

Historic Population by Municipality, 1970-2010						
Municipality	Census Population					2000-2010 Ann. Growth
	1970	1980	1990	2000	2010	
Amherst	4,605	8,243	9,068	10,769	11,201	0.39%
Brookline	1,167	1,766	2,410	4,181	4,991	1.79%
Hollis	2,616	4,679	5,705	7,015	7,684	0.92%
Hudson	10,638	14,022	19,530	22,928	24,467	0.65%
Litchfield	1,420	4,150	5,516	7,360	8,271	1.17%
Lyndeborough	789	1,070	1,294	1,585	1,683	0.60%
Mason	518	792	1,212	1,147	1,382	1.88%
Merrimack	8,595	15,406	22,156	25,119	25,494	0.15%
Milford	6,622	8,685	11,795	13,535	15,115	1.11%
Mont Vernon	906	1,444	1,812	2,034	2,409	1.71%
Nashua	55,820	67,865	79,662	86,605	86,494	-0.01%
Pelham	5,408	8,090	9,408	10,914	12,897	1.68%
Wilton	2,276	2,669	3,122	3,743	3,677	-0.18%
NRPC Total	**103,35**	**140,86**	**172,690**	**196,93**	**205,765**	**0.44%**

Source: U.S. Census Bureau

1) **Calculate the Historical Net Migration:**
Net migration, the total number moving into the area minus those moving out, were calculated for each decade since 1970 for all municipalities and the region. Each decade was graphed as a single point in a line chart to identify whether there is a historical pattern or trend.

2) **Calculate the Projected Net Migration:**
Starting with the graphed historical net migration, identify four possibilities of future migration. Generally each is a straight line projection based on the historical trends. The four were designed to represent a low, middle, high and historical average projection. Each of these were reviewed with municipal staff in the region's larger communities to solicit input on the most likely future outcome as well as to identify any local factors or planned development, or policy changes, that may impact the projected net migration rate.

3) **Calculate the Distribution of Net Migration:**
The ratio of estimated net migration is estimated for each age cohort for the last decade. This is computed by comparing the 2000 and 2010 male and female population for each age cohort. Essentially by aging forward and subtracting the 2000 population from the 2010 population and considering anticipated mortality rates, the resulting population per cohort is the population either gained or lost due to migration into or out of the region. These migration ratios by cohort are used to distribute the total projected migration to each cohort in the projection model.

4) **Calculate the Birth Rate and Project Births:**
The average birth rate from 2005-2009 was assumed to remain constant during the projection period and all women age 15 to 45 were considered to be capable of child-bearing. Additionally, the ratio of male and female births from 2000-2009 used to distribute projected births.

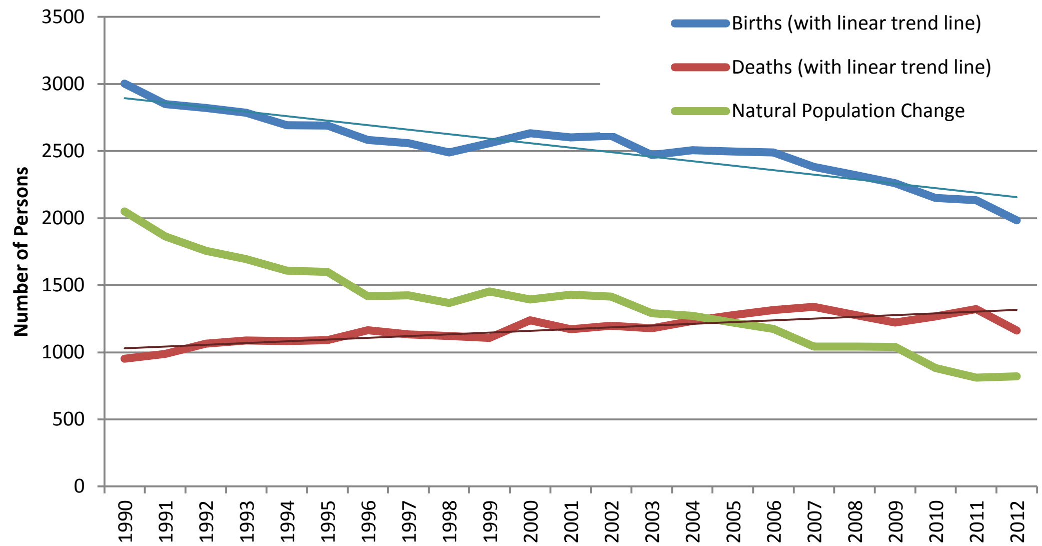
5) **Project:**
The 2010, or base year population by age cohorts and gender was multiplied by the State survival rate. The projected net migration was added then added to each cohort. This process was repeated over 5 year intervals for the male and female population until 2040.

Individualized Municipal Projections

Historic Population

The projection model used the 2010 US Census population as the base from which the projections were calculated. Historic population data from the 1970 through 2010 Censuses was used to estimate the total net migration for each community by decade. Additionally, the historic total population by community was used to reflect on the past five decades of population growth to identify any longer overall trend. Overall, the region say the greatest rates of growth from 1970 through 1990, after which population growth began to slow with the greatest declines since the mid-point of the last decade.

Natural Population Change, NRPC Region,1990-2012



Source: NH DHHS

Natural Population Change& Survival Rates

Natural population change data, particularly the total number of births and deaths by municipality were obtained from the New Hampshire Department of Health and Human Services (DHHS). The natural population change is the number of births per decade minus the number of deaths for the same time period. The last two decades have shown a notable decline in the region's natural population change. This change is attributable to a decreased number of new births each year coupled with an increased number of annual deaths. Decreased natural population change is part of a larger statewide and national trend of aging populations, fewer women of childbearing age, and lower fertility rates.

Survival rates, the statistical probability that a person of a certain age will live to the next year, were calculated based upon the number of deaths relative to the total population, by age and gender in New Hampshire from 2008 to 2010. The survival rates were computed by staff at Southern NH Planning Commission and NRPC using raw data from the NH DHHS utilizing a methodology provided by the NH Office of Energy and Planning.

The last two decades have shown a notable decline in the region's natural population change.

Net Migration

As previously stated, net migration is the total number of people that move into a geographic area minus those that move out. Migration rates can be impacted by a variety of factors, including:

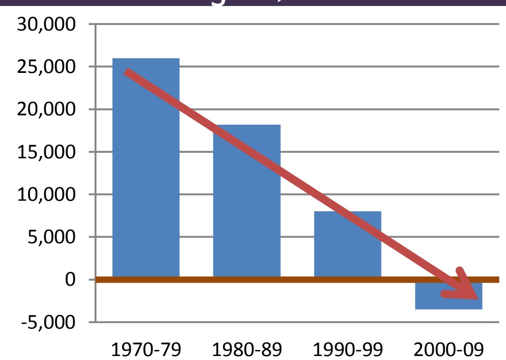
- Employment and economic opportunities
- Existing highway access and planned expansions
- Community build-out conditions
- Planned or anticipated developments
- Local regulations including growth control
- Land availability and urban/rural conditions
- Other anticipated policy changes

Historic Net Migration by Municipality, 1970-2009

MUNICIPALITY	1970-1979	1980-1989	1990-1999	2000-2009
Amherst	3,096	259	1,092	-61
Brookline	463	424	1,284	430
Hollis	1,883	639	872	480
Hudson	2,060	3,748	1,128	-57
Litchfield	2,313	620	814	168
Lyndeborough	234	85	186	32
Mason	231	338	-138	150
Merrimack	4,905	4,290	408	-1,331
Milford	1,438	2,116	802	718
Mont Vernon	446	198	101	263
Nashua	6,926	4,877	397	-5,149
Pelham	1,790	480	679	1,131
Wilton	196	115	382	-268
NRPC Total	**25,981**	**18,189**	**8,007**	**-3,494**

Source: U.S. Census American Community Survey, 2008-2012

Historic Net Migration NRPC Region, 1970-2009



Sources: US Census Bureau, NH DHHS, NRPC Computation

There are two components to the net migration computations: historical and future net migration. Given data limitations it is not possible to compute the in- or out-migration, only the net total. To calculate the historic net migration, the 2000 total population was subtracted from the 2010 population to calculate the total change, or for historical periods the older decade's population is subtracted from the newer decade. The natural population change was then subtracted from the total change to estimate the decade's net migration. The Nashua Region has seen a precipitous decline in net migration over the last four decades dropping from a high of nearly 26,000 net new person added to the region during the 1970's to a loss of nearly 3,500 persons between 2000 and 2009.

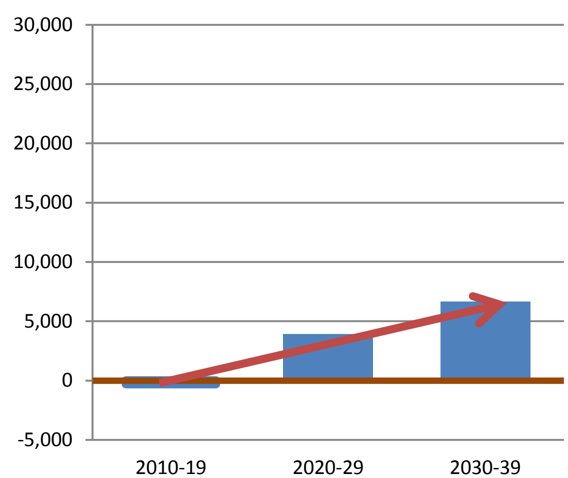
The future net migration was developed as a separate projection methodology. NRPC generated unique net migration rates for each town using the past 40 years of historic net migration and projected as four possible future net migration outcomes: high, middle, low and historical average. The most probable outcome was selected for each community based upon known local trends and anticipated influences on development such as new employment opportunities or recently approved residential development.

Projected Net Migration by Municipality, 2010-2039

MUNICIPALITY	2010-2019	2020-2039	2030-2039
Amherst	99	259	419
Brookline	215	214	206
Hollis	480	578	676
Hudson	134	268	536
Litchfield	168	351	534
Lyndeborough	96	72	48
Mason	123	96	69
Merrimack	-439	506	1,959
Milford	478	666	802
Mont Vernon	187	187	187
Nashua	-2,376	42	397
Pelham	480	622	763
Wilton	57	57	57
NRPC Total	**-298**	**3,919**	**6,653**

Source: U.S. Census American Community Survey, 2008-2012

Projected Net Migration NRPC Region, 2010-2019



Sources: US Census Bureau, NH DHHS, NRPC Computation

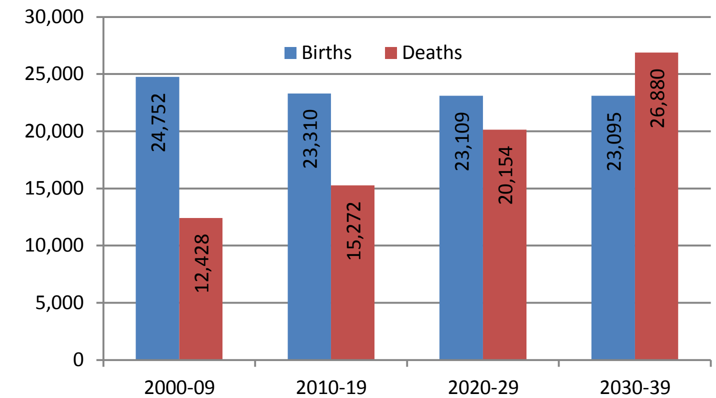
Overall, the projected net migration is expected to remain low from 2010 to 2019; afterward it is assumed that economic recovery will lead to increased future net migration, although not at the same rates the region saw during the 1970's or 1980's.

Total Projected Population

Much like the historical growth rates and trends vary by municipality, so too do the projected population figures. Overall, the Region more than tripled in population during the last 50 years. Between 1960 and 1970, the region grew by 57.7 percent; however, between 2000 and 2010, the region grew by 4.5 percent. This trend for slower growth is projected to continue in the region, as well as, across the State. The population for the NRPC region is projected to grow to approximately 223,250 persons by 2040; an increase of approximately 14,250 persons.

The annualized growth rate for 2010 to 2040 was projected to be .27 percent, which is down from .44 percent annually as experienced between 2000 and 2010. This can be explained by lower fertility rates, deaths will begin to exceed births starting in 2020 and for all communities by 2030, and that there is a significant slowing of net migration.

Projected Natural Population Change NRPC Region, 2000-2039



Source: U.S. Census Bureau, NH DHHS, NRPC Computation

Individual Municipal Cohort Component Population Projections NRPC Region, 2015-2040

Municipality	Projected Population						Annual Growth Rate	
	2015	2020	2025	2030	2035	2040	2010-40	2010-20
Amherst	11,346	11,452	11,550	11,563	11,579	11,521	0.09%	0.22%
Brookline	5,185	5,470	5,681	5,857	5,984	6,060	0.65%	0.92%
Hollis	7,790	8,034	8,226	8,380	8,534	8,648	0.39%	0.45%
Hudson	25,141	25,692	26,119	26,369	26,581	26,596	0.28%	0.49%
Litchfield	8,541	8,808	9,087	9,312	9,571	9,764	0.55%	0.63%
Lyndeborough	1,730	1,798	1,826	1,837	1,819	1,790	0.21%	0.66%
Mason	1,437	1,524	1,565	1,587	1,577	1,548	0.38%	0.98%
Merrimack	25,696	25,949	26,312	26,380	26,908	27,120	0.21%	0.18%
Milford	15,553	16,203	16,629	17,146	17,756	17,738	0.53%	0.70%
Mont Vernon	2,496	2,635	2,731	2,814	2,873	2,901	0.62%	0.90%
Nashua	86,937	88,166	89,593	90,457	90,759	90,360	0.15%	0.19%
Pelham	13,359	13,905	14,357	14,723	15,063	15,282	0.57%	0.76%
Wilton	3,776	3,871	3,928	3,958	3,954	3,921	0.21%	0.52%
NRPC Total	**208,987**	**213,507**	**217,605**	**220,381**	**222,959**	**223,249**	**0.27%**	**0.37%**

Source: U.S. Census Bureau, NH DHHS, NRPC Computation

Population Distribution by Age

Unless there is a change to the region's fertility rates or migration trends, it is anticipated that the 2040 senior population will be 2 to 3 times the current population, ¼ of the population in 2040 will be 65 years of age or older, and there will be a limited change projected in the younger population.

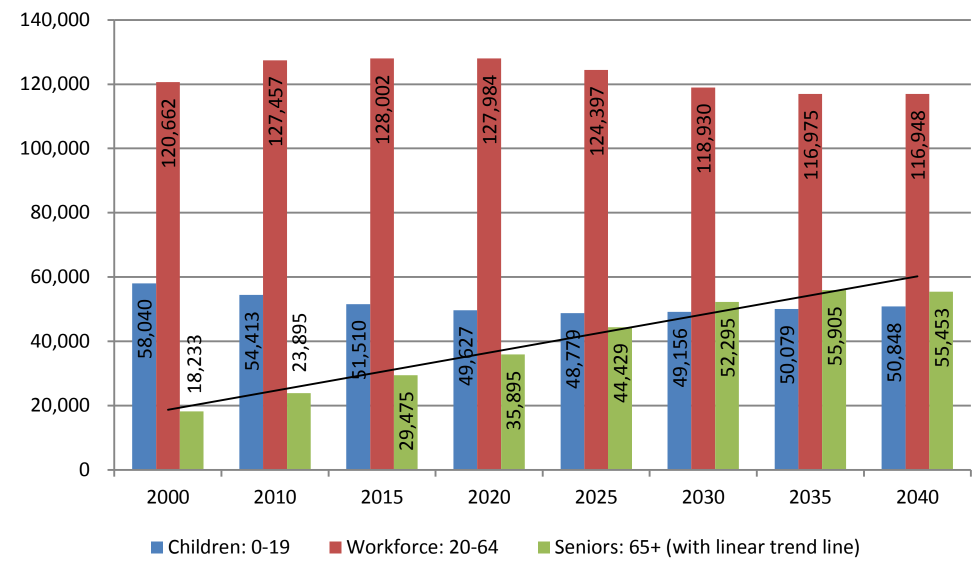
School Aged Children

The percent of the population age 19 and under decreased in all NRPC communities from 2000 to 2010. This trend is projected to continue over the projected time period. Population growth patterns are however cyclical. In the NRPC selected population projection scenario, the projected low point occurs in 2030 with a slight increase in children anticipated after that point.

Workforce

Similarly, the population aged 20 to 44 declined while the population between ages 45 and 64 is increased across all Nashua region communities between 2000 and 2010. This trend is anticipated to level out with those aged 20 to 44 remaining nearly constant over the next thirty years and slight declines in those aged 45 to 64. The total workforce age population in the region (ages 20 to 64) is projected to remain nearly constant over first decade of the projection period and then decline, dropping for a projected high of 128,000 persons in 2015 to just under 117,000 persons in 2040.

Projected Population by Age Group
Aggregated Individual Municipal Projections



Source: U.S. Census Bureau, NH DHHS, NRPC Computation

Seniors and Elderly

The most notable change is among the age 65 plus population that is projected to grow by 132 percent over the next 30 years. These rates of change however vary significantly by community. Hollis, where currently, 14 percent of the population was over age 65 in 2010 was only projected to see a 33 percent increase in its senior population to 18.6 percent in 2040. Conversely, Brookline had 6.6 percent of their 2010 population over 65 and was projected to increase 280 to reach 25 percent of the population by 2040. Across the region, seniors represented just over nine percent of the total population in 2000, 11.6 percent in 2010 and were projected to reach 24.8 percent in 2040.

Doomsday Alternatives

Population growth in New Hampshire from 1970 to 2000 was attributable to a high number of in-migration from other states. This historical influx slowed dramatically both regionally and statewide. However, the NRPC region was unique in that the most recent decade saw an actual loss or negative net migration. People moving into the region in the past decade settled in communities such as Brookline, Hollis, Milford and Pelham rather than Nashua and Merrimack, both of which saw a net loss of people moving out. In fact, combined, Nashua and Merrimack, along with Amherst, Hudson and Wilton saw a net outward migration of 6,866 persons. Comparatively, the remainder of the region saw a net in migration gain of 3,372 persons. Combined however, the region as a whole lost 3,494 persons to out migration. Compared to the 1970s when the region gained nearly 26,000 persons moving into the region, migration trends have been on a continual decline ever since, a 113 percent drop over time.

The "doomsday" alternatives were developed to pose a set of theoretical "what if?" questions. As noted in the overview, in reviewing the historic net-migration trends for the region it was apparent that there was a notable decline in the number of individuals moving into the region over the last four decades. As a result, NRPC prepared two additional projection scenarios that assumed migration trends do not recover in the region. The first alternative investigated the impact of migration trends remaining constant at the rate witnessed from 2000 to 2009. The second evaluated the impacts of a continued downward migration trend. Given the more theoretical nature of these alternatives, they were calculated only at the regional level and not for each of the municipalities.

Alternative 1: Constant Migration

The first alternative projection was based upon holding the 2000 to 2009 migration rate of -3,494 constant over the three decade projection period. Under this scenario, the 2040 population was projected to remain nearly constant over time. There were slight gains expected in the first 20 years and an overall net loss of 370 persons by 2040 once deaths exceed births in all NRPC communities. Both children and workforce age adults were estimated to decrease about 14 percent over the 40 year

Comparison of Net Migration Projection Alternatives
NRPC Region, 2020-2040

Scenario	Historic				Projected		
	1970-79	1980-89	1990-99	2000-09	2020	2030	2040
2-Decade Avg. Migration	25,981	18,189	8,007	(3,494)	2,257	2,257	2,257
Aggregated Municipal					(76)	4,003	5,672
Constant Migration					(3,494)	(3,494)	(3,494)
Declining Migration					(5,748)	(10,698)	(15,699)

Source: U.S. Census Bureau, NH DHHS, NRPC Computation

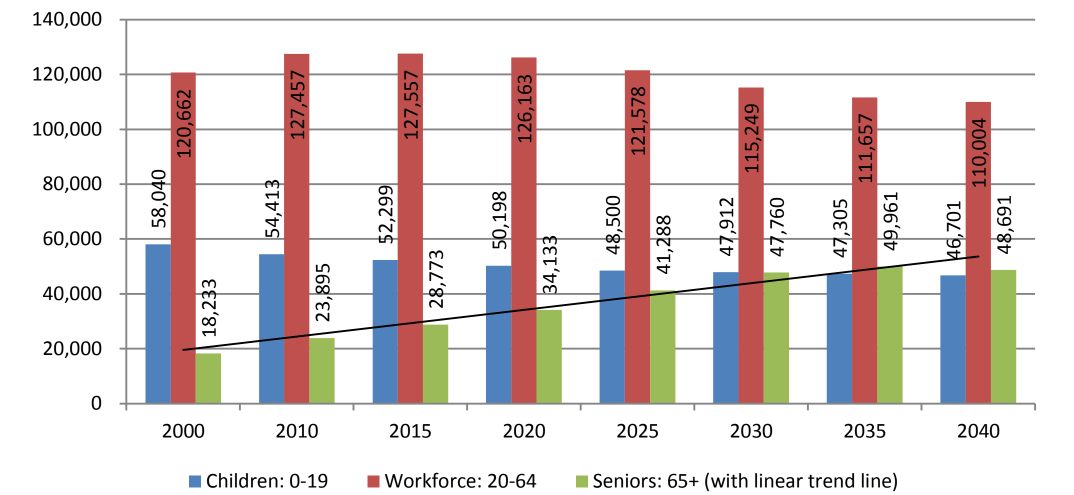
period, about a half-a-percent per year. Seniors on the other hand were projected to almost double over the 3 decades, making up nearly a quarter of the overall population. Growth among seniors was expected to be on average a 2.4 percent increase per year.

Alternative 2: Migration Declines

The second alternative, assumed that the future net migration rate would continue to decline. Had the net migration been projected as a straight line from the 1990s through the 2000s, net migration could be as low as loosing 38,000 people to outmigration during the 2030s. To temper this result, the linear extension of the 1990-2009 migration was averaged with the rounded aggregated municipal projected net migration level (generated from the individualized projections in the selected scenario).

