Regional Strategic Plan for Greater Lowell

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I. INTRODUCTION AND PLAN PURPOSE

The preparation of the Regional Strategic Plan (RSP) for Greater Lowell has been funded by the Massachusetts Executive Office of Housing and Economic Development (EOHED) as part of an initiative to increase local and regional planning capacity in the areas of economic development, housing and resource preservation. The Plan will assist the Northern Middlesex Council of Governments (NMCOG) and its member communities in planning for future development initiatives and for the preservation of important natural resources and open space. The RSP provides an assessment of existing conditions and offers recommendations relative to housing, economic development and the protection of open space and environmentally sensitive resource areas. The Plan identifies locations in each community where growth is appropriate based on zoning, infrastructure, access and environmental impacts.

NMCOG's previous regional policy plan, *2020 Vision: Planning for Growth in the Northern Middlesex Region,* was completed in 1999. The RSP has provided an opportunity to revisit and update many of the strategies and goals contained within that document. The RSP provides guidance to local and regional decision-makers on land use, infrastructure investment, environmental resource protection, and housing and economic development policy. The updated document contains strategies for advancing housing initiatives, and economic development and job creation through cooperative efforts between local, state, and regional levels of government. The Plan also provides the basis for increased interaction and coordination with federal agencies as well.

The experiences of the past fifty years have shown that policies and practices that promote sprawl, homogeneous development and divisiveness between urban and suburban communities are detrimental to the prosperity and quality of life for those living and working within the region. Sprawl uses more land than is necessary, fosters dependence on automobiles, results in fragmented open spaces, and is characterized by repetitive one-story commercial buildings surrounded by acres of parking. In the Northern Middlesex region, sprawl has resulted in the loss of community character, reduction in open space and farmland, degradation of the environment, increased traffic congestion, higher infrastructure and housing costs, and adverse impacts to municipal budgets.

Although the economy has been sluggish over the past few years, the Northern Middlesex region is well poised for additional economic growth in the future. As the recovery begins to take hold, it becomes more important than ever to make informed decisions about the location and shape of future development. On both the local and regional level, thoughtful planning can successfully integrate economic development with the preservation of environmental resources and community character.

The RSP focuses on smart growth and sustainable development principles that promote compact growth in those areas with available infrastructure, and which foster the protection and

preservation of the region's most valuable environmental and cultural resources. The Plan was created to assist local and regional decision makers in identifying ways to apply these principles to land use and development policies and practices in the future through planning, and through development practices and regulations.

The Commonwealth of Massachusetts has adopted the following Sustainable Development Principles, which are supported by NMCOG and advanced through the strategies outlined in this plan:

1. **Concentrate Development and Mix Uses**

   Support the revitalization of city and town centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources, and integrates uses. Encourage remediation and reuse of existing sites, structures, and infrastructure rather than new construction in undeveloped areas. Create pedestrian-friendly districts and neighborhoods that mix commercial, civic, cultural, educational, and recreational activities with open spaces and homes.

2. **Advance Equity**

   Promote equitable sharing of the benefits and burdens of development. Provide technical and strategic support for inclusive community planning and decision-making to ensure social, economic, and environmental justice. Ensure that the interests of future generations are not compromised by today's decisions.

3. **Make Efficient Decisions**

   Make regulatory and permitting processes for development clear, predictable, coordinated, and timely in accordance with smart growth and environmental stewardship.

4. **Protect Land and Ecosystems**

   Protect and restore environmentally sensitive lands, natural resources, agricultural lands, critical habitats, wetlands and water resources, and cultural and historic landscapes. Increase the quantity, quality and accessibility of open spaces and recreational opportunities.

5. **Use Natural Resources Wisely**

   Construct and promote developments, buildings, and infrastructure that conserve natural resources by reducing waste and pollution through efficient use of land, energy, water, and materials.

6. **Expand Housing Opportunities**

   Support the construction and rehabilitation of homes to meet the needs of people of all abilities, income levels, and household types. Build homes near jobs, transit, and where services are available. Foster the development of housing, particularly multifamily and smaller single-family homes, in a way that is compatible with a community's character and vision and with providing new housing choices for people of all means.