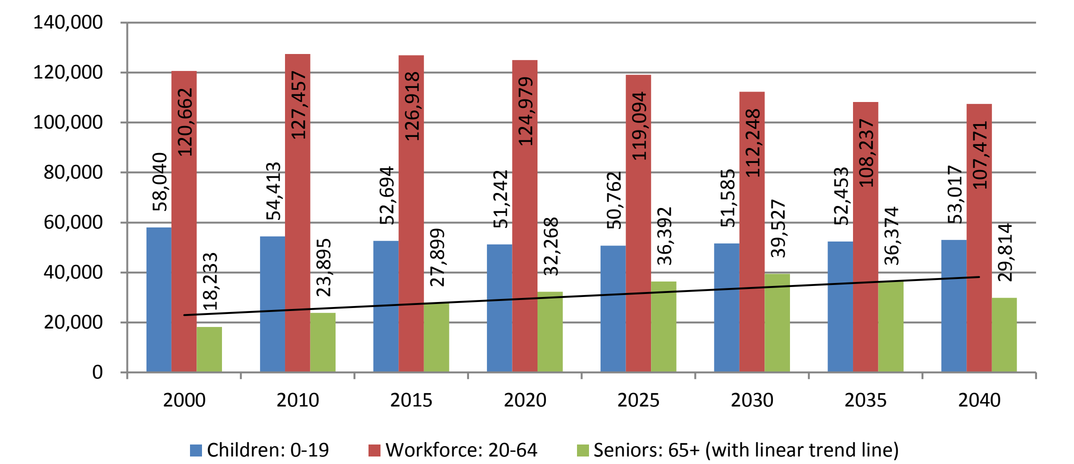
Given the steep net migration loss under the second alternative, the projected total population also saw a large decline with a total loss of 15,500 persons. This equated to a 7.5percent total decrease or about 0.25 percent per year. The greatest loss to the region under this scenario was to the workforce age population. Historically, net migration rates were higher among the

Projected Population by Age Group: Constant Migration at 2000-2009 Rate



Source: U.S. Census Bureau, NH DHHS, NRPC Computation

Projected Population by Age Group: Declining Migration Trend of 1980-2009



Source: U.S. Census Bureau, NH DHHS, NRPC Computation

younger workforce years, which were compounded under such a scenario. Workforce age population was projected to decline over 15 percent, or about 0.5 percent annually, for a total loss of 20,000 persons by 2040. Children were projected to shrink in numbers by about 2.5 percent or 1,400 individuals overall. Seniors once again, were the only cohort to see a population gain, albeit much smaller in scale. The senior population was only expected to grow by 25 percent, an increase of only 6,000 persons. Again, this was attributable to the projected outmigration where historically, the region saw its largest net migration levels among those nearer to retirement.

Conclusions

Ultimately, no population projection methodology or scenario will be 100 percent correct. However, such models enable us to plan for the future and anticipate community needs. With the continued growth and development of the region, there are greater demands placed on local services, infrastructure and water resources. If migration patterns and thus population growth increased, will local services and facilities be utilized to the maximum extent or capacity? Or, if migration and population declines will there be excess capacity? Regardless of the projection scenario the number of children in the region is anticipated to remain nearly the same over the next thirty years. For some communities, this could mean excess space in schools or a shift in focus toward maintenance rather than expansion. Electric demand in the residential and commercial sectors is forecast to grow more slowly than in the industrial sector with limited increases in population.

Regardless, of the projection scenario, the number of seniors will grow in the region. Under the most likely and selected scenario, the senior population is expected to increase by 132 percent over the next 30 years. There are many implication of an aging population on communities and the state. Are there enough younger caretakers, assisted living facilities, or housing options that allow aging

Comparison of Population Projection Scenarios
NRPC Region, 2020-2040

Scenario	US Census					Projected		
	1970	1980	1990	2000	2010	2020	2030	2040
2-Decade Avg. Migration	101,380	138,881	172,690	196,935	205,765	216,148	221,513	220,481
Aggregated Municipal						213,507	220,381	223,249
Constant Migration						210,494	210,920	205,396
Declining Migration						208,489	203,360	190,301

Source: U.S. Census Bureau, NH DHHS, NRPC Computation

in place? How will the region's oldest residents get to vital medical appointments and the grocery store if they can't drive? Aging populations are more vulnerable to heat stress and are generally more concerned about snow, ice storms and damaging winds than younger people. Older populations use more resources (water, energy, waste disposal) for health care purposes which can affect local natural resource supplies.

The projection scenarios show that positive net migration, or more people moving into the region than out, is essential to ensure a strong regional workforce. All three projection scenarios show a shrinking workforce, however, the selected scenario, with the greatest projected in migration, results in the smallest workforce cohort decline. With baby boomers nearing retirement age and life expectancies increasing, the question remains as to whether they will continue to work beyond the traditional retirement age. The REMI models, summarized later in the Scenario Planning Chapter, further test the implications of retiring manufacturing workers and a smaller workforce age projected population.

Land Use Modelling

Overview

The purpose of this land-use modelling exercise is to conceptualize, in a quantitative and spatial manner, the near-term growth potential in our region. This analysis examines whether the region's existing land-use regulations are consistent with desirable growth as described by values and priorities identified in the NRPC Regional Plan update, and as measured by a common set of impact indicators that examine the relationship between growth and demand for resources. The ultimate goal is to provide information to our communities to help inform land-use decision-making.

The model is based upon a characterization of existing conditions and land use regulations to predict future growth. The existing built landscape, i.e. number of structures, is compared against permitted densities under current zoning as well as conditions that either constrain or promote development, in order to predict the number of new structures that the land can theoretically support. Using a set of logic rules, impacts related to housing, demand for utilities, and proximity to amenities can be estimated from the model predictions.

Complete build-out is an extreme theoretical condition--tied to no particular date in the future--whereby growth has progressed to the point where no developable land remains. This analysis uses build-out modelling principles, but it takes a comparatively tempered approach by incorporating *rates of growth* based on independent population and commercial growth projections. These calibrated model predictions can then be tied to particular years in the future. Adding the dimension of time, particularly to a relatively near-term date in the future, allows communities to consider the model output with a proper level of urgency and priority.

Technical Approach

The modelling environment used is CommunityViz, a GIS-based decision support tool for planners. This extension for ESRI ArcGIS offers a diverse menu of functions to support site suitability analysis, visualization, and scenario planning. For this future conditions analysis NRPC used the Scenario 360 module of CommunityViz which offers a robust build-out model based on a rich set of user-configurable assumptions. The TimeScope function within the Build-out Wizard accepts a user-input estimated growth rate to make specific year-by-year future growth calculations. NRPC completed all analysis in ArcGIS 10.2.1/CommunityViz 4.3

CommunityViz has distinct advantages over traditional spreadsheet or database analysis approaches:

- The model prediction algorithm governing new growth considers spatial characteristics of land parcels such as minimum lot size and setback requirements.
- Characterization of undeveloped and underdeveloped land is parcel-based.
- The model scales easily to support a region-wide analysis.
- The modelling workflow is efficient because the model inputs and the analytical environment are unified in the GIS environment.
- The modelling exercise is visual, intuitive and the results are easy to communicate.

Land Use Scenarios

In the context of this chapter, land use scenarios answer "what if..." questions about hypothetical, alternative future land use conditions, with the goal to examine potential impacts and to ultimately inform future land use recommendations. The specific scenarios in this report do not represent policy, and each NRPC community is unique and likely has different land-use goals and associated challenges.

Business-As-Usual

The Business-as-Usual scenario predicts growth at year 2040 based on current zoning district regulations that are assumed constant over time. It considers a limited number of common land-use constraint conditions such as steep slopes, permanent conservation lands, and wetlands or other water bodies that would prevent future development. These constraints represent approximately 32% of the total study area. The model takes into account the presence of existing building structures in order to identify parcels that are undeveloped or underdeveloped.

Increased Local Environmental Protection

In contrast, the *Increased Local Environmental Protection* scenario is an alternative growth scenario marked by the conservation of additional environmentally important lands such as additional conservation lands, floodplain, protective buffer zones around select wetlands and water bodies, and important habitat. This scenario removes approximately **40,000** additional acres from development, resulting in approximately 51% of the total land being unbuildable. The other model inputs, including data and assumptions, are identical to Business-As-Usual in order to facilitate comparison between the scenarios.

Data Inputs

Existing Structures

In the model, existing buildings are modelled as GIS points. They are categorized into two categories, non-residential and residential, based upon the underlying parcel land use:

Summary of Structures by Parcel Land Use

Structure Type	Parcel Land uses	
Non-Residential	• Agricultural • Commercial • Industrial	• Recreation • Utility
Residential	• Single-Family Residential • Two-Family Residential • Three-Family Residential • Four-Family Residential	• Group Quarters • Mixed Use Vacant

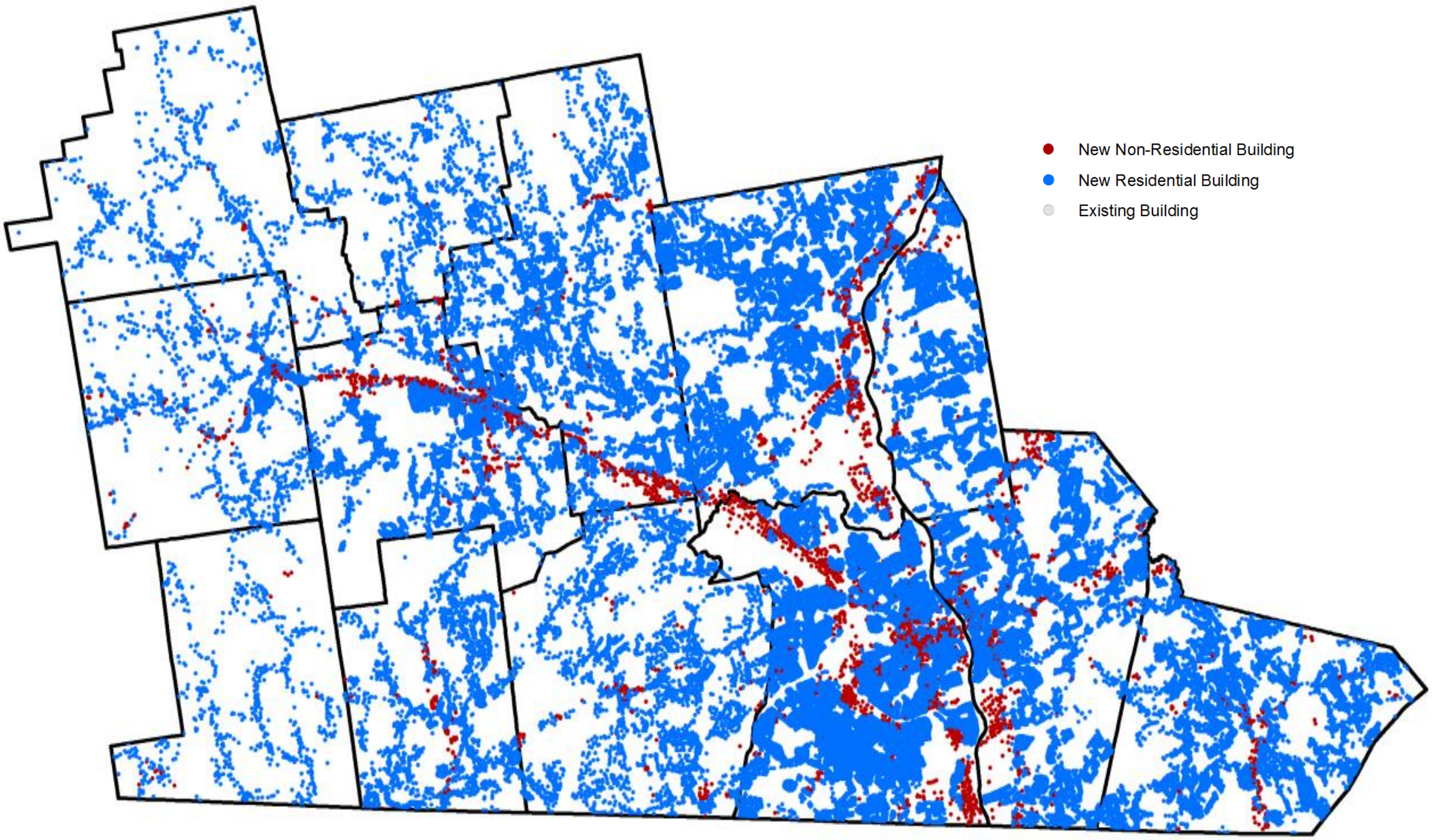
Source: NRPC GIS

Existing residential structures contain an attribute indicating the approximate number of dwelling units per existing structure. This attribute was estimated from the total housing units per parcel attribute already stored and maintained in the NRPC GIS. Non-residential buildings were assumed to be, on average, 12,000 square feet.

Zoning by Primary or Highest-Density Permitted Use

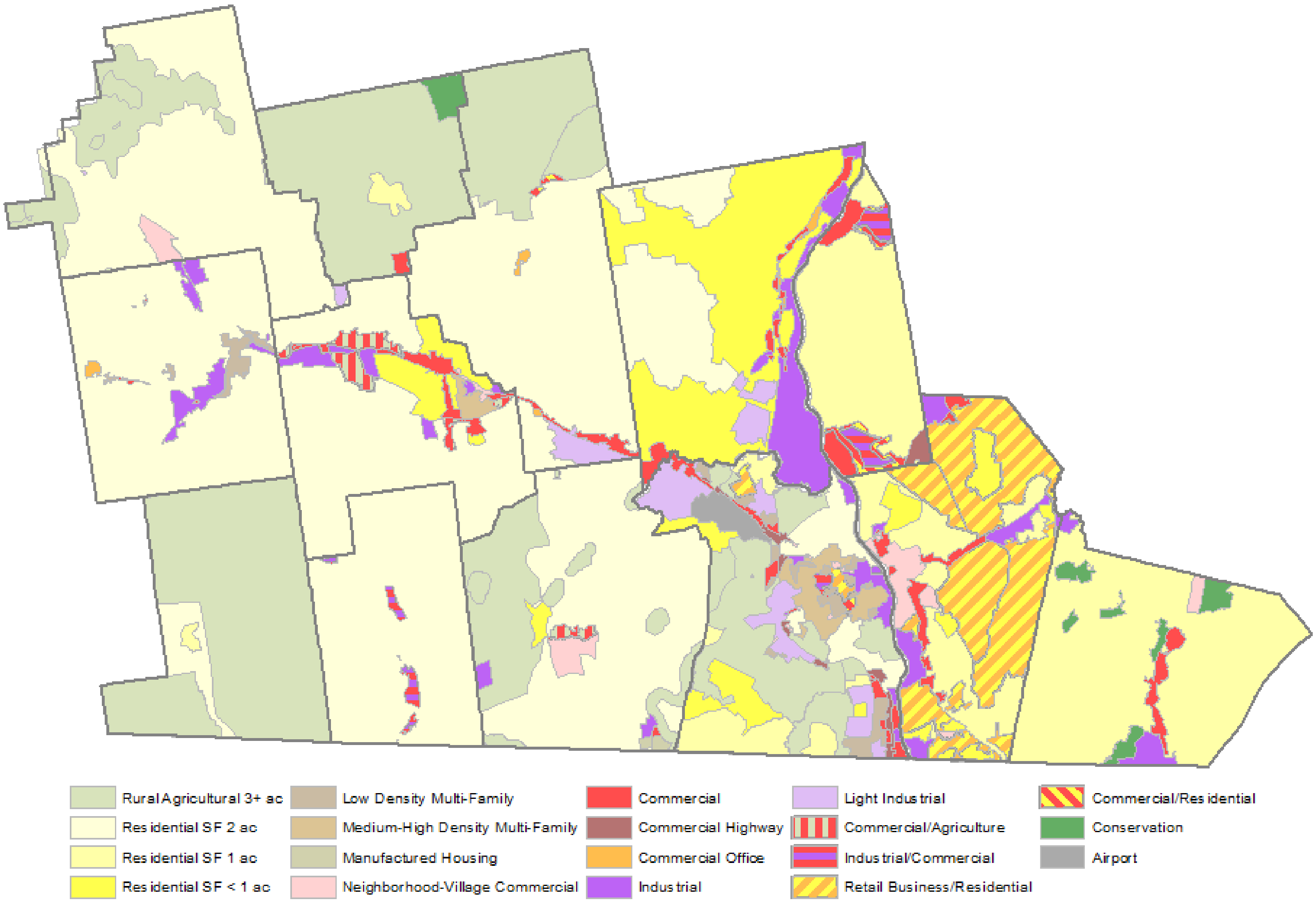
Land-use regulations were modelled according to existing zoning districts. NRPC categorized community-specific zoning districts into 19 general categories based on the primary or highest density permitted use, broadly defined, regardless of zoning district nomenclature.

Existing Buildings



Source: NRPC GIS

Zoning by Primary or Highest Density Permitted Use



Source: NRPC GIS

Zoning Districts by Town

Category	Primary Permitted Use	Amherst	Brookline	Hollis	Hudson	Litchfield	Lyndeborough	Mason	Merrimack	Milford	Mont Vernon	Nashua	Pelham	Wilton
Residential	Rural Agricultural 3+ ac	NR, NT		RL & R			RL2 & RL3	GRAF			RR	R-9 & R-18		
	Residential SF 2 ac	RR	RA	RA			RL1	VR	R-1	R-R		R-A	RU	RA
	Residential SF 1 ac				R-2	R		HP			R	R-40	R	
	Residential SF < 1 ac			WSC	R-1				R	R-A		R-30		
	Medium-High Density Multi-Family									R-B		R-B		
	Low Density Multi-Family											R-C		R
	Manufactured Housing			MH-1 & 2										
Commercial	Neighborhood-Village Commercial			TC	TR		VILL			LCB		LB		
	Commercial	C		C	B	SC & NC			C-2	C	LC	GB	B & B5	C
	Commercial Highway					HC						HB		
	Commercial Office	GO							C-1					OP
Industrial	Industrial		I	I	I	I			I-1	I		GI	I	I
	Light Industrial	I					LI		I-2 & I-3			PI		
Other	Commercial/Agriculture			AB						ICI1 & ICI2				
	Industrial/Commercial		IC			SCI & NCI						GI/MU		
	Retail Business/Residential				G & G1							D-1, PRD		
	Commercial/Residential	LC				T						D-3		
	Conservation										MCCZ		RCA	
	Airport											AI		

Categorization based on the highest density permitted use, by broad category, regardless of zoning district nomenclature. When density failed to distinguish between zoning districts in a town, the overall intentions of the zoning district as stated in the ordinance was considered.

Overlay districts, which generally add a level of restriction, are not considered in this exercise.

Lot sizes represent the smallest permissible lot.

Constraints to Development

As mentioned earlier, constraint areas are where building development cannot occur. Potential constraints can represent areas of difficult natural conditions that preclude development, areas characterized by infrastructure limitations, or areas with certain cultural or regulatory designations.

NRPC selected a very limited number of absolute constraint conditions for the Business-As-Usual scenario including permanent conservation land, steep slopes, water bodies and wetlands, and parcels with certain unbuildable land uses. The test scenario included these absolute constraints, and added additional conservation lands, moderate slopes, Shoreland Water Quality Protection Jurisdictional Area buffers, a protective wetland buffer, 100-year floodplains, and priority habitats. These constraints are summarized in the following table, which also presents total acres occupied by each constraint category.

Note: these constraint categories are not mutually-exclusive, meaning there is a significant amount of area overlap between constraints. For example, most of the Shoreland Water Quality Protection buffer areas area also in the 100-year flood zone; and these areas contribute to the totals reported below for both constraint categories.

Comparison of Development Constraints Between Scenarios

Development Constraint Category	Data Source(s)	Scenario 1: Business-As-Usual		Scenario 2: Increased Local Environmental Protection	
		Constraint Definition	**Total Area (AC)**	**Constraint Definition**	**Total Area (AC)**
Conservation Land	NH Granit Conserved Lands, NRPC Conserved Lands	Land with permanent protections in place	23,059	All land conservation categories	35,760
Slopes	NH Granit SSURGO database	Steep slopes (grade > 25%)	30,150	Steep and Moderate slopes (grade >10%)	41,869
Open Water	New Hampshire Hydrography Dataset, NHDES Designated Rivers GIS Dataset	Rivers, Lakes, Streams (no buffers)	16,447	• Rivers, Lakes, Streams • Shoreland Water Quality Protection Jurisdictional Area Buffers	19,667
Wetlands	National Wetlands Inventory (NWI)	Wetland only (no buffers)	13,022	Wetlands and 50' buffers	20,728
Floodplain	FEMA Digital Flood Insurance Rate Maps (DFIRM)	None	0	100-year floodplain	39,624
Priority Habitat	NH Wildlife Action Plan (WAP)	None	0	NH Highest Ranked Habitats	54,555
Land parcels ineligible for future development	NRPC GIS database	• Road/Row • Airport • Institutional • Other • Government • Municipal • Facilities • Schools • Water	8,568	Same as Scenario 1	8,568

Source: NRPC GIS

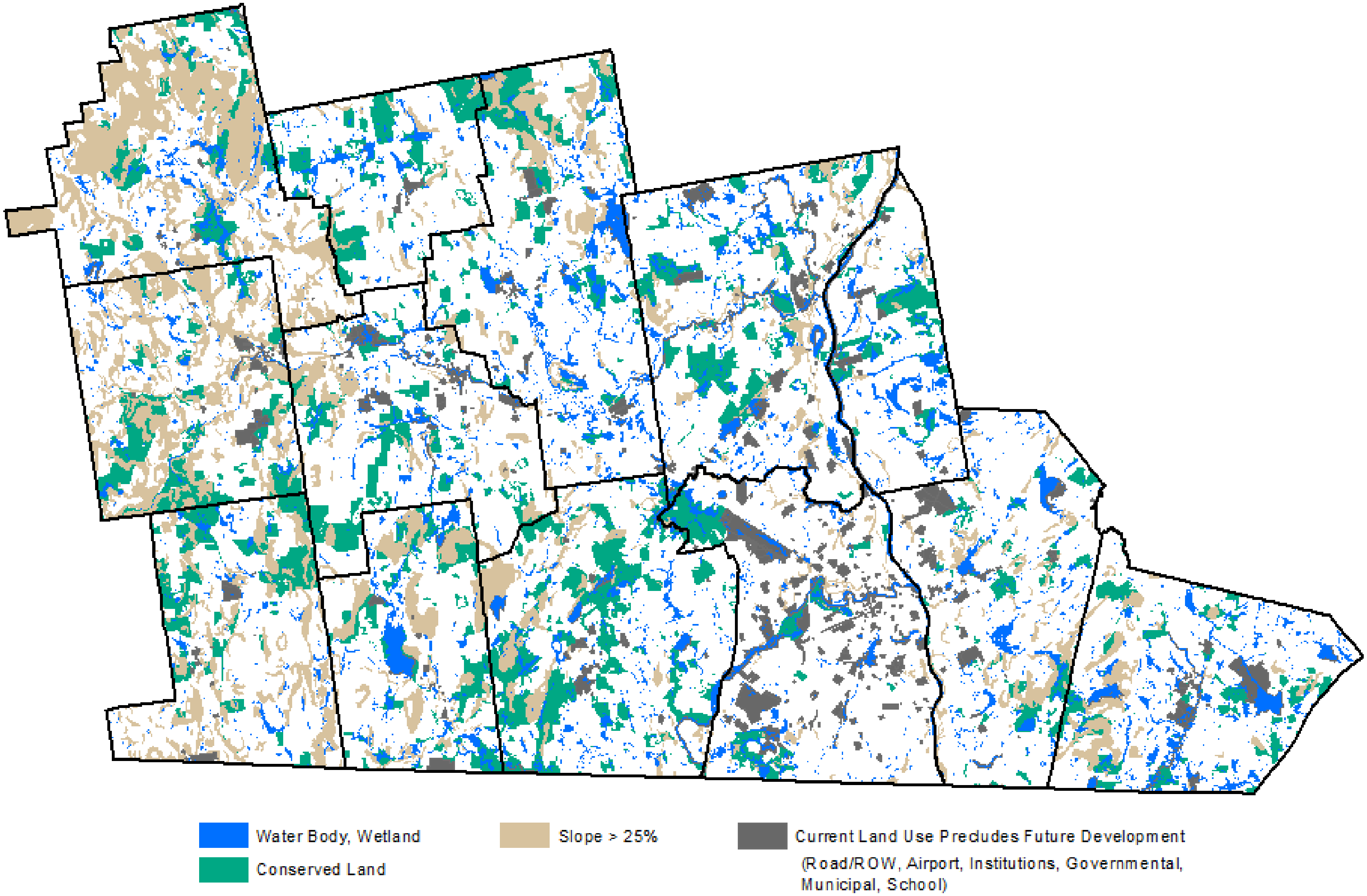
This following table summarizes the development potential within zoning districts by considering the total constrained land, irrespective of constraint category. Buildable area is further reduced once the model places buildings according to minimum lot size, setback, and frontage requirements.

Development Potential By Zoning District

		Scenario 1: Business-As-Usual		Scenario 2: Increased Local Environmental Protection	
Zoning by Primary or Highest Density Permitted Use	Total Area (acres)	Total Area Constrained from Development (acres)	Remainder, or Area Potentially Developable (acres)	Total Area Constrained from Development (acres)	Remainder, or Area Potentially Developable (acres)
Airport	663	458	205	472	191
Commercial	3,677	674	3,003	1,401	2,276
Commercial Highway	494	64	430	193	301
Commercial Office	237	53	184	76	161
Conservation	1,498	657	841	1,230	268
Industrial	5,945	1,829	4,116	3,399	2,546
Light Industrial	3,204	948	2,256	1,508	1,696
Low Density Multi-Family	1,310	288	1,022	585	725
Manufactured Housing	125	5	120	50	75
Medium-High Density Multi-Family	1,308	368	940	429	879
Mixed Use Commercial/Agriculture	1,001	263	738	513	488
Mixed Use Commercial/Residential	612	90	522	311	301
Mixed Use Industrial/Commercial	1,076	163	913	568	508
Mixed Use Retail Business/Residential	9,572	2,319	7,253	4,010	5,562
Neighborhood-Village Commercial	1,853	476	1,377	849	1,004
Residential Sf < 1 Ac	15,060	3,916	11,144	7,278	7,782
Residential Sf 1 Ac	28,141	8,305	19,836	14,264	13,877
Residential Sf 2 Ac	88,344	29,412	58,932	44,801	43,543
Rural Agricultural 3+ Ac	45,294	16,286	29,008	25,164	20,130
TOTAL	**209,414**	**66,574**	**142,840**	**107,101**	**102,313**

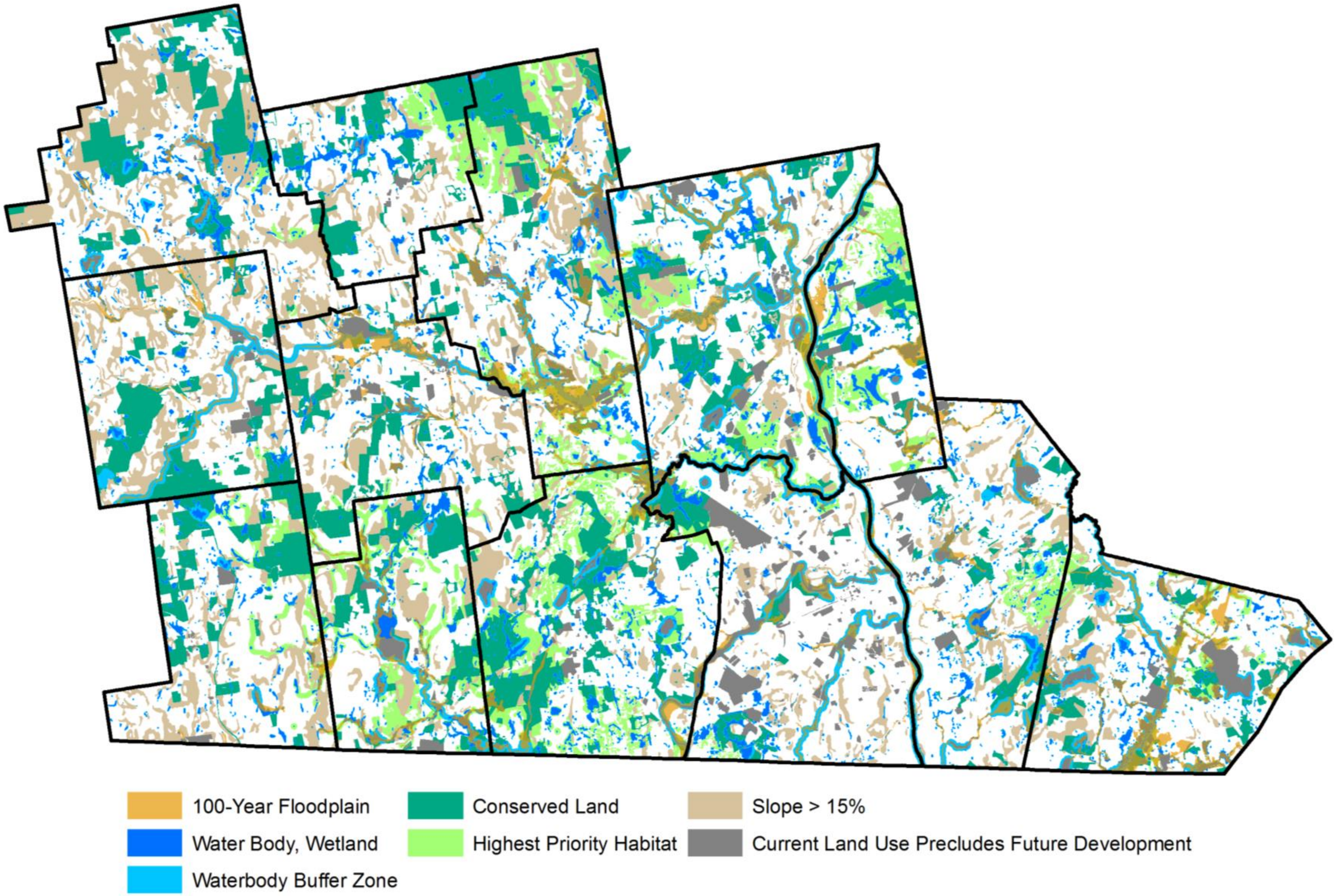
Source: NRPC GIS

Business-As-Usual – Constraints to Development



Source: NRPC GIS

Increased Local Environmental Protection Scenario – Constraints to Development



Source: NRPC GIS

Proximity Layers

The CommunityViz TimeScope function runs off a complete build-out. It assigns a date-stamp attribute to buildings in the build-out model indicating the year the structure will be built. Within the TimeScope module, proximity layers can be configured to influence prioritization of structure placement over time. In an existing build-out study areas close to features specified in a proximity layer are date-stamped before more distant areas. Buildings that are closest to ANY feature in the proximity layer are built first. For both residential and non-residential building types, this build-out assumes that new structures will be placed first in areas of closest proximity to existing structures.

Model Settings

The build-out model can be configured through numerous user-specified settings. For the purposes of description here, the model settings are divided-into three categories. In general, global settings affect the placement of structures regardless of their type or zoning district in which they are placed. Zoning district-specific settings describe 1) rules for allowed density within each district, 2) the characteristics of placed structures, and 3) the spatial placement rules for new buildings within parcels. Lastly, TimeScope settings describe both the rate and the order in which new buildings are placed on the map over time. All of these settings were held constant across the two scenarios to facilitate comparison of the results.

Global Settings

- Density transfer: applies to parcels that have unbuildable area. When density transfer is allowed, the allowance for the number of buildings on the lot remains unchanged despite the constrained area, which in effect transfers and compresses the density into the buildable areas of the parcel.

- Minimum Lot Size: minimum buildable lot size, in acres.

- Layout Pattern: the distribution of points within parcels during build-out. Choices include regular grid, along road, and random, which is the most representative of suburban-type development.

Global Settings

Global Setting	Value
Density Transfer Allowed?	No
Minimum Lot Size	0.1 AC
Layout Pattern	Random

Source: NRPC GIS

Zoning District-Specific Settings

- Residential Dwelling Units per Acre: describe the permitted (or projected or planned) density of residential units in each land-use polygon.

- Non-Residential Floor Area Ratio (FAR): total floor space, including all stories, of all buildings on a lot divided by the total buildable area of the lot.

- Efficiency Factor: an adjustment factor, expressed as a percentage, that influences building density downward from complete efficiency (100%) to no buildings placed (0%).

- Dwelling Units per new Residential Building: reflects the number of residential dwelling units allowed for each new building. Numbers greater than one indicate multi-family residences like apartments, duplexes, and condos.

- Floors: Number of stories allowed per structure.

- Minimum Separation Distance: the minimum offset, in feet, between the centroids of placed buildings.

- Setback: an approximation of the average lot-line setback distance to better estimate how many buildings can fit into a lot. Set-back is calculated from the edge of the polygon after constraints have been applied.

Zoning District-Specific Settings

	Rules for Allowed Density			New Building Characteristics		New Building Placement Rules	
Zoning by Primary or Highest Density Permitted Use	Residential Dwelling Units Per Acre	Non-Residential Floor Area Ratio (FAR)	Efficiency Factor (%)	Dwelling Units per New Residential Building	Floors	Minimum Separation Distance (feet)	Setback (feet)
Airport			80	0	1	60	80
Commercial		1	80	0	1	60	80
Commercial Highway		.5	80	0	1	60	80
Commercial Office		.5	80	0	1	60	80
Conservation			80	0	1	200	80
Industrial		2	80	0	1	60	80
Light Industrial		.5	80	0	1	60	80
Low Density Multi-Family	4		80	4	2	60	200
Manufactured Housing		1	80	1	2	60	80
Medium-High Density Multi-Family	8	.5	80	8	2	60	200
Mixed Use Commercial/Agriculture			80	1	2	60	80
Mixed Use Commercial/Residential	2	.2	80	2	2	60	80
Mixed Use Industrial/Commercial		.2	80	0	2	60	80
Mixed Use Retail Business/Residential	3	.2	80	1	2	60	80
Neighborhood-Village Commercial	2		80	1	2	60	80
Residential Sf < 1 Ac	2		80	1	2	60	250
Residential Sf 1 Ac	1		80	1	2	100	250
Residential Sf 2 Ac	.5		80	1	2	200	250
Rural Agricultural 3+ Ac	.5		80	1	2	200	250

Source: NRPC GIS

TimeScope Settings

- Build-Rate: the growth rate for new structures, per year, expressed as a percentage.
- Growth Function: specifies the mathematical curve that describes growth through time. Linear growth is constant over time whereas exponential growth is initially low but compounds over time.
- Build-Order: specifies the order in which new structures are placed on the map over time. Choices include random placement over the study area, or more realistically, proximity to other map feature types.

TimeScope Settings				
Structure Type	Build-Rate (%)	Growth Target at Year 2040	Growth Function	Build-Order
Residential	.80	13,131 Additional Buildings (~15,000 DUs)	Exponential	Proximity to existing residential structures
Non-Residential	.25	251 additional buildings	Exponential	Proximity to existing non-residential structures

Source: NRPC GIS

Derivation of Growth Targets

Great consideration was placed upon choosing appropriate build-rates for both residential and non-residential structures. Rather than specify build-rates *a priori,* NRPC ran the TimeScope iteratively with different build-rates in order to calibrate the total structure quantities against robust independent predictions for the Year 2040.

For this model, predicted development of new residential buildings was calibrated to the Population Headship Tenure Model as discussed in the Housing Chapter of NRPCs regional plan, which assumes that as the regional population ages there will be an associated decrease in household size. According to those independent projections the region will need at Year 2040 new housing stock to accommodate approximately 15,000 additional dwelling units. A model growth rate of .8 produced this desired result.

Growth of non-residential buildings was based upon an NRPC calculation which assumed the current distribution of workforce population by age cohort remains constant over time and can therefore be used to predict workforce participation at Year 2040 based on population projections for this same year. Using a factor that estimates the number of employees per building, we can then arrive at a target number of new commercial buildings, while considering existing buildings, to support this projected workforce.

Using this methodology, we estimate that the estimated additional labor force at Year 2040 is 1984 employees. Using a factor of 31 employees per building, derived from an NRPC analysis by address of geocoded NH Employment Security data, we arrive at a growth target of 251 new non-residential buildings for year 2040. This prediction equates to an average annualized growth rate of .25% and translates into about nine new buildings each year—an estimate which is anecdotally consistent with recent rates of non-residential building permits for our region.

Results

Year 2040

New Buildings

The CommunityViz TimeScope module is deterministic rather than probabilistic. In other words, the outputs are a direct reflection of the data inputs. TimeScope marks new buildings as built according to the specified rate discussed earlier. Therefore over the short term and before complete build-out, the model growth is identical under each scenario in terms of number of structures placed and rate of structure placement. Over time, as new buildings are stamped as built, the rate of new residential and non-residential structure placement also increases slightly, which reflects exponential growth as specified in the TimeScope configuration.

As described in the following table, new residential buildings develop initially at about 2,300 new residential structures per 5-year interval and increases to about 2,700 new residential structures per five-year interval.

Model Results: New Buildings

Time Frame	Number of New Buildings Placed (Five-Year Increments)	
	Residential	Non-Residential
2015-2019	2,318	40
2020-2024	2,413	40
2025-2029	2,510	40
2030-2034	2,613	40
2035-2039	2,720	45
Total (includes 2040)	**13,131**	**214**

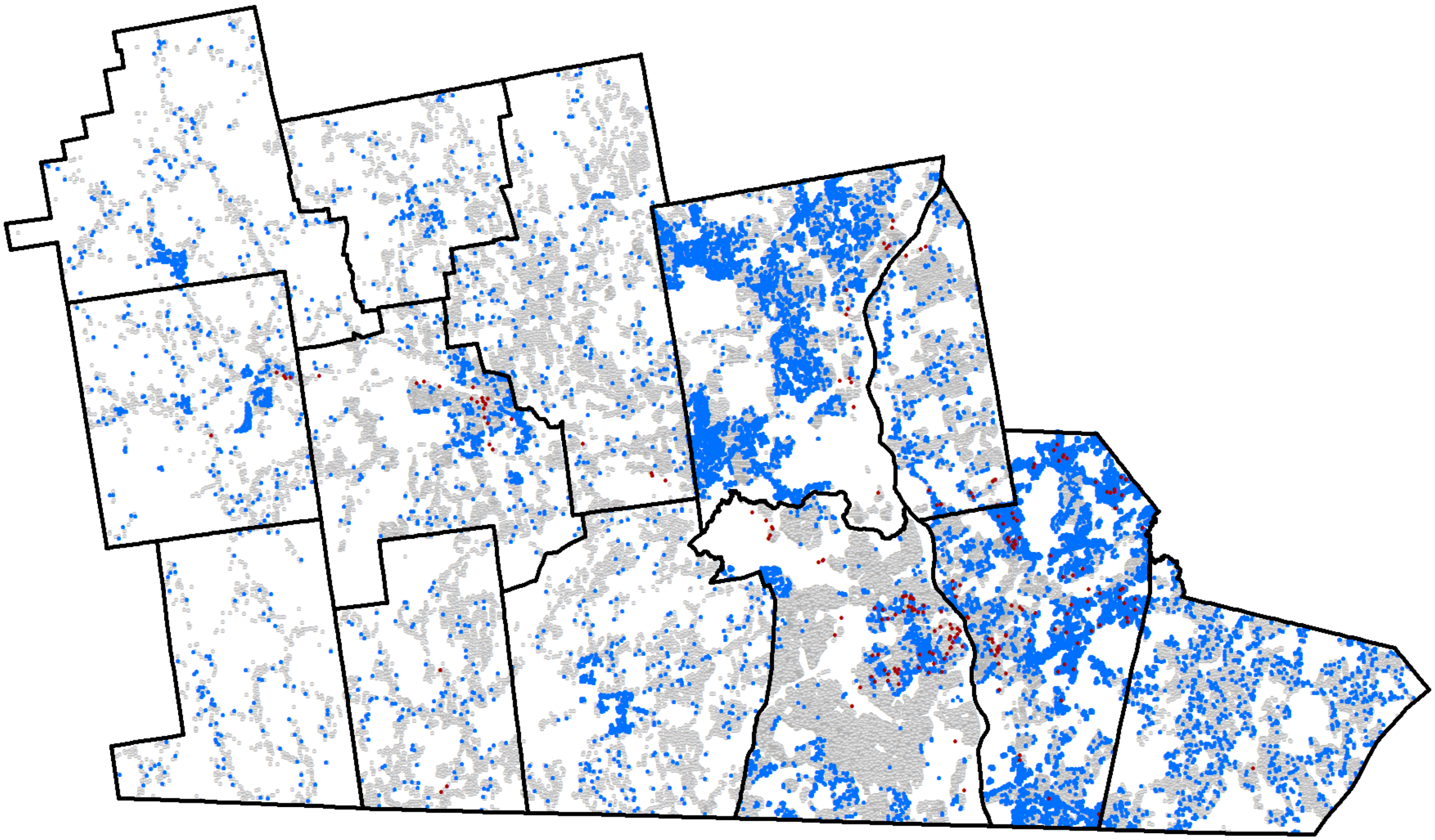
Source: NRPC GIS

For non-residential buildings, growth rate is consistent at 45 new buildings per five-year interval and increases slightly when nearing the 2040 mark at 46 new buildings per five-year interval.

The overall placement pattern of new structures at Year 2040 differs only subtly between the two scenarios. In fact, it is difficult to distinguish any significant effect of the additional constraints based upon map inspection alone. In other words, the additional environmental constraint layers do not affect the model's ability to site new residential and non-residential buildings near those that already exist, at least over the short term.

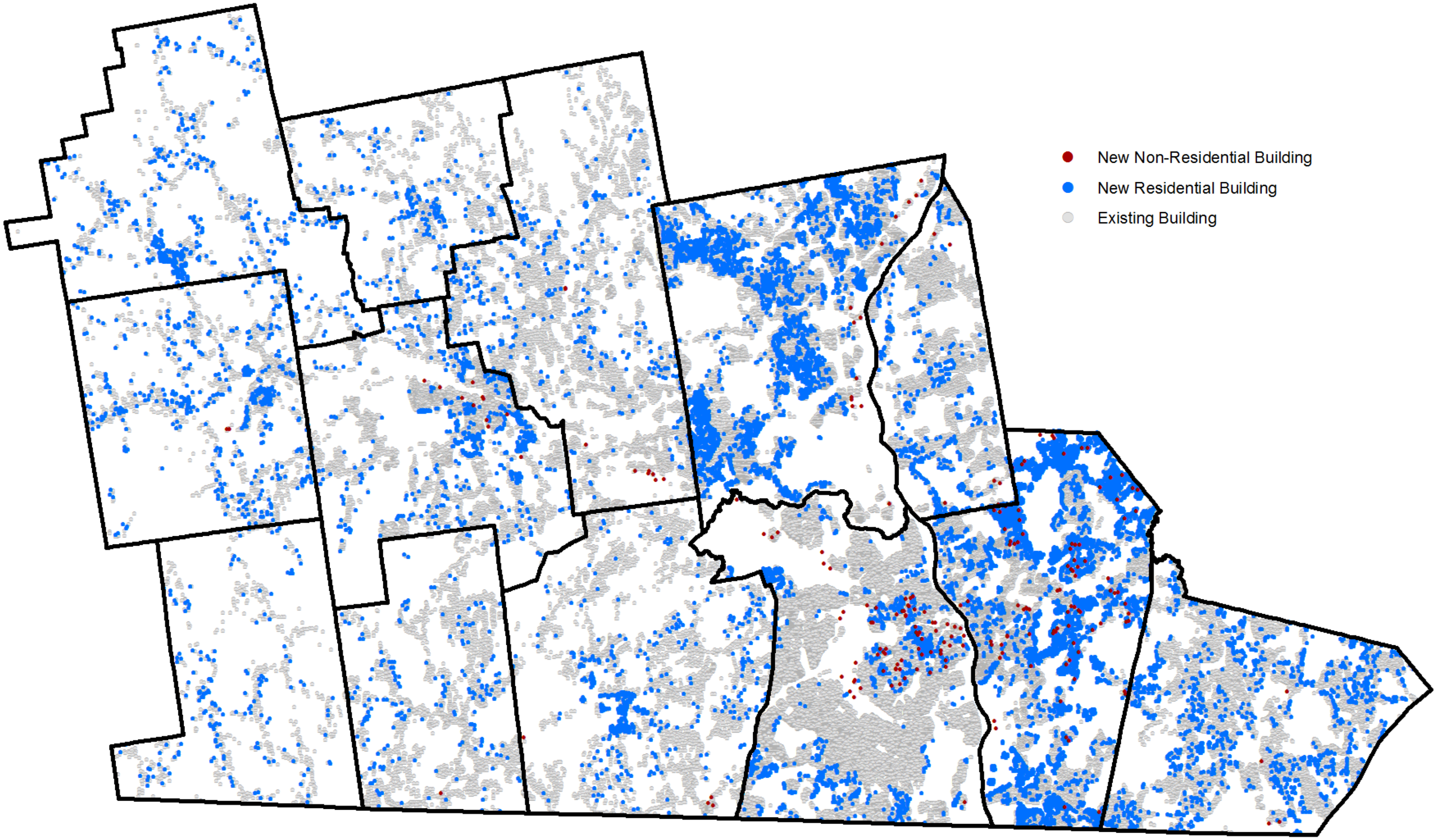
If we break down the results by zoning district, however, some patterns are revealed. In general, the additional environmental constraints cause the model to shift residential development likelihood from more compact development types such as mixed use and higher-density residential towards less dense residential types. Conversely, development from areas zoned for commercial purposes shifts into Industrial zones, where the allowed floor areas tend to be higher.