7. **Provide Transportation Choice**

   Maintain and expand transportation options that maximize mobility, reduce congestion, conserve fuel and improve air quality. Prioritize rail, bus, boat, rapid and surface transit, shared-vehicle and shared-ride services, bicycling, and walking. Invest strategically in existing and new passenger and freight transportation infrastructure that supports sound economic development consistent with smart growth objectives.

8. **Increase Job and Business Opportunities**

   Attract businesses and jobs to locations near housing, infrastructure, and transportation options. Promote economic development in industry clusters. Expand access to education, training, and entrepreneurial opportunities. Support the growth of local businesses, including sustainable natural resource-based businesses, such as agriculture, forestry, clean energy technology, and fisheries.

9. **Promote Clean Energy**

   Maximize energy efficiency and renewable energy opportunities. Support energy conservation strategies, local clean power generation, distributed generation technologies, and innovative industries. Reduce greenhouse gas emissions and consumption of fossil fuels.

10. **Plan Regionally**

    Support the development and implementation of local and regional, state and interstate plans that have broad public support and are consistent with these principles. Foster development projects, land and water conservation, transportation and housing that have a regional or multi-community benefit. Consider the long-term costs and benefits to the Commonwealth.

A. Plan Overview

The Regional Strategic Plan (RSP) is comprised of eleven chapters. Chapter I presents an overview of the plan purpose, and describes the process used for developing the plan. It also contains a list of goals developed through the public input process, and provides a demographic profile of the region.

Chapter II discusses land use reform in Massachusetts and summarizes the proposed Land Use Reform Partnership Act (LUPA). This section also assesses where each community currently stands in terms of the opt-in provisions contained within the proposed LUPA legislation. In addition, a proposed regional review process is outlined that meets the intent of LUPA.

Chapter III provides an overview of land use and zoning patterns and trends in the region, examines land use planning tools for sustainable development, and discusses issues and opportunities related to land use policy.

Chapter IV focuses on environmental planning and preservation. This chapter provides a summary of existing protected open space throughout the region, identifies important natural resource and habitat areas, provides an overview of environmental challenges, and addresses historic and cultural resources. In addition, this chapter also provides a synopsis of preservation tools available to the region, and identifies Priority Preservation Areas.

Chapter V focuses on Green Energy initiatives being undertaken at the state and local levels. This section includes an overview of the Green Communities program, outlines progress made in expanding solar and wind energy generation, discusses green building techniques, provides an overview of the economic benefits of renewable energy, and presents information relative to tools and incentives for renewable energy and energy conservation.

Chapter VI provides an overview of the regional economy, and examines existing infrastructure, workforce development, and land use practices that impact economic development. This section also outlines economic development tools and incentives available to local communities and the overall region. In addition, Chapter VI identifies Priority Economic Development Areas throughout the region.

Chapter VII provides an overview of regional and local housing trends and challenges, assesses the state of the current housing market, provides information on housing production tools, and outlines housing issues and opportunities going forward. Chapter VII also identifies priority areas for the creation of additional housing units.

Chapter VIII assesses the consistency of the Regional Strategic Plan with the Commonwealth's Sustainable Development Principles. Chapter IX outlines recommendations and strategies for addressing the various issues identified through the plan development process. These recommendations and strategies were formulated with the objective of attaining the goals outlined in Chapter I of the Plan. Chapter X discusses plan implementation and identifies performance measures that will be used to assess and chart implementation progress in the future. Chapter XI describes and documents the Plan Adoption process.

The RSP contains a series of composite maps that outline the area's water resources, land uses, and zoning districts, and that identify priority preservation areas, priority economic development areas, and priority areas for housing. These maps provide a framework for regional land use and economic development planning, and identify discrete areas upon which the region may focus its future development activities, while simultaneously protecting its natural resources. The maps were created through a collaborative effort with all nine communities, and are based on resource constraints, existing and desired land use patterns, and local zoning.