Scenario 1 – Business-As-Usual: Building at Year 2040



Source: NRPC GIS

Scenario 2 – Increased Local Environmental Protection: Buildings at Year 2040



Source: NRPC GIS

Detailed Comparison of Existing Buildings and Predicted New Buildings at 2040

Zoning by Primary or Highest Density Permitted Use	Existing Conditions (2013)			Scenario 1: Business as Usual - 2040			Scenario 2: Increased Local Environmental Protection - 2040			Difference in Scenario 2 Outcomes over Scenario 1		
	Total Number Of Buildings	Total Number of Dwelling Units	Non-Residential Floor Area (SF)	Additional Number Of Buildings	Additional Number of Dwelling Units	Additional Non-Residential Floor Area (SF)	Additional Number Of Buildings	Additional Number of Dwelling Units	Additional Non-Residential Floor Area (SF)	Delta Number Of Buildings	Delta Number of Dwelling Units	Delta Non-Residential Floor Area (SF)
Airport	108	152	528,000									
Commercial	1,819	2,864	10,164,000	69	0	2,136,412	51	0	1,382,253	-18	0	-754,159
Commercial Highway	230	497	1,752,000	4	0	51,388	6	0	62,729	2	0	11,341
Commercial Office	160	120	720,000	6	0	55,320	5	0	44,712	-1	0	-10,608
Conservation	12	2	48,000							0	0	0
Industrial	1,207	1,568	7,632,000	15	0	803,796	24	0	2,051,577	9	0	1,247,781
Light Industrial	294	681	2,808,000	3	0	22,852	7	0	214,227	4	0	191,375
Low Density Multi-Family	2,465	10,866	1,020,000	234	524	0	213	505	0	-21	-19	0
Manufactured Housing	91	118	0				2	0	229,774	2	0	229,774
Medium-High Density Multi-Family	2,966	5,672	540,000	324	1,002	255,322	301	1,059	222,136	-23	57	-33,186
Mixed Use Commercial/Agriculture	256	101	1,584,000							0	0	0
Mixed Use Commercial/Residential	213	192	840,000	146	229	86,062	141	226	5,169	-5	-3	-80,893
Mixed Use Industrial/Commercial	194	431	948,000	4	0	15,858	3	0	12,281	-1	0	-3,577
Mixed Use Retail Business/Residential	2,510	3,819	2,748,000	4,135	4,072	497,201	4,101	4,025	425,941	-34	-47	-71,260
Neighborhood-Village Commercial	1,972	2,489	1,332,000	633	633	0	583	583	0	-50	-50	0
Residential Sf < 1 Ac	10,649	11,722	1,800,000	4,602	4,602	0	3,989	3,989	0	-613	-613	0
Residential Sf 1 Ac	10,594	11,006	1,668,000	1,983	1,983	0	1,994	1,994	0	11	11	0
Residential Sf 2 Ac	16,357	15,854	3,852,000	967	967	0	1,589	1,589	0	622	622	0
Rural Agricultural 3+ Ac	13,180	13,768	1,296,000	220	220	0	336	336	0	116	116	0
TOTAL	65,277	81,922	41,280,000	13,345	14,232	3,924,211	13,345	14,306	4,650,799	0	74	726,588

Source: NRPC GIS

Impact Indicators

The comparative effects of regional development can also be better understood through the examination of quantitative measures referred to here as impact indicators. Impact indicators are a function of TimeScope; impacts of development are based on number projected number of people, structures, dwelling units, etc. The following is a cross-section of several impact indicators chosen to explore differences between the two scenarios examined.

Impact Indicators

Indicator	Units	Calculation Assumptions	Existing Impact (2014)	Added Impact of Scenario 1: Business-As-Usual (2040)	**Percentage Difference of Scenario 1 Impacts over Baseline**	Added Impact of Scenario 2: Increased Local Environmental Protection (2040)	**Percentage Difference of Scenario 2 Impacts over Baseline**
1. Residential Energy Use	MBTU/year	95 MBTU/DU/year	7,782,590	1,352,040	17.37%	1,359,070	17.46%
2. Residential Water Use	gallons/year	282 gal/DU/day	8,432,231,460	1,464,899,760	17.37%	1,472,516,580	17.46%
3. Commercial Jobs	Total	890 sq. ft./employee	46,382	4,409	9.51%	5,226	11.27%
4. Commercial Floor Area	total sq. ft.		41,280,000	3,924,211	9.51%	4,650,799	11.27%
5. Commercial Energy Use	MBTU/year	91,000 BTU/sq. ft.	3,756,480	357,103	9.51%	423,223	11.27%
6. Housing Near Community Center Areas	Total DUs	.5 mile radius from Community Center edge	22,051	1,531	6.94%	1,474	6.68%
7. Housing Near Parks	Total DUs	.5 mile radius from park edge	23,323	2,879	12.34%	2,757	11.82%

Source: NRPC GIS

Complete Build-out

The visual results of complete build-out are somewhat fantastical, but are presented here to emphasize the impact of the additional developmentally-constrained lands. Over this theoretical extreme timeline, the overall pattern of new development is much more clustered within a smaller amount of developable land, and the overall intensity of development is decreased by approximately 22%. Due to their natural landscape, particularly due to vast areas of priority habitat, some rural communities bear a disproportionate effect of environmentally-related constraints.

Key Model Limitations

Presentation of this model would not be complete without acknowledging the model's limitations. While it's notable that the model is calibrated against independent and robust measures, the task of extrapolating future conditions is complex and fraught with uncertainty. For example, residential growth here is based on a rather aggressive estimate of future housing unit need despite the prolonged housing downturn in our region's recent past. It's worth mentioning again that this analysis is not meant to be prediction of future conditions, especially in a quantitative sense.

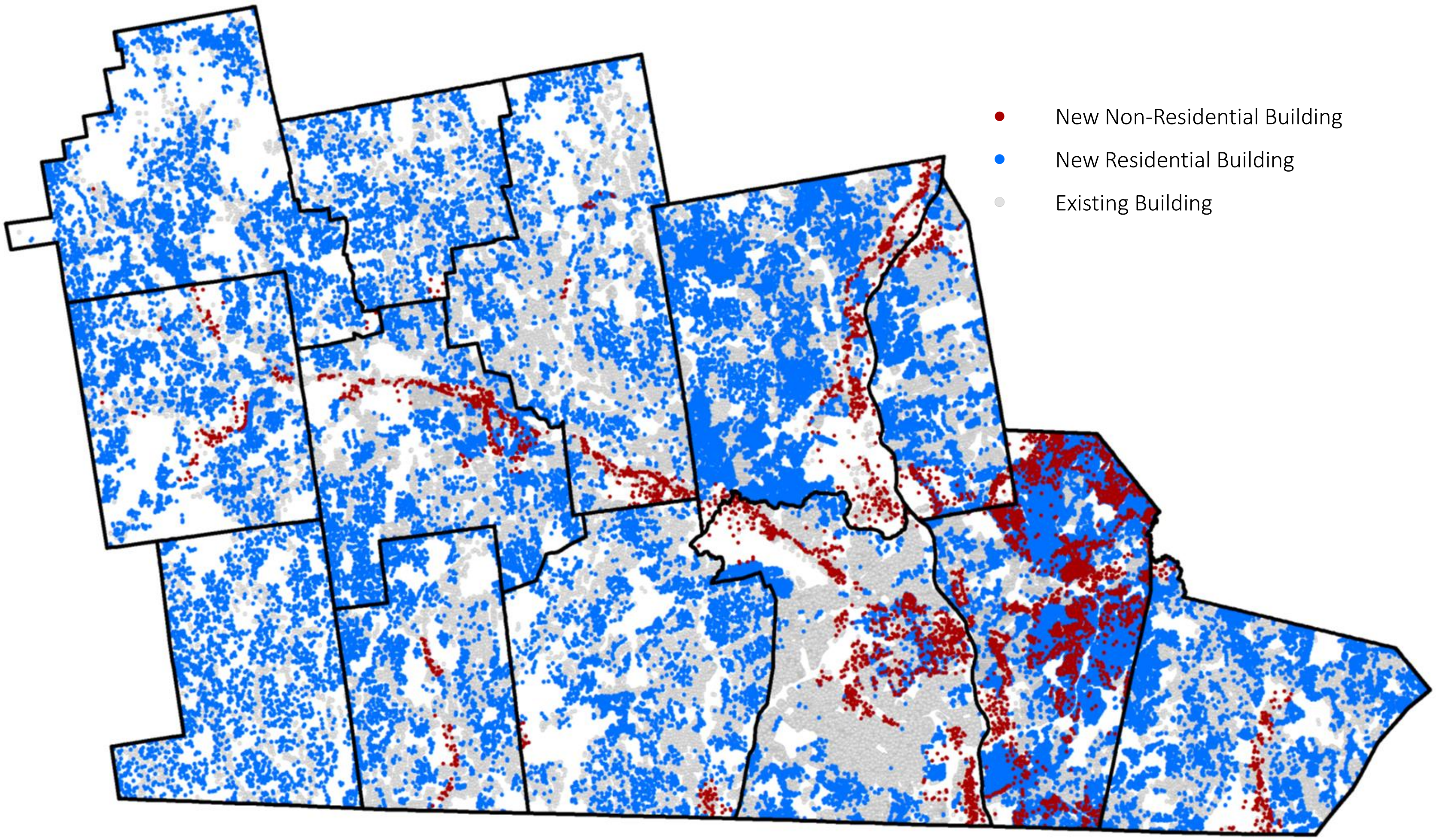
Build-out models rely on the sweeping assumption that current zoning remains static through time. The point is to examine the effect of existing regulations and to help visualize where zoning changes may need to be a priority. Zoning changes in one town might prompt changes in a neighboring town's allowed land uses; however these subtle effects through time, even if they could be predicted, could not be captured in the model.

Importantly, the model does not acknowledge the multitude of factors that predict suitability of land for development. The TimeScope assumption that new buildings will be placed near existing ones is certainly reasonable, but it's also vastly over-simplified. Factors such as availability of utilities, real estate costs, and even planned road construction are ignored here, but could be potential future refinements to this model using the Suitability Surface module in CommunityViz, subject to available data inputs.

Conclusions

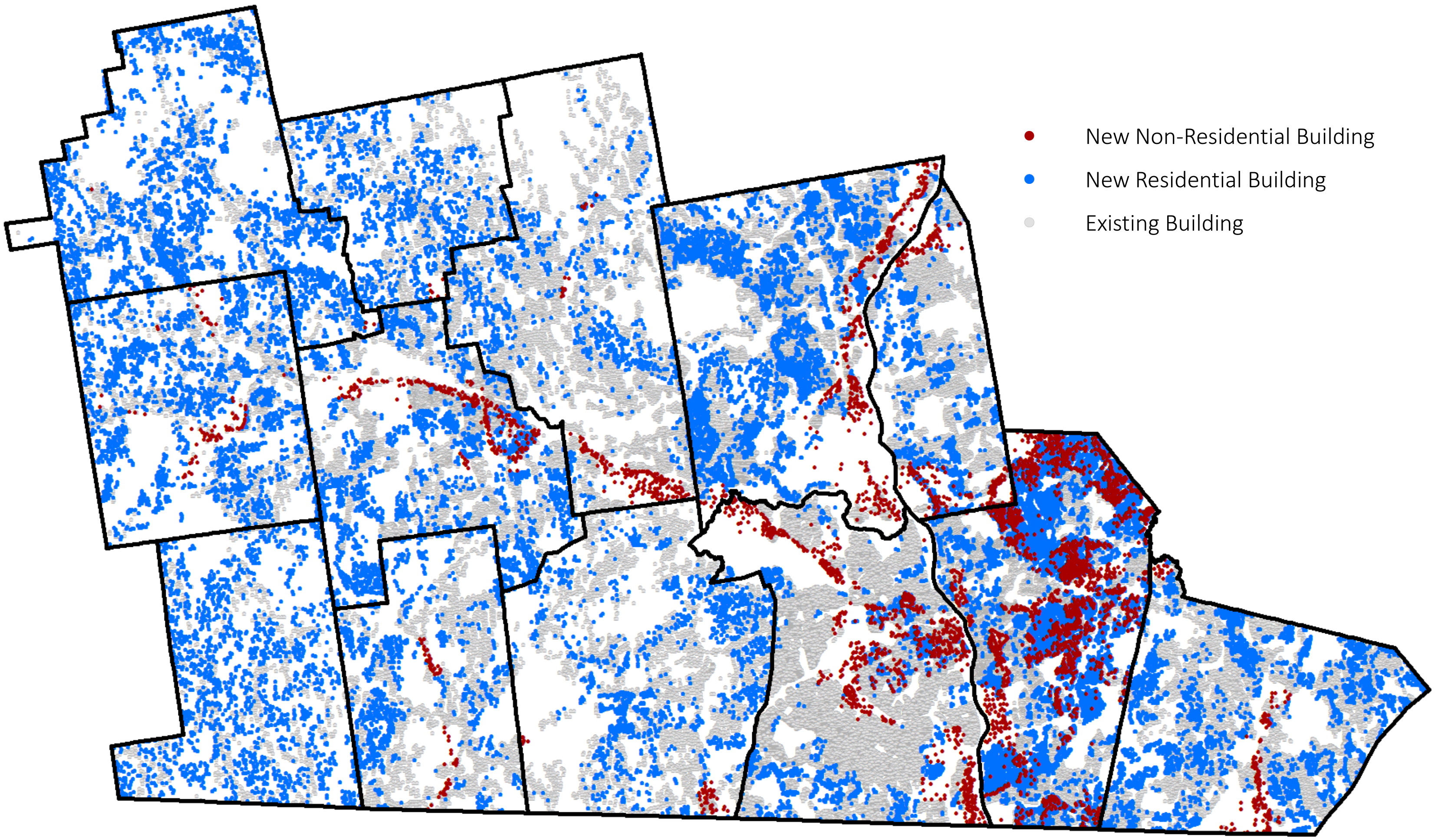
The model results pose a challenge to popular assumptions about the effects of increased land conservation. In this aggressive and idealized scenario, where a significant portion of land is earmarked because of environmental merit, there virtually no significant constraint on overall growth in the short term. Because much of our environmentally-sensitive lands are also in built-up areas of our region, new housing development shifts somewhat unexpectely towards less-dense residential areas and slightly further away from downtown community centers and existing parks. Lastly, non-commercial growth is slightly more likey to be sited in industrial zones associated with higher allowed floor area that is associated with additional energy use but also potentially more commercial jobs. Over longer timelines, the effects of additional land conservation curtail the quanity and placement of new development more profoundly and serve to amplify existing differences in land use patterns across our region. These findings should be considered in light of the model limitations discussed above and are meant to stimulate additional community conversations about appropriate land-use strategies on the local level.

Scenario 1 – Business-As-Usual: Buildings at Complete Build-out



Source: NRPC GIS

Scenario 2 – Increased Local Environmental Protection: Buildings at Complete Build-out



Source: NRPC GIS

Travel Demand Modelling

Overview

The Nashua Regional Planning Commission maintains a regional travel demand model for the general purposes of transportation planning and air quality analysis. To maintain and run the model, NRPC uses TransCad, a leading traffic modeling and GIS software package produced by the Caliper Corporation. The main inputs of employment and household data are summarized by Traffic Analysis Zone (TAZ). There are 2,034 TAZs in the NRPC model, including roughly 50 external zones. Each TAZ contains totals of households, residents and employees. Residents and employees are both assigned an industry classification, based on Census data. Industry classes include retail, manufacturing, professional services, finance and real estate, and others. In addition, each household is coded with the number of vehicles available to it, also derived from Census data. The NRPC travel demand model is the most complex model maintained by MPO staff in the state. The base year of the model was calibrated to traffic counts through 2013 and uses 2010 U.S. Census data and employment data from the State of New Hampshire. Additional details on the travel demand modelling scenarios are included in the Transportation Chapter.

Methodology

The Model uses a traditional 3-step modeling process: trip generation, trip distribution, and traffic assignment. A 4th step, mode choice, is not used by the NRPC model as means of travel other than the automobile represent an extremely small fraction of the total traffic on the regional road network.

1. **Trip Generation**: the model uses ITE trip generation rates and origin destination surveys to determine how many trips of various purposes will be produced by each TAZ, based on the associated socioeconomic data.

2. **Trip Distribution**: the model takes the expected number of trips produced and attracted by each zone and matches them with destinations. NRPC uses a "gravity model" to distribute the trips, meaning that a trip is more likely to travel to in a nearby zone that matches the trip purpose. The model uses average journey to work time to determine the appropriate percentage of trips distributed between the zones. For example, if survey and census data shows that 60% of all work trips take between 20 and 30 minutes, the model will attempt to match that ratio.

3. **Traffic Assignment**: Once the model knows where all the trips begin and end, it can find the paths on which to assign them. The model begins by sending every trip via the shortest path possible (in terms of time). Then, because of capacity constraints, it uses an iterative process to reassign certain trips along alternate routes.

The three step process results in future traffic forecasts are based on anticipated future land use patterns, population projections, projected housing units, employment, and school enrollment. The projected growth in land use was made in consultation with local planners from the Nashua Region, and through a review of present and proposed zoning, physical constraints, and assumptions made regarding future area-wide growth rates.

Model networks were developed for the no build condition and two future or build conditions for the years 2025 and 2040. The build condition networks include planned projects that have been identified as long term needs for the region through past planning efforts. These projects are in the planning and project development phases and may not have environmental permits or secured funding at this time.

No-Build Scenario

Under the "no-build" scenario the road network includes only those improvements that are known to be under construction today and assured to be completed before 2025. The 2025 and 2040 no build networks include the Broad Street Parkway in Nashua and minor safety capacity improvements on NH 101A.

Comparing the forecast traffic volume in 2040 to the 2010 base year traffic provides a snapshot of where and how traffic conditions may change if we do not make any capacity improvements to the road network. In general, traffic volume is forecast to increase on all major corridors by the 2040 planning horizon. The travel demand model forecasts an increase in the total number of vehicle trips of 8.6% with 23 miles of the road network exceeding capacity compared to 18 miles in the 2010 base year.

Analysis of this "do nothing" scenario suggests traffic on the F.E. Everett Turnpike will increase by up to 10% between the state line and Exit 10. North of Exit 10 traffic growth is expected to be in the range of 10% to 25%. The increase in traffic south of Exit 8 in Nashua can be accommodated by the current alignment and geometry of the roadway. North of Exit 8 to the Bedford toll plaza the F.E. Everett Turnpike is constrained by two bottlenecks where the cross section is reduced from three to two lanes. This geometric constraint combined with a forecast increase in daily volume of 16% makes the corridor a congestion and safety concern now and at the 2040 planning horizon. NH 3A in Litchfield and Hudson is also forecast to experience an increase in traffic by 2040. This is primarily due to the forecast growth in Hudson.

East west travel will continue to be constrained by limited crossings of the Merrimack River. With higher than average growth expected in Hudson, traffic volume on the Taylor Falls/ Veterans Memorial Bridges is expected to remain high. The Sagamore Bridge is also expected to carry additional traffic in the 2040 "do nothing" scenario. NH 101A west of the F.E. Everett Turnpike to the Nashua border should expect minimal growth in traffic volume through 2040 when compared to the 2010 base year. This is due the constrained nature if the corridor and the development of additional retail destinations such as the Merrimack Outlet Mall. East of the Turnpike through Nashua the corridor continues to be heavily travel with additional volume expected as more trips destined for Downtown Nashua and Hudson use Amherst Street and the Taylor Falls/Veterans Memorial Bridge. Looking further west along the NH 101A corridor travel demand is expected to increase with 24 hour traffic volume forecast to be up by as much as 10%. Forecast growth in Hudson suggests additional pressure will be placed upon the Amherst Street, Library Hill, Bridge Street and East Hollis Streets in Nashua as well as the Taylor Falls/Veterans Memorial Bridges. In Hudson, NH 111 and the Wason Road and Kimball Hill Road corridor are expected to see traffic volume increase by more than 25%. The NH101A and NH 101corridors are all forecast to remain congested and exceed capacity. The NH 101A from the Amherst Milford line east to Continental Blvd is expected to exceed its capacity through 2040. The NH 101 by-pass and portions of the corridor east of NH 122 are expected to exceed capacity under a do nothing scenario.

Build Scenario

To address the chronic east west travel concerns, safety and forecast congestion in the region a number of projects are proposed for future implementation in a "build scenario".

The NH 101 and NH 101A corridors work as a system and capacity improvements to either have mutual benefits. Both corridors provide access to the westerns portion the region. The proposed widening of the NH 101 corridor from the western end of the by-pass through Bedford will allow the corridor to operate within its capacity through 2040. This project will reduce traffic through Milford downtown and on portions of NH 101A between each end of the by-pass. To the east through Amherst the NH 101 Corridor will continue operate at or below capacity through 2040 with the proposed improvements.

The traffic volumes on the eastern end of NH 101A between the Nashua border and the F.E. Everett Turnpike are forecast to drop by about 2% by the 2040 horizon year compared to the "do nothing" scenario. This forecast "leveling of traffic volume" is influenced by a number of factors in the build scenario. This portion of the corridor is already approaching capacity and experiences recurrent congestion in the peak hours. The land along this portion of the corridor is largely built and the opportunity for additional large traffic generators is limited. The development and expansion of the Merrimack Premium Outlets provides alternative retail options for the residents of the western part of the region and draws traffic onto Continental Boulevard in Merrimack to access the outlets. Finally, improvement to NH 101 result in shorter trips east across the region and have a small impact on future volumes on NH 101A. All of these factors serve to limit traffic growth along this portion of NH 101A. The proposed widening of the NH 101A corridor from Celina Avenue to Somerset Parkway under the build scenario will reduce the recurring congestion experienced today through the planning horizon year.