B. The Planning Process

The development of the RSP included a public involvement process comprised of two Visioning Sessions. The first session was held on November 4, 2010 at the UMass Lowell Inn and Conference Center. This session provided attendees with an overview of the planning project and with information regarding the proposed Land Use Reform Act (LUPA). In addition, a SWOT Analysis (Strengths, Weaknesses, Opportunities and Threats) was performed as a means of gathering input and ideas to be used in the formulation of the RSP goals. Participants were asked to address the following questions:

- What are the strengths of the Greater Lowell region?
- What are the weaknesses in the Greater Lowell region that need to be addressed?
- What opportunities are available to grow the Greater Lowell economy and to balance this growth with the quality of life?
- What future threats to the Greater Lowell region can you identify that will need to be addressed?
- What do you see as the future for the Greater Lowell region? Where will the regional growth centers be? Where should preservation areas be? Where should housing growth occur?

The second visioning session was held on November 18, 2010 in the Community Room at the Tewksbury Police Headquarters. Participants discussed LUPA, and were presented with the results of the SWOT session conducted at the first visioning session. Draft goals were developed and discussed among those in attendance. In addition, attendees provided input relative to identifying priority development areas and priority preservation areas. Copies of the visioning session notices, agendas, and materials are included in Appendix A.

In addition to the public visioning sessions, numerous meetings with local officials and municipal staff were held to collect data, and receive input and feedback relative to the identification of the priority development and preservation areas. The RSP was also discussed at several meetings of the NMCOG Council. These meetings were posted at the City/Town Clerk offices and were open to the public. In addition, the public was able to submit comments via the NMCOG website at www.nmcog.org.

Much of the data used to develop this plan was drawn from municipal master plans, Open Space and Recreation Plans, GIS sources, Housing Production Plans, local bylaws and ordinances, and Economic Development Plans. In addition, several NMCOG documents were utilized including the *Greater Lowell Comprehensive Economic Development Strategy (CEDS) for 2009-2013*, the *Regional Transportation Plan*, the region's *Pre-Disaster Mitigation Plan*, and the *Regional Open Space Plan*. Stakeholders participating in the plan development process included the nine member communities, the Greater Lowell Chamber of Commerce, the Merrimack Valley Economic Development Council, Community Teamwork, Inc, Lowell Parks and Conservation Trust, United Teen Equality Center, UMass Lowell, Middlesex Community College, the National Park Service, the Greater Lowell Workforce Investment Board, the Westford Affordable Housing Committee, the Middlesex North Registry of Deeds, the Pawtucketville Citizens Council, private industry, the Chelmsford Economic Development Committee and the Merrimack River Watershed Council.

The draft Plan is being presented to the chief elected officials in each of the nine communities during October and November of 2011. Each community will be asked to adopt the RSP and to work with NMCOG on its implementation in the future.

C. Goals of the Plan

Based on input received throughout the plan development process, goals were formulated and organized into four subject areas: land use; economic development; housing; and natural, cultural and environmental resources:

Land Use

- Use land efficiently and protect sensitive resource areas by directing growth to priority development areas and locations with adequate infrastructure;
- Support the transformation of key underutilized lands, such as "brownfields", to productive uses that complement the community and enhance existing neighborhoods;
- Incentivize redevelopment activities through land use tools, streamlined permitting and economic incentives;
- Minimize the environmental impact of future development by encouraging mixed-use and compact development patterns, and by promoting the use of low impact development techniques; and
- Use capital facilities and infrastructure efficiently and in a manner that is consistent with the region's natural features, respectful of the character of its communities and neighborhoods, and that builds upon the economic strengths of each community.

Economic Development

- Create a regional economic development framework that supports the efforts of private industry, local communities and agencies, educational institutions, federal and state agencies and private foundations to create jobs and improve the quality of life in the region;
- Create higher-skilled, higher wage jobs within industry clusters – biotech, nanotech, high technology, "green" industries, and emerging technology – to diversify the regional economy and focus on the global economy;
- Utilize a combination of economic development and redevelopment strategies that reflects the character of each community and address infrastructure barriers (roads, wastewater capacity, telecommunications, etc) to future economic growth; and
- Increase the supply of skilled workers for industry in the region through the integration of economic development and workforce development strategies.