East of the F.E. Everett Turnpike, NH101A (Amherst Street) experiences significant reductions in traffic under the build scenario. The completion of the Broad Street Parkway and the proposed construction of a Northern crossing of the Merrimack River serve to reduce traffic volume on Amherst Street by up to 50% in 2040 when compared to the "do nothing" scenario. The combination of the Broad Street Parkway and Northern Crossing of the Merrimack River serve to reduce future traffic volume throughout much of Downtown Nashua. Similarly in Hudson, the Northern Crossing of the Merrimack River reduces traffic on NH 3A, NH 111, NH 102 and the cut through routes of Wason Road and Kimball Hill Road. Traffic is also forecast to drop on the Sagamore with the construction of a northern river crossing.

The construction of the Northern Merrimack River Crossing by 2040 will also impact traffic volumes on the F.E. Everett Turnpike through Merrimack. Traffic currently using the Airport Access Road (Ray Wiezorick Blvd) is drawn south to the new crossing of the Merrimack River and redistributed across the modeled network. This results in the volumes on the F.E. Everett Turnpike remaining within a few percent of the 2040 "do nothing" scenario.

The build scenario also includes the construction of an Exit 36 Southbound off ramp just south of the New Hampshire border in Tyngsborough Massachusetts. The ramp system terminates/originates at the signalized intersection with Middlesex Road and the Pheasant Lane Mall. The current configuration of the interchange provides for all movements except for southbound Route 3 traffic. The construction of the Exit 36S off ramp will result in a substantial reduction in traffic volume on Spit Brook Road east of the F.E. Everett Turnpike and Daniel Webster Highway, by providing efficient and direct access to the retail and commercial land uses along southern D. W. Highway and the northern reaches of Middlesex Road. The 24- hour traffic volumes are forecast to decrease by an average of 10 percent on Spit Brook Road east of the F.E. Everett Turnpike, and by an average of 20 percent on D.W. Highway south of Spit Brook Road when compared to the 2040 do nothing Scenario.

REMI Econometric Modelling

Overview

The health of the Nashua Region's economy is very reliant on its manufacturing sector, in which many high-paying, highly skilled positions are concentrated. Approximately 18% of the region's labor force works in manufacturing, the highest employment share of any region in New Hampshire. In 2012, the average weekly wage of manufacturing workers in the NRPC Region was $1,545 or more than $440 more than the average wage among all industries in the region. Additionally, manufacturing workers in the region tend to be older than their peers in other industries; among workers age 55-64, 26.5 percent work in manufacturing, relative to 19 percent among all workers.

NH Employment Security conducted an analysis for NRPC using the Economic and Labor Market Information Bureau's New Hampshire Econometric Model – a REMI Policy Insight +® model. The selected scenarios evaluated the impact of an aging workforce and the difficulty in attracting younger employees specifically in the manufacturing sector on the region. The question posed in this scenario is "what will happen to the region if the high tech companies in the region are not able to attract younger workers to replace the current experienced workers?"

Inputs

All manufacturing workers age 55-64 (in the year 2012) are gradually phased out of the regional workforce between 2014 and 2023 amounting to a cumulative job loss of 3,761 manufacturing jobs in 2023. Manufacturing job losses were distributed among 60 detailed manufacturing industries based on NHES forecasted employment shares for 2023. In the second scenario, all manufacturing age 55-64 (in the year 2012) are assumed to retire, but remain living in the region.

Assumptions

The simulation assumes that all manufacturing workers under the age of 55 in the year 2012 will remain employed in manufacturing and remain in the region. No additional manufacturing jobs are added over the course of the simulation. This simulation is not a worst case scenario, because its focus and any negative assumptions are limited to the age55-64 cohort. Additionally is assumes that all retiring manufacturing workers will remain in the region. However, it is clearly a somewhat pessimistic simulation in its assumption that all manufacturing workers over 55 will retire and employers will be entirely unable to replace such workers.

Results

- A loss of 3,761 manufacturing jobs over 10 years results in a total regional job loss of 7,516. This underscores the multiplier effect of manufacturing jobs in the region. Because manufacturing is a high-paying industry that demands a support system - including supply chain, transportation, logistics and technical support – it has a higher multiplier effect than other industries. Thus, in the Nashua Region, a loss of 1 manufacturing job results in a total job loss of 2 jobs.

- Indirect job losses would be concentrated in construction (-771), state and local government (-565), retail trade (-450), wholesale trade (-419) and healthcare (-318)

- GDP negative impact of $1 billion below 2023 baseline projection, representing 3.4 percent of Hillsborough County's total GDP (since the NRPC Region represent only approximately 53% of Hillsborough County's population, the impact would be more severe in NRPC Region)

- Population loss of 4,280 compared to 2023 baselines

- Even if all manufacturing retirees remain living in the region post-retirement, the economic impact to the region would remain severe. Though retirees will generate some additional employment and economic output through their demand for services, this additional output pales in comparison to output generated by manufacturing employment. The following figures represent the net economic loss to the region by 2023 assuming 3,761 manufacturing workers retire, are not replaced, and remain living in the region:
    - Net employment loss of 6,662
    - Net GDP loss of $952.1 million (in 2005 dollars)
    - Net population loss of 1,111

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Conclusions

This simulation focuses directly on the aging of the region's population, a trend with great significance to all chapters of the regional plan. It shows that the addition of retirees to the region only slightly buffer the negative consequences of a declining regional workforce. Job losses and reductions in economic output from job losses severely outnumber the positive economic impact of retirees in the region.

Though not directly measured, it can be inferred that housing values would be stagnant or drop should the region's economy suffer due to a loss of manufacturing employment. Additionally, in a region of many large single family homes, sellers would likely have continuing difficulty selling inventory in an increasingly retirement-focused market. This might force planners and policymakers to adopt creative solutions in re-orienting and re-marketing single-family homes set on large lots. Transportation planners would likely have to shift focus from commuting trips to those associated with an aging population.

Climate Change Modelling

Overview

Weather refers to the hourly and daily changes in local conditions, such as temperature, precipitation, humidity, and wind. Climate is the long-term average of these indicators. The Southern New Hampshire Climate Assessment provides decision-relevant information as municipalities and the region face challenging choices regarding future investments. The report indicates a rise in temperature and precipitation will be the biggest issue for the Nashua region in the next century. Historical trends reveal a 2°F increase in temperature and an annual precipitation increase of 8-22% since 1970. Full results and methodologies can be found in the Southern New Hampshire Climate Assessment Report.

Inputs

The climate assessment uses regional historical data gathered from meteorological stations and creates future scenarios based on potential future carbon emissions. Monthly temperature and precipitation observations were used for the time period 1895-2012 for three stations across southern New Hampshire: Keene, Durham and Hanover. Daily temperature and precipitation observations are available for from the Global Historical Climatology Network (GHCN) at the Milford, Nashua and Hudson meteorological stations. The data produced is subject to quality assurance and quality control and has been homogenized. Data was used from these stations only if near complete records exist for the time period 1960-2012. Data available before 1960 was limited for New Hampshire thus not used. Milford contained adequate historical precipitation data but was insufficient for future projection modeling. The station in Hudson and two stations in Nashua contained sufficient data sets for precipitation and temperature modeling thus they were the only stations which were suitable for future projections.

Historic Trends

- Historical temperature trends have been increasing across the region for the past 100 years with the largest increases happening in the last 40 years during winter.

- From 1960-2012 there was an average of 154 days less than 32°F and has been declining by 5 days per decade across the region.

- The Nashua region has seen an increase in average precipitation with a threefold increase over in the past 40 years.

- Nashua alone experienced 14 extreme precipitation events during 2003-2012, a 50% increase since 1993.

- Milford experienced eight extreme precipitation events during 2003-2012, a 33% increase since 1993.

- Milford has a significant decreasing trend of -6.1 days per decade of annual mean snow covered days.

Assumptions

Global Climate Modeling (GCM) provides the basis for potential future global high and low emissions. In this report, the emissions scenarios are drawn from the original modeling scenarios created by the Intergovernmental Panel on Climate Change (IPCC) called Special Report on Emissions Scenarios (SRES). The high and low emissions scenarios are referred to as SRES A1fi (high) and B1 (low). The GCMs produce geographic grid based projections of temperature, precipitation and other climate variables at daily and monthly scales. Typical GCMs produce results on a large scale and cannot accurately capture the fine-scale changes experienced on a local level. Statistical downscaling or regional climate modeling captures the historical relationship between large-scale weather features and local climate. These are translated into future projections for the individual weather stations which is the case in this report.

Results

The difference between the two scenario's occurs with the lower emission's scenario incorporates improvements in energy efficiency, combined with the development of renewable energy , reduced global emissions of heat-trapping gases below 1990 levels by the end of the 21st century. In the higher emissions scenario, fossil fuels are assumed to remain a primary energy resource and emissions of heat-trapping gases grow to three times those of today by the end of the century. Depending on the emission's scenario, mid-century annual average temperatures may increase by 3 to 5°F under a low emissions scenario and 4 to 8 °F under a high emissions scenario for the Nashua region. Both scenarios are probable for the region but the higher emissions scenario will have more drastic effects on precipitation and temperature especially after mid-century.

Future Trends

- The minimum winter temperatures could increase by 8.5oF and up to 23°F under a high emissions scenario.
- The region could experience temperature maximum of 104°F on the hottest day of the year under a high emissions scenario compared to 95°F currently.
- Annual precipitation in the region is projected to increase 17 to 20% under both emissions scenarios.
- In the latter half of the century, under a high emissions scenario, the region could experience up to an 8 inch increase in precipitation.
- By the end of the century, snow-covered days are projected to decrease by 20% under the low emissions scenario or 50 % under the higher emissions scenario for the region.
- The region experiences 11 extreme precipitation events per year which could increase to 13 events under a low emissions scenario and 14 under a high emissions scenario.

Conclusions

The Southern Climate Assessment demonstrates the largest climate issues for the Nashua region are temperature and precipitation. The number of extreme precipitation events has increased by 50% in some areas over the last 20 years and is expected to continue. The conversion of snow to rain from warmer temperatures has increased the amount of extreme precipitation events. December temperatures have increase the most compared to other times of the year which has caused a decrease in the annual number of snow covered days. Extreme temperatures are increasing across the region and will continue to rise into the middle of the century. Under a high emissions scenario, communities will experience warmer summer time temperatures most notably at night.

Communities will need to prepare for more extreme precipitation events and higher temperatures across the region. Areas prone to flooding will be at a higher risk with the increase precipitation. Repetitive flooding events can lead to higher flood insurance rates and more repair costs over time. Comparatively, the rise in temperatures could cause an increase in heat stress for vulnerable populations who cannot afford air conditioning.

Appendix I: Municipal Population Projection Tables

Amherst

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	664	552	490	518	559	589	628	628
5 to 9	929	742	564	513	565	606	665	704
10 to 14	1,136	991	754	589	563	614	686	745
15 to 19	931	878	987	747	576	550	594	666
20 to 24	236	397	848	928	635	464	370	414
25 to 29	288	338	395	843	921	629	456	362
30 to 34	533	401	367	454	959	1,037	821	649
35 to 39	938	559	420	406	532	1,035	1,162	947
40 to 44	1,205	869	565	435	440	565	1,086	1,213
45 to 49	1,063	1,126	862	561	435	440	566	1,083
50 to 54	944	1,196	1,104	838	531	406	396	521
55 to 59	678	949	1,164	1,068	795	494	356	346
60 to 64	440	801	914	1,118	1,014	749	444	311
65 to 69	287	581	756	858	1,041	942	676	386
70 to 74	218	371	532	691	779	948	850	605
75 to 79	136	215	321	460	597	675	820	735
80 to 84	88	145	171	256	367	476	541	656
85+	55	90	134	169	241	344	461	550
TOTAL	**10,769**	**11,201**	**11,346**	**11,452**	**11,550**	**11,563**	**11,579**	**11,521**

Brookline

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	385	280	252	274	287	298	311	318
5 to 9	437	476	302	319	318	331	341	353
10 to 14	406	515	492	350	351	350	361	371
15 to 19	260	408	511	480	342	343	342	354
20 to 24	87	170	378	423	422	284	287	286
25 to 29	122	168	159	344	400	399	262	265
30 to 34	321	205	182	201	372	428	425	289
35 to 39	560	322	229	255	250	419	473	470
40 to 44	490	467	338	282	290	284	451	505
45 to 49	347	624	472	362	297	305	299	464
50 to 54	255	502	618	473	362	298	306	300
55 to 59	191	309	488	595	457	349	286	293
60 to 64	111	216	296	463	570	437	332	270
65 to 69	77	143	202	269	432	535	408	308
70 to 74	42	81	129	180	244	394	489	372
75 to 79	50	57	70	110	155	210	340	424
80 to 84	18	23	44	53	85	122	164	267
85+	22	25	24	36	47	73	108	149
TOTAL	**4,181**	**4,991**	**5,185**	**5,470**	**5,681**	**5,857**	**5,984**	**6,060**

Hollis

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	459	296	267	317	353	376	389	381
5 to 9	634	475	354	385	423	458	499	513
10 to 14	668	695	535	477	495	533	587	628
15 to 19	443	629	680	505	450	468	501	556
20 to 24	143	237	492	402	257	201	177	211
25 to 29	148	177	231	481	392	247	190	167
30 to 34	362	190	323	529	747	659	560	503
35 to 39	726	319	287	521	706	923	865	767
40 to 44	764	583	361	374	598	781	1,010	953
45 to 49	679	933	583	367	380	601	784	1,011
50 to 54	650	808	892	518	312	324	533	714
55 to 59	484	690	759	809	450	247	249	453
60 to 64	276	580	643	684	737	389	185	187
65 to 69	197	422	524	555	600	650	312	117
70 to 74	149	259	374	455	486	528	570	259
75 to 79	103	166	221	318	390	417	452	489
80 to 84	63	122	137	186	261	319	342	371
85+	67	103	127	151	193	259	327	369
TOTAL	**7,015**	**7,684**	**7,790**	**8,034**	**8,226**	**8,380**	**8,534**	**8,648**

Hudson

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	1,704	1,441	1,423	1,383	1,370	1,379	1,430	1,439
5 to 9	1,882	1,648	1,456	1,454	1,430	1,418	1,475	1,527
10 to 14	1,880	1,837	1,664	1,489	1,505	1,481	1,519	1,577
15 to 19	1,469	1,772	1,831	1,654	1,476	1,491	1,455	1,493
20 to 24	972	1,204	1,730	1,750	1,535	1,357	1,258	1,222
25 to 29	1,299	1,249	1,198	1,721	1,739	1,526	1,345	1,246
30 to 34	2,071	1,439	1,285	1,277	1,838	1,857	1,768	1,588
35 to 39	2,459	1,799	1,460	1,335	1,354	1,912	2,014	1,926
40 to 44	2,276	2,216	1,800	1,475	1,363	1,382	1,974	2,075
45 to 49	1,656	2,319	2,196	1,785	1,466	1,354	1,377	1,963
50 to 54	1,557	2,133	2,278	2,149	1,737	1,422	1,288	1,310
55 to 59	1,120	1,512	2,079	2,212	2,077	1,673	1,338	1,207
60 to 64	774	1,305	1,458	1,999	2,122	1,991	1,578	1,254
65 to 69	588	872	1,234	1,371	1,878	1,996	1,848	1,455
70 to 74	463	627	800	1,129	1,250	1,716	1,815	1,679
75 to 79	352	447	545	694	979	1,082	1,485	1,573
80 to 84	209	328	355	435	553	778	863	1,180
85+	197	319	350	380	447	553	749	881
TOTAL	**22,928**	**24,467**	**25,141**	**25,692**	**26,119**	**26,369**	**26,581**	**26,596**

Litchfield

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	682	442	429	435	460	484	517	522
5 to 9	754	634	462	469	498	524	581	614
10 to 14	690	740	655	505	536	565	626	683
15 to 19	481	679	734	644	488	520	540	600
20 to 24	248	385	630	636	492	337	290	310
25 to 29	389	300	382	625	628	485	328	281
30 to 34	729	364	350	485	785	788	731	574
35 to 39	910	573	396	418	592	890	950	893
40 to 44	754	813	585	425	464	636	958	1,018
45 to 49	581	878	807	583	427	465	639	957
50 to 54	472	710	856	776	544	390	412	582
55 to 59	253	541	684	815	724	498	328	350
60 to 64	156	518	515	644	761	673	440	275
65 to 69	95	296	483	471	582	693	594	372
70 to 74	79	185	268	435	418	520	615	524
75 to 79	44	98	159	231	375	360	447	529
80 to 84	29	74	79	130	188	302	294	363
85+	14	41	68	83	125	181	283	317
TOTAL	**7,360**	**8,271**	**8,541**	**8,808**	**9,087**	**9,312**	**9,571**	**9,764**

Lyndeborough

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	97	67	74	80	82	82	78	75
5 to 9	127	99	79	98	94	95	91	87
10 to 14	119	109	111	103	111	107	104	100
15 to 19	113	109	106	105	100	108	105	102
20 to 24	70	66	81	50	74	69	87	84
25 to 29	80	77	65	79	49	73	68	86
30 to 34	109	81	106	125	112	82	95	90
35 to 39	133	99	100	146	147	134	97	109
40 to 44	195	137	107	118	155	156	140	103
45 to 49	165	187	137	108	118	155	155	140
50 to 54	103	180	179	123	100	110	148	148
55 to 59	104	146	170	162	114	91	103	140
60 to 64	60	107	136	154	151	104	84	95
65 to 69	27	105	96	118	140	137	95	75
70 to 74	24	55	94	83	106	126	124	86
75 to 79	24	31	47	80	71	92	109	107
80 to 84	23	17	26	39	64	58	73	87
85+	12	11	17	26	38	59	63	75
TOTAL	**1,585**	**1,683**	**1,730**	**1,798**	**1,826**	**1,837**	**1,819**	**1,790**

Mason

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	65	58	58	65	63	62	62	62
5 to 9	88	117	63	69	72	69	67	66
10 to 14	77	73	118	65	70	73	70	68
15 to 19	73	78	70	112	62	66	70	68
20 to 24	39	52	71	57	105	54	61	65
25 to 29	44	53	47	62	52	99	50	57
30 to 34	73	77	62	66	72	63	106	58
35 to 39	118	89	88	84	79	85	72	115
40 to 44	143	100	96	102	92	86	91	77
45 to 49	130	154	109	115	112	103	94	98
50 to 54	101	165	158	121	121	118	107	98
55 to 59	56	128	163	157	119	120	117	106
60 to 64	43	104	126	161	154	118	117	115
65 to 69	39	51	99	119	153	147	112	112
70 to 74	24	46	49	96	112	144	137	105
75 to 79	16	21	37	37	80	94	123	117
80 to 84	9	9	15	26	27	61	72	96
85+	9	7	7	10	19	24	49	66
TOTAL	**1,147**	**1,382**	**1,437**	**1,524**	**1,565**	**1,587**	**1,577**	**1,548**

Merrimack

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	1,731	1,368	1,319	1,265	1,263	1,235	1,343	1,356
5 to 9	2,107	1,716	1,421	1,331	1,332	1,329	1,495	1,603
10 to 14	2,250	1,878	1,754	1,430	1,387	1,387	1,544	1,710
15 to 19	1,753	1,807	1,795	1,732	1,398	1,355	1,268	1,426
20 to 24	902	1,185	1,514	1,718	1,547	1,215	656	570
25 to 29	1,379	1,260	1,050	1,476	1,646	1,476	955	398
30 to 34	1,938	1,469	1,413	1,085	1,612	1,782	2,021	1,502
35 to 39	2,618	1,791	1,579	1,436	1,192	1,716	2,208	2,446
40 to 44	2,646	2,049	1,813	1,578	1,479	1,237	1,908	2,396
45 to 49	1,989	2,525	2,016	1,793	1,581	1,484	1,296	1,960
50 to 54	1,930	2,399	2,438	1,974	1,758	1,550	1,428	1,243
55 to 59	1,374	1,757	2,304	2,375	1,928	1,718	1,503	1,383
60 to 64	901	1,652	1,654	2,220	2,295	1,861	1,638	1,430
65 to 69	558	1,048	1,514	1,560	2,098	2,170	1,717	1,506
70 to 74	422	668	933	1,387	1,442	1,936	2,017	1,599
75 to 79	306	410	571	809	1,228	1,275	1,763	1,836
80 to 84	210	304	327	452	669	1,001	1,126	1,510
85+	105	208	281	329	456	653	1,022	1,248
TOTAL	**25,119**	**25,494**	**25,696**	**25,949**	**26,312**	**26,380**	**26,908**	**27,120**

Milford

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	984	898	878	876	888	905	927	911
5 to 9	1,072	1,068	914	943	916	962	1,014	954
10 to 14	1,103	1,113	1,091	1,008	1,001	1,023	1,121	1,054
15 to 19	893	1,057	1,109	1,079	1,000	986	1,002	1,115
20 to 24	595	810	1,002	895	947	759	630	911
25 to 29	946	851	800	971	875	913	710	616
30 to 34	1,145	899	903	1,021	1,103	1,125	1,284	801
35 to 39	1,339	1,107	925	1,021	1,090	1,236	1,324	1,329
40 to 44	1,246	1,233	1,117	988	1,056	1,161	1,343	1,344
45 to 49	995	1,377	1,232	1,151	1,006	1,097	1,224	1,349
50 to 54	865	1,182	1,352	1,192	1,120	965	1,042	1,197
55 to 59	621	914	1,149	1,289	1,146	1,059	889	1,005
60 to 64	434	810	883	1,104	1,244	1,101	1,012	858
65 to 69	349	608	776	862	1,063	1,208	1,083	972
70 to 74	310	421	568	743	811	1,011	1,160	1,011
75 to 79	250	264	364	484	640	693	860	1,005
80 to 84	189	258	217	319	403	541	601	693
85+	199	245	272	257	318	402	529	614
TOTAL	**13,535**	**15,115**	**15,553**	**16,203**	**16,629**	**17,146**	**17,756**	**17,738**

Mont Vernon

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	117	100	101	106	114	122	127	125
5 to 9	191	183	115	130	128	136	144	149
10 to 14	192	213	205	159	163	161	169	177
15 to 19	147	211	217	213	165	169	167	175
20 to 24	46	112	192	180	185	137	141	139
25 to 29	66	55	91	149	147	153	105	110
30 to 34	122	64	59	98	155	153	158	110
35 to 39	202	152	83	97	127	183	181	186
40 to 44	237	204	170	121	125	155	211	208
45 to 49	210	264	216	198	141	146	175	230
50 to 54	137	257	266	225	204	148	153	181
55 to 59	107	207	253	263	223	202	147	151
60 to 64	75	142	203	251	259	220	199	147
65 to 69	55	85	132	187	234	242	205	185
70 to 74	55	56	76	117	169	213	220	185
75 to 79	31	49	49	67	103	148	187	192
80 to 84	27	38	39	39	53	81	117	148
85+	17	17	30	33	36	46	69	102
TOTAL	**2,034**	**2,409**	**2,496**	**2,635**	**2,731**	**2,814**	**2,873**	**2,901**

Nashua

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	5,644	5,472	5,509	5,364	5,288	5,183	5,056	4,980
5 to 9	6,307	5,235	5,292	5,445	5,359	5,283	5,181	5,053
10 to 14	6,147	5,018	5,027	5,222	5,442	5,357	5,280	5,178
15 to 19	5,281	5,642	4,796	4,950	5,216	5,436	5,349	5,272
20 to 24	5,001	5,836	5,539	4,755	4,939	5,205	5,435	5,348
25 to 29	6,600	6,050	6,082	5,608	4,743	4,927	5,238	5,468
30 to 34	7,133	5,879	6,334	6,160	5,591	4,730	4,963	5,273
35 to 39	7,863	5,989	5,663	6,241	6,131	5,565	4,708	4,941
40 to 44	7,379	6,343	5,728	5,553	6,201	6,092	5,526	4,675
45 to 49	6,332	7,075	6,069	5,602	5,499	6,141	6,032	5,472
50 to 54	5,481	6,666	6,800	5,925	5,521	5,421	6,056	5,949
55 to 59	4,185	5,683	6,385	6,609	5,800	5,405	5,313	5,934
60 to 64	3,210	4,627	5,316	6,123	6,403	5,619	5,237	5,149
65 to 69	2,800	3,280	4,208	4,993	5,826	6,092	5,347	4,982
70 to 74	2,496	2,350	2,874	3,826	4,598	5,364	5,614	4,928
75 to 79	2,049	2,052	1,983	2,479	3,327	3,996	4,675	4,891
80 to 84	1,462	1,693	1,615	1,567	1,962	2,630	3,174	3,710
85+	1,235	1,604	1,716	1,746	1,745	2,010	2,575	3,157
TOTAL	**86,605**	**86,494**	**86,937**	**88,166**	**89,593**	**90,457**	**90,759**	**90,360**

Pelham

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	804	729	708	715	726	748	777	786
5 to 9	891	951	757	765	770	781	816	845
10 to 14	914	1,073	989	835	841	845	874	909
15 to 19	772	906	1,074	993	838	844	850	878
20 to 24	433	582	857	976	898	744	729	734
25 to 29	531	516	544	781	902	824	655	640
30 to 34	860	606	539	593	828	948	882	713
35 to 39	1,191	935	662	655	705	938	1,085	1,019
40 to 44	1,128	1,184	977	754	745	794	1,047	1,193
45 to 49	820	1,363	1,200	1,023	800	791	852	1,103
50 to 54	749	1,193	1,357	1,209	1,034	814	811	871
55 to 59	554	793	1,168	1,328	1,184	1,013	798	794
60 to 64	413	708	768	1,131	1,286	1,146	980	772
65 to 69	276	473	668	719	1,065	1,213	1,077	920
70 to 74	228	337	432	609	656	974	1,109	983
75 to 79	171	251	296	385	538	578	857	974
80 to 84	121	166	199	236	307	428	459	680
85+	58	131	164	199	235	299	406	468
TOTAL	**10,914**	**12,897**	**13,359**	**13,905**	**14,357**	**14,723**	**15,063**	**15,282**

Wilton

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	239	195	210	211	214	217	222	227
5 to 9	307	234	196	213	213	216	219	224
10 to 14	295	280	239	206	220	220	223	226
15 to 19	246	226	276	232	200	215	215	218
20 to 24	155	172	219	263	222	191	205	205
25 to 29	178	197	170	216	260	219	188	202
30 to 34	279	172	200	176	220	265	223	192
35 to 39	357	238	178	212	185	229	273	232
40 to 44	338	290	240	183	215	189	232	276
45 to 49	316	358	290	243	185	217	191	234
50 to 54	313	337	356	292	244	187	219	192
55 to 59	184	307	332	353	289	242	186	217
60 to 64	131	235	295	317	338	276	230	177
65 to 69	120	152	224	282	303	323	264	220
70 to 74	110	93	141	208	260	280	298	244
75 to 79	74	99	83	127	184	230	247	262
80 to 84	62	44	78	65	101	145	181	195
85+	39	48	49	74	74	98	138	176
TOTAL	**3,743**	**3,677**	**3,776**	**3,871**	**3,928**	**3,958**	**3,954**	**3,921**

NRPC Region

Age Groups	2000 Census	2010 Census	Total Projected Population					
			2015	2020	2025	2030	2035	2040
0 to 4	13,575	11,898	11,717	11,610	11,667	11,680	11,866	11,810
5 to 9	15,726	13,578	11,973	12,135	12,117	12,208	12,587	12,691
10 to 14	15,877	14,535	13,634	12,437	12,684	12,716	13,165	13,424
15 to 19	12,862	14,402	14,186	13,446	12,311	12,552	12,460	12,923
20 to 24	8,927	11,208	13,554	13,034	12,258	11,016	10,326	10,500
25 to 29	12,070	11,291	11,213	13,355	12,756	11,969	10,550	9,897
30 to 34	15,675	11,846	12,124	12,271	14,394	13,916	14,037	12,342
35 to 39	19,414	13,972	12,069	12,829	13,089	15,266	15,413	15,380
40 to 44	18,801	16,488	13,896	12,387	13,224	13,518	15,979	16,038
45 to 49	15,283	19,183	16,188	13,891	12,447	13,298	13,683	16,063
50 to 54	13,557	17,728	18,653	15,814	13,588	12,153	12,898	13,306
55 to 59	9,911	13,936	17,097	18,036	15,305	13,108	11,612	12,382
60 to 64	7,024	11,805	13,207	16,368	17,335	14,685	12,477	11,039
65 to 69	5,468	8,116	10,918	12,365	15,416	16,349	13,739	11,612
70 to 74	4,620	5,549	7,269	9,958	11,330	14,154	15,017	12,581
75 to 79	3,606	4,160	4,748	6,281	8,667	9,849	12,366	13,135
80 to 84	2,510	3,221	3,300	3,801	5,040	6,943	8,007	9,953
85+	2,029	2,849	3,240	3,491	3,975	5,000	6,777	8,173
TOTAL	**196,935**	**205,765**	**208,987**	**213,507**	**217,605**	**220,381**	**222,959**	**223,249**

Build-Out Report - Base Scenario

Analysis Name: Analysis 3 Random

Thursday, February 06, 2014, 8:40 AM

Report Contents

Report Summary

This report gives details about a single run of the Build-Out Wizard for this scenario.

☑ Numeric Build-Out has been run

☑ Spatial Build-Out has been run

☒ Visual Build-Out has not been run

Numeric Build-Out Settings

Land Use Layer	
Layer containing land-use information	ZoningLandUse
Attribute specifying land-use designation	PRIM_USE
Attribute specifying unique identifier of each land-use area	OBJECTID

Density Rules

Land-Use Designation	Dwelling	Floor Area	Efficiency

	Units		**Factor (%)**
AIRPORT			80
COMMERCIAL		1 FAR	80
COMMERCIAL HIGHWAY		0.5 FAR	80
COMMERCIAL OFFICE		0.5 FAR	80
CONSERVATION			80
INDUSTRIAL		2 FAR	80
LIGHT INDUSTRIAL		0.5 FAR	80
LOW DENSITY MULTI-FAMILY	4 DU per acre		80
MANUFACTURED HOUSING		1 FAR	80
MEDIUM-HIGH DENSITY MULTI-FAMILY	8 DU per acre	0.5 FAR	80
MIXED USE COMMERCIAL/AGRICULTURE			80
MIXED USE COMMERCIAL/RESIDENTIAL	2 DU per acre	0.2 FAR	80
MIXED USE INDUSTRIAL/COMMERCIAL		0.2 FAR	80
MIXED USE RETAIL BUSINESS/RESIDENTIAL	3 DU per acre	0.2 FAR	80
NEIGHBORHOOD-VILLAGE COMMERCIAL	2 DU per acre		80
RESIDENTIAL SF < 1 AC	2 DU per acre		80
RESIDENTIAL SF 1 AC	1 DU per acre		80
RESIDENTIAL SF 2 AC	0.5 DU per acre		80
RURAL AGRICULTURAL 3+ AC	0.3 DU per acre		80

Building Information

Land-Use Designation	**DU per Building**	**Area (sq feet)**	**Floors**

AIRPORT	0	0	1
COMMERCIAL	0	0	1
COMMERCIAL HIGHWAY	0	0	1
COMMERCIAL OFFICE	0	0	1
CONSERVATION	0	0	1
INDUSTRIAL	0	0	1
LIGHT INDUSTRIAL	0	0	1
LOW DENSITY MULTI-FAMILY	4	0	2
MANUFACTURED HOUSING	1	0	3
MEDIUM-HIGH DENSITY MULTI-FAMILY	8	0	2
MIXED USE COMMERCIAL/AGRICULTURE	1	0	2
MIXED USE COMMERCIAL/RESIDENTIAL	2	0	2
MIXED USE INDUSTRIAL/COMMERCIAL	0	0	2
MIXED USE RETAIL BUSINESS/RESIDENTIAL	1	0	2
NEIGHBORHOOD-VILLAGE COMMERCIAL	1	0	2
RESIDENTIAL SF < 1 AC	1	0	2
RESIDENTIAL SF 1 AC	1	0	2
RESIDENTIAL SF 2 AC	1	0	2
RURAL AGRICULTURAL 3+ AC	1	0	2

Constraints to Development

Constraint Layer	Can density be transferred?
NonEligbleREGUSEtypes	yes
SlopeGRANITConservedLandsWaterbodiesWetlandsUnion	no

Existing Buildings		
Layer containing existing buildings	**Value or attribute specifyingDU/bldg**	**Value or attribute specifying floor area(sq feet)**
NRPCBuildingPoints2013atts	DU_EST	Floor_EST

Spatial Build-Out Settings

Settings				
Land-Use Designation	**Minimum Separation Distance(feet)**	**Layout Pattern**	**Road or Line Layer**	**Setback (feet)**
AIRPORT	60	Random		80
COMMERCIAL	60	Random		80
COMMERCIAL HIGHWAY	60	Random		80
COMMERCIAL OFFICE	60	Random		80
CONSERVATION	200	Random		80
INDUSTRIAL	60	Random		80
LIGHT INDUSTRIAL	60	Random		80
LOW DENSITY MULTI-FAMILY	60	Random		200
MANUFACTURED HOUSING	60	Random		80
MEDIUM-HIGH DENSITY MULTI-FAMILY	60	Random		200
MIXED USE COMMERCIAL/AGRICULTURE	60	Random		80
MIXED USE COMMERCIAL/RESIDENTIAL	60	Random		80
MIXED USE INDUSTRIAL/COMMERCIAL	60	Random		80

MIXED USE RETAIL BUSINESS/RESIDENTIAL	60	Random		80
NEIGHBORHOOD-VILLAGE COMMERCIAL	60	Random		80
RESIDENTIAL SF < 1 AC	60	Random		250
RESIDENTIAL SF 1 AC	100	Random		250
RESIDENTIAL SF 2 AC	200	Random		250
RURAL AGRICULTURAL 3+ AC	200	Random		250

Results

Dwelling Unit Quantities				
Land-Use Designation	**Numeric Build-Out**	**Spatial Build-Out**	**Difference**	**Existing Dwelling Units**
AIRPORT	0	0	0	152
COMMERCIAL	0	0	0	2799
COMMERCIAL HIGHWAY	0	0	0	499
COMMERCIAL OFFICE	0	0	0	113
CONSERVATION	0	0	0	2
INDUSTRIAL	0	0	0	1373
LIGHT INDUSTRIAL	0	0	0	681
LOW DENSITY MULTI-FAMILY	933	742	191	9491
MANUFACTURED HOUSING	0	0	0	118
MEDIUM-HIGH DENSITY MULTI-FAMILY	2753	2024	729	5262
MIXED USE COMMERCIAL/AGRICULTURE	0	0	0	101
MIXED USE	794	706	88	173

COMMERCIAL/RESIDENTIAL				
MIXED USE INDUSTRIAL/COMMERCIAL	0	0	0	430
MIXED USE RETAIL BUSINESS/RESIDENTIAL	14349	13903	446	3647
NEIGHBORHOOD-VILLAGE COMMERCIAL	1437	1102	335	2382
RESIDENTIAL SF < 1 AC	10132	8573	1559	11244
RESIDENTIAL SF 1 AC	8637	7186	1451	10714
RESIDENTIAL SF 2 AC	16417	11511	4906	15421
RURAL AGRICULTURAL 3+ AC	5164	4113	1051	13592
Total	**60616**	**49860**	**10756**	**78194**

Commercial Floor Space

Land-Use Designation	Numeric Build-Out Floor Area (sq. feet)	Spatial Build-Out Floor Area (sq. feet)	Difference	Existing Floor Area
AIRPORT	0	0	0	528000
COMMERCIAL	100065120.017	93041016.969	7024103.048	9804000
COMMERCIAL HIGHWAY	6470189.941	5981579.339	488610.602	1752000
COMMERCIAL OFFICE	2815817.342	2474782.089	341035.253	696000
CONSERVATION	0	0	0	48000
INDUSTRIAL	295705508.078	277053073.839	18652434.24	7392000
LIGHT INDUSTRIAL	38867665.162	36493120.24	2374544.921	2808000
LOW DENSITY MULTI-FAMILY	0	0	0	900000
MANUFACTURED HOUSING	4167905.831	4062276.113	105629.719	0
MEDIUM-HIGH DENSITY MULTI-FAMILY	17399882.538	8042798.625	9357083.913	528000

MIXED USE COMMERCIAL/AGRICULTURE	0	0	0	1572000
MIXED USE COMMERCIAL/RESIDENTIAL	3459630.941	3215342.47	244288.471	804000
MIXED USE INDUSTRIAL/COMMERCIAL	5823936.128	5682323.258	141612.87	936000
MIXED USE RETAIL BUSINESS/RESIDENTIAL	49996151.133	46171679.11	3824472.023	2472000
NEIGHBORHOOD-VILLAGE COMMERCIAL	0	0	0	1296000
RESIDENTIAL SF < 1 AC	0	0	0	1800000
RESIDENTIAL SF 1 AC	0	0	0	1656000
RESIDENTIAL SF 2 AC	0	0	0	3840000
RURAL AGRICULTURAL 3+ AC	0	0	0	1296000
Total	**524771807.111**	**482217992.052**	**42553815.06**	**40128000**

Building Quantities

Land-Use Designation	Numeric Build-Out Units	Spatial Build-Out Units	Difference	Existing Buildings
AIRPORT	0	0	0	107
COMMERCIAL	1485	1091	394	1760
COMMERCIAL HIGHWAY	209	180	29	232
COMMERCIAL OFFICE	127	75	52	151
CONSERVATION	0	0	0	12
INDUSTRIAL	928	685	243	1106
LIGHT INDUSTRIAL	320	279	41	294
LOW DENSITY MULTI-FAMILY	424	298	126	1806
MANUFACTURED HOUSING	16	15	1	91

MEDIUM-HIGH DENSITY MULTI-FAMILY	3271	699	2572	2710
MIXED USE COMMERCIAL/AGRICULTURE	0	0	0	255
MIXED USE COMMERCIAL/RESIDENTIAL	617	470	147	199
MIXED USE INDUSTRIAL/COMMERCIAL	143	123	20	189
MIXED USE RETAIL BUSINESS/RESIDENTIAL	16552	15749	803	2398
NEIGHBORHOOD-VILLAGE COMMERCIAL	1437	1102	335	1895
RESIDENTIAL SF < 1 AC	10132	8573	1559	10169
RESIDENTIAL SF 1 AC	8637	7186	1451	10290
RESIDENTIAL SF 2 AC	16417	11511	4906	15887
RURAL AGRICULTURAL 3+ AC	5164	4113	1051	12985
Total	**65879**	**52149**	**13730**	**62536**

Buildable Area

Land-Use Designation	Gross Area (sq feet)	Net Buildable Area (sq feet)	Difference (sq feet)
AIRPORT	28864879.116	24562878.412	4302000.705
COMMERCIAL	160913725.646	136746851.416	24166874.23
COMMERCIAL HIGHWAY	21893476.452	20181420.898	1712055.554
COMMERCIAL OFFICE	10309070.045	8308419.558	2000650.488
CONSERVATION	65318815.022	37691713.873	27627101.149
INDUSTRIAL	259326762.307	189319019.39	70007742.918
LIGHT INDUSTRIAL	139637080.015	103984822.995	35652257.021

LOW DENSITY MULTI-FAMILY	57059441.399	44207508.361	12851933.038
MANUFACTURED HOUSING	5441347.109	5209882.289	231464.819
MEDIUM-HIGH DENSITY MULTI-FAMILY	56974009.52	44398357.227	12575652.294
MIXED USE COMMERCIAL/AGRICULTURE	43591939.055	35754061.334	7837877.721
MIXED USE COMMERCIAL/RESIDENTIAL	27149577.173	24012628.189	3136948.984
MIXED USE INDUSTRIAL/COMMERCIAL	46855964.716	40478186.13	6377778.586
MIXED USE RETAIL BUSINESS/RESIDENTIAL	417812302.022	320891845.247	96920456.775
NEIGHBORHOOD-VILLAGE COMMERCIAL	80715802.243	66309693.962	14406108.281
RESIDENTIAL SF < 1 AC	658363259.249	521924173.125	136439086.123
RESIDENTIAL SF 1 AC	1227889810.009	908575339.44	319314470.569
RESIDENTIAL SF 2 AC	3853321914.4	2617603372.254	1235718542.146
RURAL AGRICULTURAL 3+ AC	1975261749.115	1299479131.053	675782618.062
Total	**9136700924.615**	**6449639305.153**	**2687061619.462**

Exceptions

Land-Use Designation	Number of dwelling units that couldn't be placed because of space constraints	Number of buildings that couldn't be placed because of space constraints	Number of polygons where number of existing buildings exceeds build-out limit
AIRPORT	0	0	0
COMMERCIAL	0	394	0
COMMERCIAL HIGHWAY	0	29	0
COMMERCIAL OFFICE	0	52	0

CONSERVATION	0	0	0
INDUSTRIAL	0	243	0
LIGHT INDUSTRIAL	0	41	0
LOW DENSITY MULTI-FAMILY	191	126	0
MANUFACTURED HOUSING	0	1	0
MEDIUM-HIGH DENSITY MULTI-FAMILY	729	2572	0
MIXED USE COMMERCIAL/AGRICULTURE	0	0	0
MIXED USE COMMERCIAL/RESIDENTIAL	88	147	0
MIXED USE INDUSTRIAL/COMMERCIAL	0	20	0
MIXED USE RETAIL BUSINESS/RESIDENTIAL	446	803	0
NEIGHBORHOOD-VILLAGE COMMERCIAL	335	335	0
RESIDENTIAL SF < 1 AC	1559	1559	0
RESIDENTIAL SF 1 AC	1451	1451	0
RESIDENTIAL SF 2 AC	4906	4906	0
RURAL AGRICULTURAL 3+ AC	1051	1051	0
Total	**10756**	**13730**	**0**

Build-Out Report - Environmental Preservation

Analysis Name: Env Preservation Try 3

Friday, May 09, 2014, 8:38 AM

Report Contents

Report Summary

This report gives details about a single run of the Build-Out Wizard for this scenario.