Housing

- Create more affordable and market-rate housing throughout the region to ensure that businesses can expand and relocate to the region with the assurance that their workforce will be able to own, lease or rent quality housing;
- Encourage mixed-use development that ties together residential and commercial uses in city and town centers and mill districts throughout the region;
- Increase housing options available to families, young couples, single adults, seniors, artists, students, the disabled, veterans, and other groups so that they may live and work in the Greater Lowell region;
- Address expiring uses as a means of maintaining the region's stock of affordable housing; and
- Encourage the location of future housing in areas served by public transit.

Natural, Cultural and Environmental Resources

- Care for the natural environment by protecting and restoring natural systems, conserving habitat, improving water quality, and reducing air pollution, thereby ensuring that all residents, regardless of social and economic status, live in a healthy environment;
- Promote the use of innovative, environmentally-sensitive development practices, including design, materials, construction, and on-going maintenance;
- Encourage the use of low impact development techniques and other best management practices (BMPs) for managing stormwater;
- Preserve, protect and enhance the region's remaining agricultural lands;
- Support agricultural, farmland and aquatic uses that enhance the local food system and increase its capacity to produce fresh and minimally processed foods;

- Preserve significant historic, visual and cultural resources, including public views, landmarks, archaeological sites, historic and cultural landscapes, and areas of special character;
- Improve public access to the region's waterways, water bodies and open spaces; and
- Promote the production and use of alternative energy.

D. Demographic Profile of the Region

The Greater Lowell region consists of the City of Lowell and its eight suburbs – Billerica, Chelmsford, Dracut, Dunstable, Pepperell, Tewksbury, Tyngsborough and Westford – and has a land area of approximately 196 square miles and an inland water area of 5.76 square miles. The City of Lowell serves as the central city and economic center of the region. According to the U.S. Census Bureau, the Greater Lowell region had a population of 286,901 in 2010, which represented an increase of 2.2% since 2000. This growth rate was one-third of what the region experienced between 1990 and 2000. The region is tied together by the Merrimack River and is located in the northeastern section of Massachusetts, abutting the New Hampshire state line. The City of Lowell is approximately forty-five minutes from the City of Boston and Manchester, New Hampshire and an hour from the City of Worcester and Portsmouth, New Hampshire.

1. Development History

The Greater Lowell region represents the classic development of an urban center surrounded by suburbs. The nine communities within the region initially shared a common agricultural development pattern, but later separated into urban, suburban and rural communities. Three hundred fifty years ago, these communities didn't exist, but with the establishment of meetinghouses within the classic New England town centers, these communities, as we know them today, were formed. Billerica and Chelmsford were incorporated in 1655, while Dunstable was incorporated in 1673. By the first part of the 18th century, Dracut (1701), Westford (1729), and Tewksbury (1734) were incorporated, while Pepperell (1775) and Tyngsborough (1809) were incorporated later that century. Lowell was founded in 1821 and became a City in 1836.

Initially, this region focused upon agriculture and related activities, such tanning, blacksmithing, coopering, and furniture making. Other activities, such as grist and saw milling, fulling and iron forging, depended upon good sources of water power. Major growth occurred between 1790 and 1820, when the vast potential of the Merrimack River and its tributaries – Concord River, Stony Brook and Beaver Brook - was recognized. The canal system was instituted in the 1790s, principally for travel to Boston and New Hampshire. The Pawtucket and Middlesex Canals provided the necessary waterways, while the Middlesex Turnpike served as the principal land trade route to Boston.

The industrialization of the region began in 1811, with the introduction of wool manufacturing in North Billerica. Subsequently, the first planned industrial city in America was created in Lowell, utilizing the hydraulic power of the Merrimack River at Pawtucket Falls. By 1836, the City of

Lowell had eight major textile firms employing 7,000 people. The region surrounding Lowell was also impacted by industrialization, as small industrial settlements grew into extensive textile mill villages, particularly in North Billerica, North Chelmsford, Graniteville, Forge Village and Collinsville, between 1820 and 1850.