☑ Numeric Build-Out has been run

☑ Spatial Build-Out has been run

☒ Visual Build-Out has not been run

Numeric Build-Out Settings

Land Use Layer	
Layer containing land-use information	ZoningLandUse
Attribute specifying land-use designation	PRIM_USE
Attribute specifying unique identifier of each land-use area	OBJECTID

Density Rules

Land-Use Designation	Dwelling Units	Floor Area	Efficiency Factor (%)

AIRPORT			80
COMMERCIAL		1 FAR	80
COMMERCIAL HIGHWAY		0.5 FAR	80
COMMERCIAL OFFICE		0.5 FAR	80
CONSERVATION			80
INDUSTRIAL		2 FAR	80
LIGHT INDUSTRIAL		0.5 FAR	80
LOW DENSITY MULTI-FAMILY	4 DU per acre		80
MANUFACTURED HOUSING		1 FAR	80
MEDIUM-HIGH DENSITY MULTI-FAMILY	8 DU per acre	0.5 FAR	80
MIXED USE COMMERCIAL/AGRICULTURE			80
MIXED USE COMMERCIAL/RESIDENTIAL	2 DU per acre	0.2 FAR	80
MIXED USE INDUSTRIAL/COMMERCIAL		0.2 FAR	80
MIXED USE RETAIL BUSINESS/RESIDENTIAL	3 DU per acre	0.2 FAR	80
NEIGHBORHOOD-VILLAGE COMMERCIAL	2 DU per acre		80
RESIDENTIAL SF < 1 AC	2 DU per acre		80
RESIDENTIAL SF 1 AC	1 DU per acre		80
RESIDENTIAL SF 2 AC	0.5 DU per acre		80
RURAL AGRICULTURAL 3+ AC	0.3 DU per acre		80

Building Information

Land-Use Designation	DU per Building	Area (sq feet)	Floors
AIRPORT	0	0	1

COMMERCIAL	0	0	1
COMMERCIAL HIGHWAY	0	0	1
COMMERCIAL OFFICE	0	0	1
CONSERVATION	0	0	1
INDUSTRIAL	0	0	1
LIGHT INDUSTRIAL	0	0	1
LOW DENSITY MULTI-FAMILY	4	0	2
MANUFACTURED HOUSING	1	0	3
MEDIUM-HIGH DENSITY MULTI-FAMILY	8	0	2
MIXED USE COMMERCIAL/AGRICULTURE	1	0	2
MIXED USE COMMERCIAL/RESIDENTIAL	2	0	2
MIXED USE INDUSTRIAL/COMMERCIAL	0	0	2
MIXED USE RETAIL BUSINESS/RESIDENTIAL	1	0	2
NEIGHBORHOOD-VILLAGE COMMERCIAL	1	0	2
RESIDENTIAL SF < 1 AC	1	0	2
RESIDENTIAL SF 1 AC	1	0	2
RESIDENTIAL SF 2 AC	1	0	2
RURAL AGRICULTURAL 3+ AC	1	0	2

Constraints to Development

Constraint Layer	Can density be transferred?
AllConstraintsEnvPreservation	no
NonEligbleREGUSEtypes	yes

Existing Buildings		
Layer containing existing buildings	**Value or attribute specifyingDU/bldg**	**Value or attribute specifying floor area(sq feet)**
NRPCBuildingPoints2013atts	DU_EST	Floor_EST

Spatial Build-Out Settings

Settings				
Land-Use Designation	**Minimum Separation Distance(feet)**	**Layout Pattern**	**Road or Line Layer**	**Setback (feet)**
AIRPORT	60	Random		80
COMMERCIAL	60	Random		80
COMMERCIAL HIGHWAY	60	Random		80
COMMERCIAL OFFICE	60	Random		80
CONSERVATION	200	Random		80
INDUSTRIAL	60	Random		80
LIGHT INDUSTRIAL	60	Random		80
LOW DENSITY MULTI-FAMILY	60	Random		200
MANUFACTURED HOUSING	60	Random		80
MEDIUM-HIGH DENSITY MULTI-FAMILY	60	Random		200
MIXED USE COMMERCIAL/AGRICULTURE	60	Random		80
MIXED USE COMMERCIAL/RESIDENTIAL	60	Random		80
MIXED USE INDUSTRIAL/COMMERCIAL	60	Random		80
MIXED USE RETAIL	60	Random		80

BUSINESS/RESIDENTIAL				
NEIGHBORHOOD-VILLAGE COMMERCIAL	60	Random		80
RESIDENTIAL SF < 1 AC	60	Random		250
RESIDENTIAL SF 1 AC	100	Random		250
RESIDENTIAL SF 2 AC	200	Random		250
RURAL AGRICULTURAL 3+ AC	200	Random		250

Results

Dwelling Unit Quantities				
Land-Use Designation	**Numeric Build-Out**	**Spatial Build-Out**	**Difference**	**Existing Dwelling Units**
AIRPORT	0	0	0	152
COMMERCIAL	0	0	0	2514
COMMERCIAL HIGHWAY	0	0	0	499
COMMERCIAL OFFICE	0	0	0	112
CONSERVATION	0	0	0	1
INDUSTRIAL	0	0	0	1275
LIGHT INDUSTRIAL	0	0	0	681
LOW DENSITY MULTI-FAMILY	716	546	170	9213
MANUFACTURED HOUSING	0	0	0	118
MEDIUM-HIGH DENSITY MULTI-FAMILY	2236	1613	623	5063
MIXED USE COMMERCIAL/AGRICULTURE	0	0	0	97
MIXED USE COMMERCIAL/RESIDENTIAL	526	447	79	139

MIXED USE INDUSTRIAL/COMMERCIAL	0	0	0	426
MIXED USE RETAIL BUSINESS/RESIDENTIAL	10243	9915	328	3468
NEIGHBORHOOD-VILLAGE COMMERCIAL	1117	820	297	2282
RESIDENTIAL SF < 1 AC	6503	5287	1216	10434
RESIDENTIAL SF 1 AC	5524	4385	1139	9975
RESIDENTIAL SF 2 AC	11747	7783	3964	14664
RURAL AGRICULTURAL 3+ AC	3569	2678	891	12172
Total	**42181**	**33474**	**8707**	**73285**

Commercial Floor Space

Land-Use Designation	**Numeric Build-Out Floor Area (sq. feet)**	**Spatial Build-Out Floor Area (sq. feet)**	**Difference**	**Existing Floor Area**
AIRPORT	0	0	0	528000
COMMERCIAL	78004292.169	73294002.407	4710289.762	8892000
COMMERCIAL HIGHWAY	5285865.354	4939281.956	346583.398	1680000
COMMERCIAL OFFICE	2737291.298	2411166.598	326124.7	696000
CONSERVATION	0	0	0	48000
INDUSTRIAL	203192569.443	189939020.13	13253549.313	7152000
LIGHT INDUSTRIAL	24468560.786	22348068.284	2120492.502	2808000
LOW DENSITY MULTI-FAMILY	0	0	0	828000
MANUFACTURED HOUSING	2909194.073	2813507.085	95686.988	0
MEDIUM-HIGH DENSITY MULTI-FAMILY	15044143.382	6365231.209	8678912.174	516000

MIXED USE COMMERCIAL/AGRICULTURE	0	0	0	1500000
MIXED USE COMMERCIAL/RESIDENTIAL	2356266.819	2137067.433	219199.386	672000
MIXED USE INDUSTRIAL/COMMERCIAL	2991773.151	2921405.431	70367.72	876000
MIXED USE RETAIL BUSINESS/RESIDENTIAL	36927167.487	32809742.534	4117424.954	2268000
NEIGHBORHOOD-VILLAGE COMMERCIAL	0	0	0	1236000
RESIDENTIAL SF < 1 AC	0	0	0	1596000
RESIDENTIAL SF 1 AC	0	0	0	1620000
RESIDENTIAL SF 2 AC	0	0	0	3696000
RURAL AGRICULTURAL 3+ AC	0	0	0	1260000
Total	**373917123.963**	**339978493.066**	**33938630.897**	**37872000**

Building Quantities

Land-Use Designation	Numeric Build-Out Units	Spatial Build-Out Units	Difference	Existing Buildings
AIRPORT	0	0	0	107
COMMERCIAL	1243	936	307	1574
COMMERCIAL HIGHWAY	199	171	28	226
COMMERCIAL OFFICE	125	76	49	150
CONSERVATION	0	0	0	10
INDUSTRIAL	799	603	196	1050
LIGHT INDUSTRIAL	285	251	34	294
LOW DENSITY MULTI-FAMILY	337	227	110	1673
MANUFACTURED HOUSING	16	15	1	91

MEDIUM-HIGH DENSITY MULTI-FAMILY	3007	584	2423	2572
MIXED USE COMMERCIAL/AGRICULTURE	0	0	0	244
MIXED USE COMMERCIAL/RESIDENTIAL	455	323	132	178
MIXED USE INDUSTRIAL/COMMERCIAL	118	103	15	176
MIXED USE RETAIL BUSINESS/RESIDENTIAL	12262	11580	682	2268
NEIGHBORHOOD-VILLAGE COMMERCIAL	1117	820	297	1804
RESIDENTIAL SF < 1 AC	6503	5287	1216	9312
RESIDENTIAL SF 1 AC	5524	4385	1139	9484
RESIDENTIAL SF 2 AC	11747	7783	3964	15094
RURAL AGRICULTURAL 3+ AC	3569	2678	891	11559
Total	**47306**	**35822**	**11484**	**57866**

Buildable Area

Land-Use Designation	Gross Area (sq feet)	Net Buildable Area (sq feet)	Difference (sq feet)
AIRPORT	28864879.116	17045432.566	11819446.551
COMMERCIAL	160913725.646	108053825.676	52859899.969
COMMERCIAL HIGHWAY	21893476.452	16994835.778	4898640.674
COMMERCIAL OFFICE	10309070.045	8112104.412	2196965.633
CONSERVATION	65318815.022	8305325.122	57013489.901
INDUSTRIAL	259326762.307	131311940.213	128014822.094
LIGHT INDUSTRIAL	139637080.015	67742140.661	71894939.354

LOW DENSITY MULTI-FAMILY	57059441.399	34730507.558	22328933.841
MANUFACTURED HOUSING	5441347.109	3636492.591	1804854.518
MEDIUM-HIGH DENSITY MULTI-FAMILY	56974009.52	38487124.167	18486885.353
MIXED USE COMMERCIAL/AGRICULTURE	43591939.055	22898035.963	20693903.093
MIXED USE COMMERCIAL/RESIDENTIAL	27149577.173	16364739.688	10784837.485
MIXED USE INDUSTRIAL/COMMERCIAL	46855964.716	22049743.275	24806221.441
MIXED USE RETAIL BUSINESS/RESIDENTIAL	417812302.022	238598670.708	179213631.314
NEIGHBORHOOD-VILLAGE COMMERCIAL	80715802.243	54890022.726	25825779.517
RESIDENTIAL SF < 1 AC	658363259.249	391805528.309	266557730.94
RESIDENTIAL SF 1 AC	1227889810.009	653081027.181	574808782.828
RESIDENTIAL SF 2 AC	3853321914.4	1924987660.005	1928334254.396
RURAL AGRICULTURAL 3+ AC	1975261749.115	925739033.396	1049522715.719
Total	**9136700924.615**	**4684834189.996**	**4451866734.619**

Exceptions

Land-Use Designation	Number of dwelling units that couldn't be placed because of space constraints	Number of buildings that couldn't be placed because of space constraints	Number of polygons where number of existing buildings exceeds build-out limit
AIRPORT	0	0	0
COMMERCIAL	0	307	0
COMMERCIAL HIGHWAY	0	28	0
COMMERCIAL OFFICE	0	49	0

CONSERVATION	0	0	0
INDUSTRIAL	0	196	0
LIGHT INDUSTRIAL	0	34	0
LOW DENSITY MULTI-FAMILY	170	110	0
MANUFACTURED HOUSING	0	1	0
MEDIUM-HIGH DENSITY MULTI-FAMILY	623	2423	0
MIXED USE COMMERCIAL/AGRICULTURE	0	0	0
MIXED USE COMMERCIAL/RESIDENTIAL	79	132	0
MIXED USE INDUSTRIAL/COMMERCIAL	0	15	0
MIXED USE RETAIL BUSINESS/RESIDENTIAL	328	682	0
NEIGHBORHOOD-VILLAGE COMMERCIAL	297	297	0
RESIDENTIAL SF < 1 AC	1216	1216	0
RESIDENTIAL SF 1 AC	1139	1139	0
RESIDENTIAL SF 2 AC	3964	3964	0
RURAL AGRICULTURAL 3+ AC	891	891	0
Total	**8707**	**11484**	**0**

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Economic Impact of an Older Manufacturing Workforce in the Greater Nashua Area of Hillsborough County, New Hampshire

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prepared by

Economic and Labor Market Information Bureau
New Hampshire Employment Security

for

Nashua Regional Planning Commission

Granite State Future

November 2014

Nashua Regional Planning Commission

Acknowledgments

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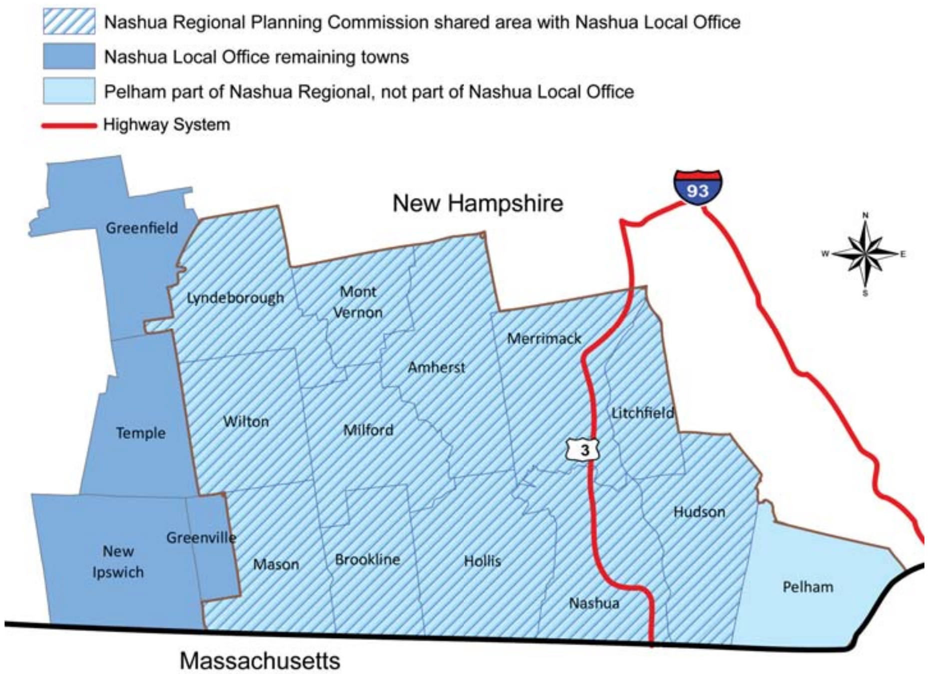
For more information about Granite State Future, go to www.granitestatefuture.org.

Assessing the economic impact of an older manufacturing workforce for the Nashua Regional Planning Commission

The Nashua Regional Planning Commission is concerned about ability to attract young talent to the region. The region is known for its highly educated workforce and has a cluster of high tech businesses dependent on this highly educated workforce. There is also a large concentration of baby boomers living in the region. The combination of these two factors means that a portion of the region's highly educated workforce is part of that baby boom generation, therefore increasing the likelihood that many of these skilled workers will retire within the next decade. The question posed in this scenario is "what will happen to the region if the high tech companies in the region are not able to attract younger workers to replace the current experienced workers?"

To evaluate the impact of an aging workforce in the *Manufacturing* sector on the region, workforce demographic data[2] was extracted for the Nashua NH Employment Security/NHWorks One-Stop office area (hereafter Local Office Area). Workforce demographic data for the NRPC region is not available. The Nashua Local Office Area geography was selected as a proxy, as it is more representative of the NRPC region than is Hillsborough County as a whole. The map below depicts the NRPC region and the Nashua Local Office area.

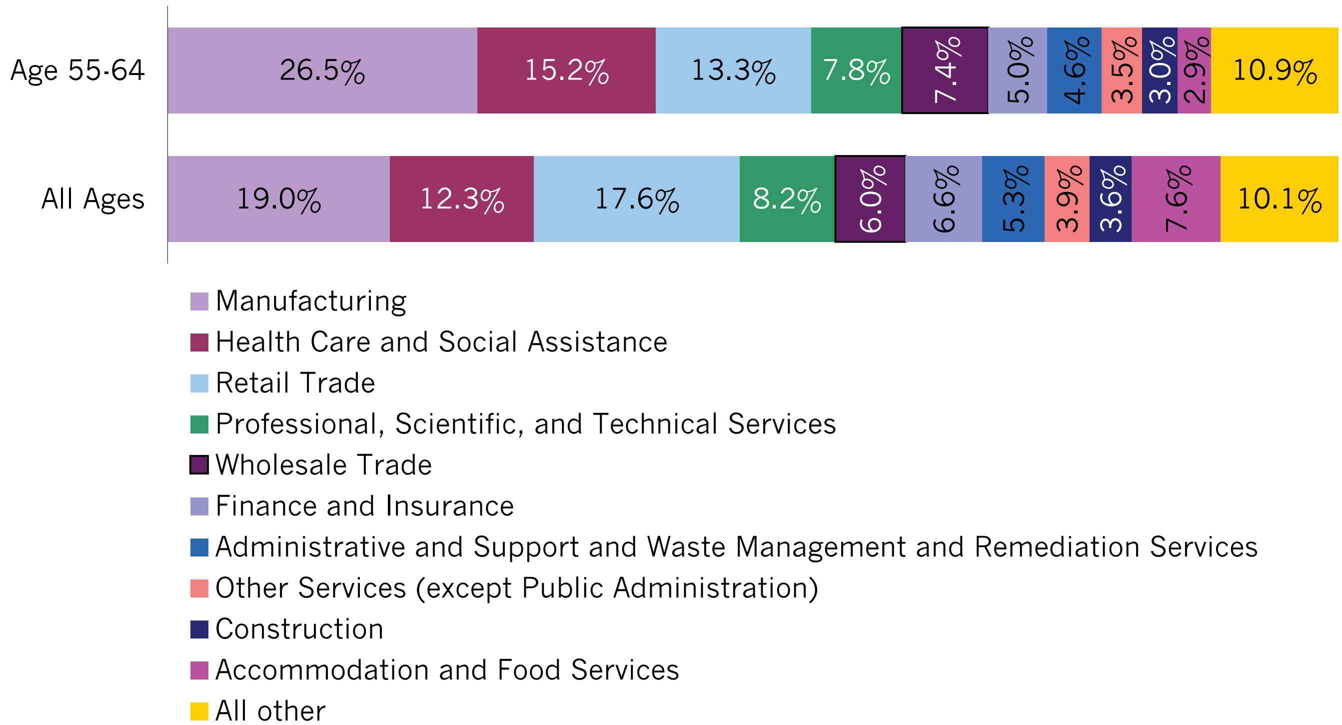
Quarterly Workforce Indicators[3] for the Nashua Local Office Area show that there is a high concentration of workers in *Manufacturing*, and an even higher concentration of workers in the 55-64 years age group. Among all age groups, one in five private industry workers are employed in *Manufacturing*, and one in four private industry workers age 55-64 years are employed in *Manufacturing*. In 2012, there were 3,761 workers age 55-64 in *Manufacturing* (based on a four-quarter average).



1. Product of Regional Economic Models, Inc. of Amherst, MA.
2. US Census Bureau, Local Employment Dynamics Program, Quarterly Workforce Indicators, 2012 Q1 -2012 Q4 Average.
3. Quarterly Workforce Indicators (QWI), a product of the U.S. Census Bureau's Local Employment Dynamics (LED) Partnership, are possible because of an innovative system that merges data already collected from various sources. The state Labor Market Information (LMI) agencies supply key data from unemployment wage records and from businesses each quarter. The Census Bureau merges the data from state LMI agencies with current demographic information to produce the data found in LED. By combining data from different administrative sources, censuses and surveys, the Census Bureau is able to produce local employment information.

To assess the impact of the aging of highly educated and experienced *Manufacturing* workers in the Nashua Region, a counterfactual (hypothetical) scenario was developed. The impact is assessed from two perspectives, each run separately.

Distribution of workers in Nashua Local Office Area by Industry, 2012



The first perspective is evaluation of the economic impact of jobs held by *Manufacturing* workers in the age cohort 55-64 years. This scenario is run as a negative scenario, meaning that the jobs held by these workers are removed from baseline employment numbers over a period of time. As part of this hypothetical scenario, the assumption is made that though workers are retiring, establishments are unable to replace those workers as there is an insufficient supply of younger workers available to fill positions.

The second perspective is evaluation of the economic impact of these persons entering into the region's economy as retirees. This scenario captures the positive impact of retiree in-migration. Retirees are not labor force participants, but spur an increase in total personal income for the region, through retirement savings, pensions, and social security.

The results of these scenarios will simulate two possible outcomes, one assessing the lack of younger talent coming into the region, and one assessing changes in demand for workers as current residents retire while staying in the region.

This impact analysis was conducted using the Economic and Labor Market Information Bureau's New Hampshire Econometric Model – a REMI Policy Insight + ® model.[1] Using this econometric model, we are able to estimate both the number of direct jobs added in Hillsborough County, as well as the indirect and induced jobs gained in the county.

Scenario 1: Hypothetical Impact of an Older Manufacturing Workforce

Inputs and assumptions

Data from the QWI showed that there were 3,761 *Manufacturing* workers aged 55-64 in the Nashua Local Office service area in 2012. To evaluate the impact of the 55-64 years age cohort of highly educated and experienced manufacturing workers retiring, those 3,761 jobs were removed from the REMI model baseline employment in Hillsborough County over a ten-year period, from 2014 to 2023. Since not all workers in the cohort will retire simultaneously, removing jobs from the baseline over this period emulates the retirement of these *Manufacturing* workers over a ten-year timeframe.

The removal of employment was cumulative over time. Thus, 376 jobs were removed in 2014, the number of jobs removed from baseline was aggregated annually, and by 2023, the full amount of 3,761 jobs were removed from baseline employment. Table 1 illustrates the cumulative job count removed from baseline employment totals for each year in the scenario.

Table 1. Aging Workforce	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Manufacturing Job Loss	-376	-752	-1,128	-1,504	-1,880	-2,257	-2,633	-3,009	-3,385	-3,761

In addition to spreading hypothetical retirements out over time, job losses were distributed across 60 detailed *Manufacturing* industries in proportion to 2023 forecasted employment share, to account for future growth patterns.[4] The direct jobs losses in Hillsborough County were removed from manufacturing industry employment based on the shares listed in Table 2 below.

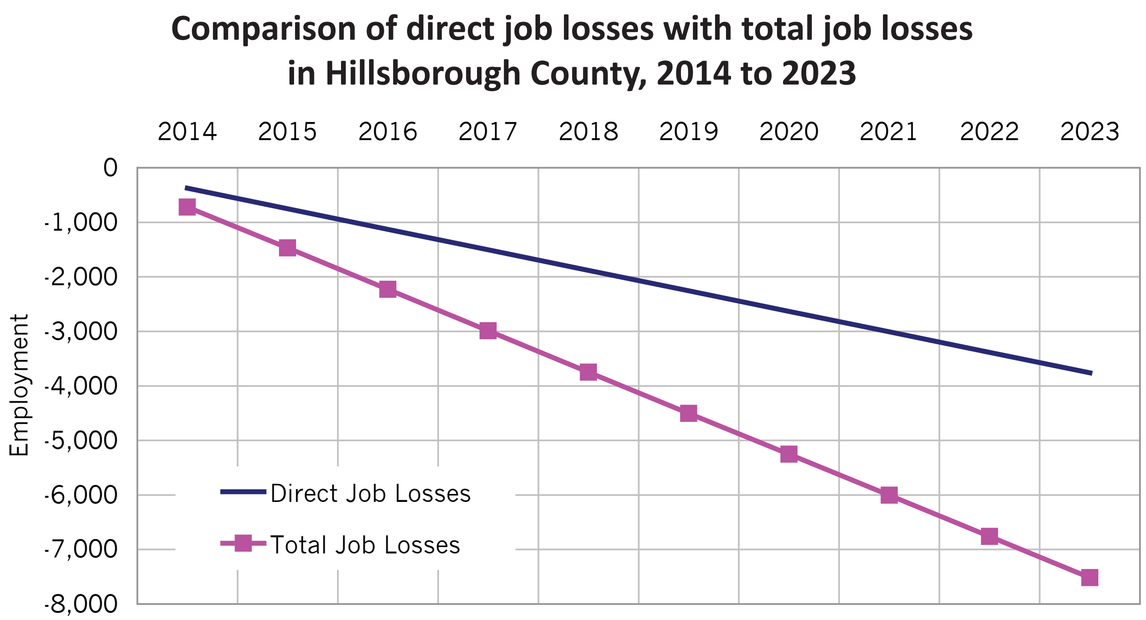
Table 2. REMI Model detailed Manufacturing NAICS Industries	Share of 2023 forecasted employment base
Navigational, measuring, electromedical, and control instruments manufacturing	23.32%
Plastics product manufacturing	9.31%
Semiconductor and other electronic component manufacturing	8.50%
Medical equipment and supplies manufacturing	5.01%
Architectural and structural metals manufacturing	4.38%
Electric lighting equipment manufacturing	3.71%
Foundries	3.37%
Commercial and service industry machinery manufacturing	3.11%
Other fabricated metal product manufacturing	2.95%
Computer and peripheral equipment manufacturing	2.86%
Machine shops; turned product; and screw, nut, and bolt manufacturing	2.29%
Printing and related support activities	2.29%

4. The REMI model is based on NAICS, the North American Industry Classification System, which is used to classify business establishments according to type of economic activity (process of production) in Canada, Mexico and the United States. An establishment is typically a single physical location, though administratively distinct operations at a single location may be treated as distinct establishments. Each establishment is classified to an industry according to the primary business activity taking place there.