Even further industrialization occurred between 1850 and 1890 with the introduction of the railroad. The railroad made the canals obsolete for transportation purposes and brought many immigrants to work in the mills. The immigrant workers settled in Lowell and its surrounding communities, and thus began the influx of ethnic groups to the region. However, with the introduction of the railroad nationwide, the competitive advantage enjoyed by this region shifted to the South, and by 1920 the textile industry began to deteriorate. The Depression years were particularly hard on this area due to the overdependence on the textile industry.

Following World War II, the construction of major highways and investment in housing, particularly outside the City, created new growth opportunities for the region. Suburbs were formed and still depended upon Lowell as the regional economic center of the region. The construction of Route 128, Route 3, I-93, I-495 and the Lowell Connector opened up the region to increased economic opportunities. The tie-in between this region and the Route 128 area was enhanced by the road construction, and the development of affordable houses that were built to accommodate the labor force that worked along Route 128. The expansion of Route 3 during the past five years has once again increased the economic opportunities in the region and enhanced connections to Route 128 and New Hampshire.

Development pressures in the region shifted from the City of Lowell to the outlying communities, particularly Billerica, Chelmsford and Tewksbury, in the 1970s and 1980s. Manufacturing continued to decline in the 1970s as the textile, shoe, metal working and chemical industries re-located to other parts of the country in search of cheaper labor and other expenses. Increased investment in the defense and service industries did not make up for the loss of these manufacturing industries.

During the 1980s, the growth of the computer, communications systems and military equipment industries, as well as the construction and housing industries, pulled the Lowell region out of the economic depths it had experienced. Employment growth increased outside the City of Lowell with the development of new industrial parks along Route 3, I-495 and I-93. However, during the late 1980s and early 1990s, the region experienced a large number of layoffs in the computer and military equipment industries. It wasn't until the mid-1990s that the region was able to regain its footing economically by diversifying its industrial and commercial base. The growth of small to medium sized businesses ended up exceeding the job losses in major firms in the area. During the mid-2000s the Greater Lowell region enjoyed a diversified economy that did not rely as heavily as it had in the past on the City of Lowell or Route 128. Instead expanded economic opportunities were found in the suburban communities and in New Hampshire.

Since 2007, the overall economy has suffered as a result of the housing crisis and the national recession. The Greater Lowell region has been experiencing unemployment rates that haven't been seen in this area for thirty years.

2. Greater Lowell Population and Growth Rates

The population in the Greater Lowell region has increased steadily since 1960. Between 1960 and 2010, the population grew by 69.4% from 169,403 to 286,901 or an average of 13.88% per decade. However, the growth rate for the region between 2000 and 2010 was only 2.02%. In the City of Lowell, the population increased from 92,107 in 1960 to 106,519 in 2010, for an overall growth rate of 15.6%. Yet, the city's share of the Greater Lowell region's population has been reduced from 54.4% in 1960 to 37.1% in 2010. Obviously, the overall growth in the region has occurred in the suburbs, even though there has been increased housing development in downtown Lowell during the past five years. The U.S. Census figures for 2000 and 2010 for the Greater Lowell region are summarized in Table 1.

Table 1: Population Figures for the Northern Middlesex Region

Community	2000 Population	2010 Population	% Change
Billerica	38,981	40,243	3.24%
Chelmsford	33,858	33,802	-0.17%
Dracut	28,562	29,457	3.13%
Dunstable	2,829	3,179	12.37%
Lowell	105,167	106,519	1.29%
Pepperell	11,142	11,497	3.19%
Tewksbury	28,851	28,961	0.38%
Tyngsborough	11,081	11,292	1.90%
Westford	20,754	21,951	5.77%
Total	**281,225**	**286,901**	**2.02%**