Table 2. REMI Model detailed Manufacturing NAICS Industries (continued)	Share of 2023 forecasted employment base
Other miscellaneous manufacturing	2.25%
Textile mills and textile product mills	2.17%
Industrial machinery manufacturing	1.98%
Coating, engraving, heat treating, and allied activities	1.88%
Other electrical equipment and component manufacturing	1.82%
Beverage manufacturing	1.81%
Cement and concrete product manufacturing	1.80%
Converted paper product manufacturing	1.68%
Alumina and aluminum production and processing	1.49%
Spring and wire product manufacturing	1.24%
Pulp, paper, and paperboard mills	0.89%
Electrical equipment manufacturing	0.82%
Motor vehicle parts manufacturing	0.81%
Bakeries and tortilla manufacturing	0.73%
Other wood product manufacturing	0.65%
Audio and video equipment manufacturing	0.62%
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	0.48%
Metalworking machinery manufacturing	0.44%
Rubber product manufacturing	0.43%
Communications equipment manufacturing	0.41%
Household and institutional furniture and kitchen cabinet manufacturing	0.40%
Other general purpose machinery manufacturing	0.39%
Lime, gypsum and other nonmetallic mineral product manufacturing	0.36%
Paint, coating, and adhesive manufacturing	0.33%
Cutlery and handtool manufacturing	0.29%
Apparel manufacturing; Leather and allied product manufacturing	0.25%
Clay product and refractory manufacturing	0.22%
Hardware manufacturing	0.21%
Forging and stamping	0.20%
Veneer, plywood, and engineered wood product manufacturing	0.20%
Fruit and vegetable preserving and specialty food manufacturing	0.19%
Basic chemical manufacturing	0.17%
Sawmills and wood preservation	0.16%
Ship and boat building	0.14%
Pharmaceutical and medicine manufacturing	0.14%
Glass and glass product manufacturing	0.13%
Agriculture, construction, and mining machinery manufacturing	0.12%
Manufacturing and reproducing magnetic and optical media	0.12%
Seafood product preparation and packaging	0.11%
Other chemical product and preparation manufacturing	0.11%
Other food manufacturing	0.10%
Nonferrous metal (except aluminum) production and processing	0.07%
Household appliance manufacturing	0.03%
Office furniture (including fixtures) manufacturing; Other furniture related product manufacturing	0.02%
Pesticide, fertilizer, and other agricultural chemical manufacturing	0.01%
Animal food manufacturing	0.01%
Petroleum and coal products manufacturing	0.01%

Scenario Results: Potential impact from job losses in *Manufacturing* due to the aging of the *Manufacturing* workforce in the greater Nashua Region

The following results are the potential implications of *Manufacturing* jobs lost due to workers aging out of (retiring from) the workforce. The results include both direct job losses and secondary (indirect and induced) job losses in Hillsborough County.



Employment Impacts

- In 2014, a total of 722 direct, indirect and induced jobs[5] would be lost in Hillsborough County. By 2023, job loss would accumulate to 7,516.
- By 2023, secondary job losses would be distributed across other industry sectors: *Retail* and *Wholesale trade* would decline by 869 jobs; *Construction* would decline by 771 jobs; and *Health care and social assistance* would decline by 318 jobs. *State and local government* would decline by 565 jobs.[6] In addition to the 3,761 direct jobs lost in *Manufacturing*, an additional 123 *Manufacturing* jobs would be lost in the region.

5. Employment in the REMI model is based on Bureau of Economic Analysis (BEA) definition of employment. The BEA estimates of employment and wages differ from covered employment data because BEA makes adjustments to account for self-employment. The employment count in the REMI model is larger than what is regularly reported by the Economic and Labor Market Information Bureau (ELMIB), New Hampshire Employment Security, which excludes self-employment. The REMI model does not distinguish between full-time and part-time jobs.

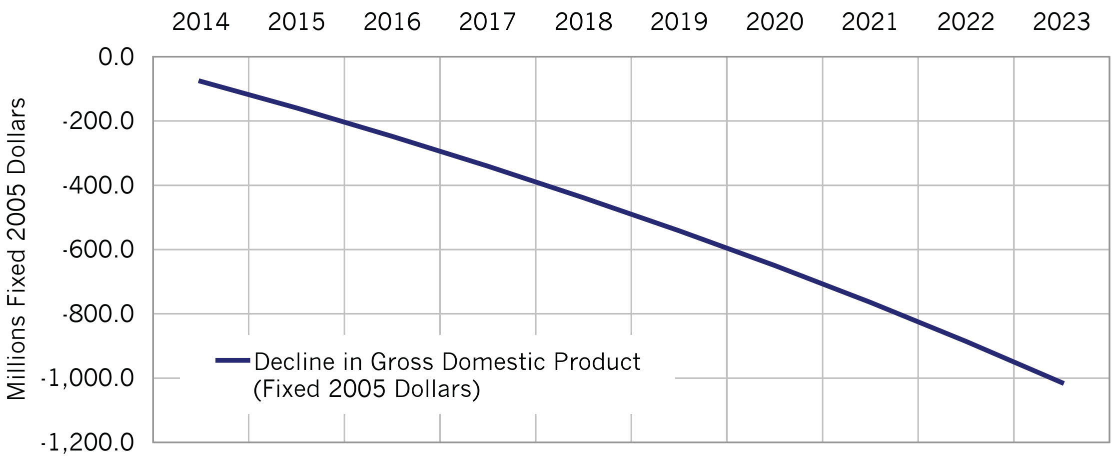
6. The impact on local and state government jobs would best be interpreted as employment (below the projected government employment baseline) that would not be required due to the decrease in the demand for shared government services. Shared services could include education, public safety, water and sewage treatment, road construction and maintenance, and other services related to an increase in business activity and resident population.

Table 3. Direct and Secondary Job Losses by Sector	2023	
	Direct Job Loss	Total Job Losses
Manufacturing	-3,761	-3,884
Construction		-771
Retail Trade		-450
Wholesale Trade		-419
Health Care and Social Assistance		-318
Accommodation and Food Services		-268
Administrative and Waste Management Services		-234
Professional, Scientific, and Technical Services		-205
Other Services, except Public Administration		-169
Real Estate and Rental and Leasing		-113
Arts, Entertainment, and Recreation		-65
Educational Services		-27
Management of Companies and Enterprises		-17
Information		-15
Utilities		-9
Forestry, Fishing, and Related Activities		-3
Transportation and Warehousing		-2
State and local government		-565

Gross Domestic Product

- As the aging of the workforce is a gradual process, only 376 direct jobs were lost in the county economy in 2014. In the first year of this scenario, the Gross Domestic Product in Hillsborough County was $76.6 million (in fixed 2005 dollars).
- With the loss of 3,761 *Manufacturing* jobs by 2023, Gross Domestic Product (GDP) in Hillsborough County would be $1.0 billion (in fixed 2005 dollars) below the projected baseline for 2023. This decline accounts for 3.4 percent of Hillsborough County's GDP. [Nashua Regional Planning Commission only covers about half of the Hillsborough County economy, so the potential impact on GDP for the planning region would be much larger than the 3.4 percent indicates.]

The impact on the GDP in Hillsborough County from the losses of *Manufacturing* jobs due to an aging workforce in the Nashua Region



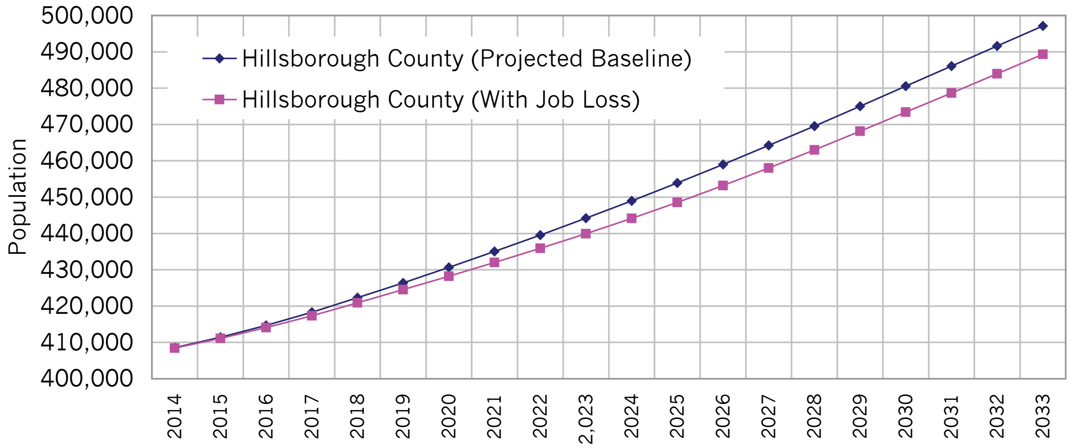
Personal Income

- Based on this scenario, total real personal income would be $31.1 million (in fixed 2005 dollars) below the projected baseline in 2014. By 2023, real personal income would be $423.1 million (in fixed 2005 dollars) below the projected baseline for Hillsborough County.
- Real personal income per capita in Hillsborough County would be reduced by $64 (in fixed 2005 dollars) in 2014. By 2023, real personal income per capita would be reduced by $435 (in fixed 2005 dollars) in comparison to the baseline for the county.

Population

- In 2014, Hillsborough County's population would be reduced by 116 persons compared to the projected baseline for that year. By 2023, the county's population would be reduced by 4,280 residents in comparison to the forecasted population baseline.

The population growth in Hillsborough County would be lower due to job losses in Manufacturing



Job Multiplier

- The multiplier effect on the Nashua Region for each job loss in *Manufacturing* is between 1.9 and 2.0 jobs annually[7] — including the direct job created — over the entire simulation period.

Scenario 2: Hypothetical Impact of Retiree Retention to the Nashua Region

Inputs and assumptions

In the following scenario, it was assumed that all the jobholders in manufacturing that were about to age out of the workforce lived within region, and that all of them would remain in the region after retirement. For the purpose of this exercise, it was also assumed that these workers were single — in other words, there was no re-calibration or assumptions made regarding how many of these retiring workers were living with a partner and the potential implications on the number of retired migrants. It was assumed that one retired jobholder would equal the in-migration of one retiree to the region.

7. A job multiplier of more than one indicates that the new job created in the local economy has a ripple effect that generates more employment in the region. A multiplier of less than one indicates that some of the current employment in the region would be eliminated due to the competition from the expanding businesses.

When entering population to the REMI model, the amount entered is added to total population permanently. So by entering 376 retired migrants (ages 65+) to the REMI Model each year between 2014 and 2023, a total of 3,760 retired migrants (ages 65+) were added to Hillsborough County by 2023. Table 4 shows the annual increase in population age 65 and over for this scenario.

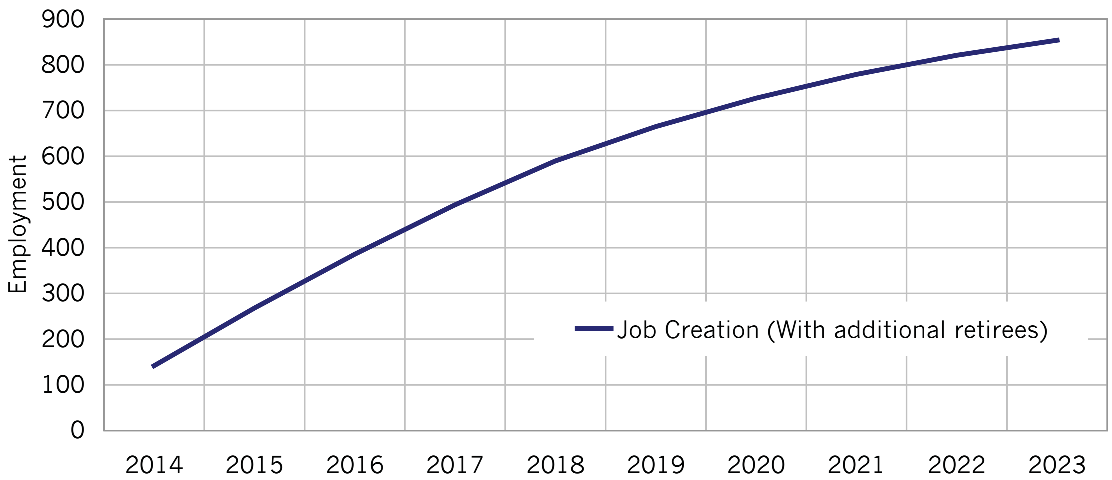
Table 4. Scenario 2	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Retired In-migrants Age 65+	376	376	376	376	376	376	376	376	376	376

Scenario Results: Potential impact on employment of retiree retention* in the greater Nashua Region

The following results are the potential implications of 3,760 retired persons migrating into the area. The results include both direct job losses and secondary (indirect and induced) job losses in Hillsborough County.

- In 2014, a total of 142 direct, indirect and induced jobs (see footnote 4 on bottom of page 6) would be created in Hillsborough County, and by 2023 total job creation would be 854.
- By 2023, the distribution of the jobs created would be as follows: 225 jobs would be created in *Construction*; 204 jobs would be created in *Health care and social assistance*; 163 jobs would be created in *Retail trade*; and 66 jobs would be created in *Accommodation and food services*. Another 51 jobs would be created in *State and local government*.

Change in employment in Hillsborough County due to the in-migration* of retired population (age 65+)



* In order to model a change, the retirees that remains in the greater Nashua Region were added to the REMI model baseline as persons migrating into the area. In reality, the simulation is trying to capture the economic impact of these retirees not leaving the region.

Table 5. Direct and Secondary Job Losses by Sector	2023	
	Total Job Losses	Per retention of 100 retirees age 65+
Construction	225	5.98
Health Care and Social Assistance	204	5.43
Retail Trade	163	4.34
Accommodation and Food Services	66	1.76
Other Services, except Public Administration	58	1.54
Wholesale Trade	26	0.69
Administrative and Waste Management Services	20	0.53
Real Estate and Rental and Leasing	16	0.43
Arts, Entertainment, and Recreation	14	0.37
Educational Services	6	0.16
Manufacturing	4	0.11
Professional, Scientific, and Technical Services	4	0.11
Information	3	0.08
Utilities	1	0.03
State and Local	51	1.36

The increase in *Construction* employment is due to an increase in demand for housing as retirees migrate into the region. In reality, this is not what is happening, as retiring jobholders are already living in the region. The impact on *Construction* employment might, therefore, be smaller than what is indicated by the simulation results. However, housing needs of retirees will still have to be met, whether by creating new housing stock or remodeling existing structures.

The increase in the population age 65 and over creates additional demand for services in *Health care and social assistance*, *Retail trade* and *Accommodation and food services*, but in general, the demand for goods and services are depressed due to a reduced level of spending by retirees, due to either ability to spend or a decrease in consumption. As no direct jobs were created, this scenario did not increase the level of spending between businesses. The impact on state and local government related to an increase in the population age 65 and over was fairly minimal, as no additional public education is required and no large-scale infrastructure is necessary to meet the needs of this populace.

Gross Domestic Product

- In 2014, Gross Domestic Product (GDP) in Hillsborough County would increase above the baseline by $9.0 million (in fixed 2005 dollars). By 2023, the GDP in Hillsborough County would grow to $47.9 million (in fixed 2005 dollars) above the baseline.
- The economic activity of this scenario would account for 0.16 percent of total GDP in Hillsborough County by 2023.

Personal Income

- Total real personal income would increase by $27.7 million (in fixed 2005 dollars) in 2014. By 2023, the increase in real personal income would grow by $212.3 million (in fixed 2005 dollars) above the baseline for Hillsborough County. [In this scenario, the impact on real personal income is larger than on GDP, indicating that an increase in personal income due to retirees generates a lesser impact on the local economic activity.]
- Real personal income per capita in Hillsborough County would gain $24 (in fixed 2005 dollars) in 2014. By 2023, real personal income per capita would gain $91 (in fixed 2005 dollars) above the original baseline for the county. [This per capita increase in real personal income is partly due to a relative decline in the population over time — as retirees continue to age, some will die or emigrate, thus decreasing the population.]

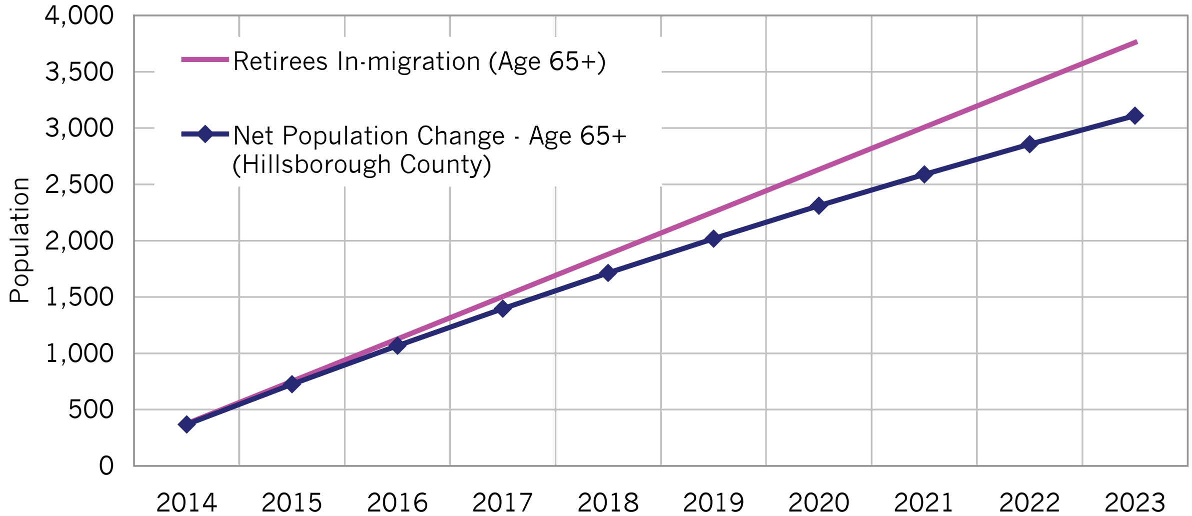
Population

- Population in Hillsborough County would gain 415 persons above baseline in 2014. By 2023, the county would gain a total of 3,169 residents, which is less than the 3,760 retirees (persons age 65 and over) that migrated into the region over the ten-year period. This relative decline in population creates a reduction in the demand for jobs and economic activity over time.
- The natural change in population (number of deaths versus number of births) in Hillsborough County would be negatively impacted in 2014 by six persons, and by 2023, the negative impact on the natural change would increase to 118 persons. Over the ten-year period, the net negative impact on population in Hillsborough County would accumulate to 612 persons.

Job Creation Per 100 Retirees

- It is not possible to generate a job multiplier from this scenario, as the count of jobs was not altered. Instead, it can be stated that for every additional 100 retirees that are retained in Hillsborough County, 37 jobs would be created in the county. Over time, however, this number will be diminished to 23 jobs per 100 retirees due to the negative natural change in population (more deaths than births) in the region.

Input and net changes to the projected baseline population in Hillsborough County



Summary

The greater Nashua region is heavily reliant on good-paying manufacturing jobs that require a knowledgeable and experienced workforce. Losing any portion of the jobs that are currently occupied by older, experienced manufacturing workers would have implications on many other industries in the region. Even if many of these older workers choose to stay in the region after retirement, only a limited amount of additional demand for services would be generated.

While the two scenarios were based on hypothetical situations, both perspectives showed a potential impact from the described situation.

The first scenario, in which 3,761 *Manufacturing* workers were removed from the workforce over a ten-year period, produced a job multiplier effect of 1.9 to 2.0 jobs (including the originally removed job). The secondary impact of these job losses would be felt in all industry sectors, but particularly in *Construction*, *Retail trade*, *Wholesale trade*, and *Healthcare and social assistance*.

The second scenario, in which the impact of 3,760 retired persons that were retained in the region was assessed, did not produce a job multiplier, as the job count was not altered. However, for every 100 persons age 65 and over that remain in the county (adding to the population count), 37 jobs would be created. This impact would reduce over time, as those persons age 65 and over would have an effect on natural change (births minus deaths).

The explanation below is the economic theory and empirical data behind the REMI model.

The REMI Model

REMI Policy Insight® is a structural model, meaning that it clearly includes cause-and-effect relationships.

The model is based on two key underlying assumptions from mainstream economic theory: households maximize utility and producers maximize profits. Since these assumptions make sense to most people, lay people as well as trained economists can understand the model. The tool is often used by economic developers and planners to gage the potential impact on a regional economy of proposed projects such as transportation infrastructure, office and retail development, relocation or expansion of businesses, etc.

In the model, businesses produce goods and services to sell locally to other firms, investors, governments, and individuals, and to sell as exports to purchasers outside the region. The output is produced using labor, capital, fuel, and intermediate inputs. The demand, per unit of output, for labor, capital, and fuel depends on their relative costs, since an increase in the price of any one of these inputs leads to substitution away from that input to other inputs. The supply of labor in the model depends on the number of people in the population and the proportion of those people who participate in the labor force. Economic migration affects the population size. People will move into an area if the real after-tax wage rates or the likelihood of being employed increases in a region.

Supply and demand for labor determine the wage rates in the model. These wage rates, along with other prices and productivity, determine the cost of doing business for each industry in the model. An increase in the cost of doing business causes either an increase in prices or a cut in profits, depending on the market for the product. In either case, an increase in costs would decrease the share of the local and U.S. market supplied by local firms. This market share, combined with the demand described above, determines the amount of local output. Many other feedbacks are incorporated in the model. For example, changes in wages and employment impact income and consumption, while economic expansion changes investment, and population growth impacts government spending.

The effects of a change scenario to the model are determined by comparing the baseline REMI forecast with an alternative forecast that incorporates the assumptions for the change scenario.