Source: U.S. Census Bureau, 2000 U.S. Census and 2010 Redistricting Data

The 2010 U.S. Census, which was just released this spring, provides some useful information on the population, age cohorts and housing data. According to the 2010 U.S. Census, the Greater Lowell region had a population of 286,901 in 2010 over a land area of 196.36 square miles, which represented a density of 1,461.1 residents per square mile. The median age in the Greater Lowell region was 38.3 years with 27.2% under the age of 20, 61.1% of residents between the ages of 20 and 64 and 11.7% of its population 65 years of age and older. The average household size was 2.76 persons per household. Information on the specific communities within the region includes the following:

- As the most populated suburban community in the region with a land area of 26.38 miles, the Town of Billerica had 40,243 residents in 2010 according to the U.S. Census Bureau. The overall population in Billerica increased by 3.24% between 2000 and 2010, as compared to the population increase of 2.02 % in the Greater

Lowell region. The median age in Billerica in 2010 was 40.1 years, with 25.3% of its population under the age of 20, 62.5% of residents between the ages of 20 and 64 and 12.2% of its population 65 years of age and older. The average household size was 2.79 persons per household.

- As the second most populated suburban community in the region with a land area of 23.28 square miles, the Town of Chelmsford had 33,802 residents in 2010 according to the U.S. Census Bureau. The overall population in Chelmsford actually decreased by 0.17%, or 56 residents, between 2000 and 2010. The median age in Chelmsford in 2010 was 43.2 years, with 24.9% of its population under the age of 20, 59% of residents between the ages of 20 and 64 and 16.2% of its population 65 years of age and older. The average household size was 2.53 persons per household.

- As the third most populated suburban community in the region with a land area of 21.36 square miles, the Town of Dracut had a total population of 29,457 residents in 2010 according to the U.S. Census Bureau. Dracut's population increased by 3.13% between 2000 and 2010. The median age in Dracut in 2010 was 39.9 years with 25.5% of its population under the age of 20, 62% of residents between the ages of 20 and 64 and 12.5% of its population 65 years of age and older. The average household size was 2.69 persons per household.

- As the least populated community in the region with a land area of 16.74 square miles, the Town of Dunstable had a total population of 3,179 residents in 2010 according to the U.S. Census Bureau. The overall population in Dunstable increased by 12.37% between 2000 and 2010. The median age in Dunstable in 2010 was 42.9 years, with 31.1% of its population under the age of 20, 58.9% of residents between the ages of 20 and 64 and 9.9% of its population 65 years of age and older. The average household size was 2.69 persons per household.

- As the most populated community in the region with a land area of 14.54 square miles, the City of Lowell had a total population of 106,519 residents in 2010 according to the U.S. Census Bureau. The overall population in Lowell increased by 1.29% between 2000 and 2010. The median age in Lowell in 2010 was 32.6 years, with 27.8% of its population under the age of 20, 62.2% of residents between the ages of 20 and 64 and 10.1% of its population 65 years of age and older. The average household size was 2.66 persons per household.

- As the western most community in the region with a land area of 23.17 square miles, the Town of Pepperell had a total population of 11,497 residents in 2010 according to the U.S. Census Bureau. The overall population in Pepperell increased by 3.19% between 2000 and 2010. The median age in Pepperell in 2010 was 41.6 years, with 27.9% of its population under the age of 20, 62.3% of residents between the ages of

20 and 64 and 9.8% of its population 65 years of age and older. The average household size was 2.74 persons per household.

- The Town of Tewksbury had a total population of 28,961 residents in 2010 according to the U.S. Census Bureau and a land area of 21.06 square miles. The overall population in Tewksbury increased by 0.38% between 2000 and 2010. The median age in Tewksbury in 2010 was 43.9 years with 24.6% of its population under the age of 20, 60.9% of residents between the ages of 20 and 64 and 14.5% of its population 65 years of age and older. The average household size was 2.7 persons per household.

- As one of the fastest growing communities in the region with a land area of 18.5 square miles, the Town of Tyngsborough had a total population of 11,292 residents in 2010 according to the U.S. Census Bureau. The overall population in Tyngsborough increased by 1.9% between 2000 and 2010. The median age in Tyngsborough in 2010 was 40.6 years, with 27.4% of its population under the age of 20, 63.7% of residents between the ages of 20 and 64 and 8.9% of its population 65 years of age and older. The average household size was 2.82 persons per household.

- As the largest community in the region in terms of land area (31.33 square miles), the Town of Westford had a total population of 21,951 residents in 2010 according to the U.S. Census Bureau. The population in Westford increased by 5.77% between 2000 and 2010. The median age in Westford in 2010 was 42 years, with 31.7% of its population under the age of 20, 58.4% of residents between the ages of 20 and 64 and 9.9% of its population 65 years of age and older. The average household size was 2.93 persons per household.

3. Housing and Income Data

The total number of housing units in the region increased from 101,973 units in 2000 to 109,446 units in 2010, an increase of 7,473 units or 7.3%. The City of Lowell accounted for the largest share of housing units in the region, however, its percentage share of the total housing units in the region decreased slightly from 38.7% in 2000 to 37.9% in 2010. The number of vacant units in the region nearly doubled from 2.6% in 2000 to 5 % in 2010. In terms of housing unit density, the City of Lowell was the only community in 2010 that had more than 600 housing units per square mile at 2,849.45 housing units, with the next highest community being Chelmsford at 593.08 housing units per square mile. Table 2 on the following page, provides population density and housing density data for the region and for each community.

Table 2: 2010 Population and Housing Density

Community	Population	Housing Units	Land Area (Sq. Mi.)	Population Density (Per Sq. Mi.)	Housing Unit Density (Per Sq. Mi.)
Billerica	40,243	14,481	26.38	1,525.51	548.94
Chelmsford	33,802	13,807	23.28	1,451.98	593.08
Dracut	29,457	11,351	21.36	1,379.07	531.41
Dunstable	3,179	1,098	16.74	189.90	65.59
Lowell	106,519	41,431	14.54	7,325.93	2,849.45
Pepperell	11,497	4,348	23.17	496.20	187.66
Tewksbury	28,961	10,848	21.06	1,375.17	515.10
Tyngsborough	11,292	4,206	18.50	610.38	227.35
Westford	21,951	7,876	31.33	700.64	251.39
Total	**286,901**	**109,446**	**196.36**	**1,461.10**	**557.37**

Source: U.S. Census Bureau, 2010 U.S. Census

In comparing the regional income figures in the Greater Lowell region in 2000 with what is available today, NMCOG used the data included in the 2005-2009 ACS developed by the U.S. Census Bureau. Income information will not be available in the 2010 U.S. Census as it was in the 2000 U.S. Census. Therefore, the principal focus has been on three major income indices – Per Capita Income, Median Household Income and Median Family Income, as well as the below the poverty level data (number and percentages). This data has been developed as a means to compare what has transpired within the Greater Lowell region, as well as in relation to the nation, state and county.

Per Capita Income

The Per Capita Income for the Northern Middlesex region increased from $24,081 in 2000 to $31,065 in 2005-2009, which represented an increase of 29%. Per capita income in the Greater Lowell region increased at a higher rate than that for the United States (25.27%), Commonwealth of Massachusetts (28.93%) and Middlesex County (26.04%). However, the per capita income in the Greater Lowell region still exceeds the per capita income at the national level ($27,041), while still lagging behind the per capita incomes for Massachusetts ($33,460) and Middlesex County ($39,322).

Within the Northern Middlesex region, six communities experienced per capita income growth rates between 2000 and 2005-2009 that exceeded the regional per capita income growth rates for the same period – Chelmsford (32.41%), Dracut (31.55%), Dunstable (30.03%), Lowell (30.04%), Pepperell (38.68%) and Tyngsborough (35.01%). The City of Lowell has maintained the lowest per capita income in the region at $22,831, which is 84.43% of the national per capital income level. Per capita incomes in the City of Lowell range from $10,264 in Census Tract 3107.00 to $33,696 in Census Tract 3125.02. Fourteen (14) of the twenty-five (25) Census Tracts in Lowell earned less than 80% of the national per capita income figures in 2005-2009, or $21,632.80, making them eligible for financial assistance from the Economic Development Administration (EDA) of the U.S. Department of Commerce. These Census Tracts include 3103.00, 3104.00, 3105.00, 3107.00, 3108.00, 3110.00, 3111.00, 3112.00, 3117.00, 3118.00, 3119.00, 3120.00, 3121.00, and 3124.00 (Note: Census Tracts 3108.00 and 3110.00 were combined in 2010 into Census Tract 3887.00). The highest per capita income figures were in Westford ($44,872), Chelmsford ($40,340) and Dunstable ($39,799).

Summarized in Table 3 are the per capita income figures for 2000 and 2005-2009 in the Greater Lowell region, the state and the nation, as reported by the 2000 U.S. Census and the 2005-2009 American Community Survey.

Table 3: Per Capita Income for the Northern Middlesex Region, 2000 and 2005-2009

Community/Region	2000	2005-2009	Percentage Change
Billerica	$24,953	$31,659	26.87%
Chelmsford	$30,465	$40,340	32.41%
Dracut	$23,750	31,243	31.55%
Dunstable	$30,608	$39,799	30.03%
Lowell	$17,557	$22,831	30.04%
Pepperell	$25,722	$35,671	38.68%
Tewksbury	$27,031	$33,045	22.25%
Tyngsborough	$27,249	$36,789	35.01%
Westford	$37,979	$44,872	18.15%
NMCOG Region	**$24,081**	**$31,065**	**29.00%**
Massachusetts	$25,952	$33,460	28.93%
United States	$21,587	$27,041	25.27%

Source: U.S. Census Bureau, 2000 U.S. Census and 2005-2009 American Community Survey

Median Household Income

The Median Household Income for the region increased by 27.13% from $58,472 in 2000 to $74,336 in 2005-2009. This increase in the median household income surpassed that experienced at the national (22.46%) and county (26.61%) levels, but lagged slightly behind the increase at the state (27.71%) level. The median household income for the region ($74,336) in 2005-2009 was greater than that for the State ($64,496) and the nation ($51,425) and lower than that for Middlesex County ($77,004). As reflected in Table 4, this relationship was similar in 2000.

The greatest percentage change in median household income between 2000 and 2005-2009 occurred in Tyngsborough (40.96%), Pepperell (35.33%) and Billerica (31.34%). Westford (21.14%), Tewksbury (21.67%) and Dracut experienced the least amount of growth in their median household incomes. Westford ($119,081) had the highest median income in 2005-2009 within the region, replacing Dunstable ($109,333), which had the highest median household income in 2000. The City of Lowell had the lowest median household income in 2000 ($39,192) and in 2005-2009 ($49,816). Within the City of Lowell, the median household income for 2005-2009 ranged from $14,105 in Census Tract 3111.00 to $69,470 in Census Tract 3125.02. Table 4 summarizes the median household income information for the region.

Table 4: Median Household Income in the Northern Middlesex Region, 2000 and 2005-2009

Community/Region	2000	2005-2009	Percentage Change
Billerica	$67,799	$87,048	31.34%
Chelmsford	$70,207	$89.022	26.80%
Dracut	$57,676	$71,480	23.93%
Dunstable	$86,633	$109,333	26.20%
Lowell	$39,192	$49,816	27.11%
Pepperell	$65,163	$88,185	35.33%
Tewksbury	$68,800	$83,709	21.67%
Tyngsborough	$69,818	$98,413	40.96%
Westford	$98,272	$119,081	21.14%
NMCOG Region	**$58,472**	**$74,336**	**27.13%**
Massachusetts	$50,502	$64,496	27.71%
United States	$41,994	$51,425	22.46%

Source: U.S. Census Bureau, 2000 U.S. Census and 2005-2009 American Community Survey

In assessing levels of distress in the region, the current poverty figure from the U.S. Department of Housing and Urban Development (HUD) for a family of four at 60% of median income is $44,601.60. The census tracts whose median income are below this figure are all in the City of Lowell; Census Tracts 3101.01, 3104.00, 3107.00, 3108.00, 3110.00, 3111.00, 3112.00, 3119.00, 3121.00 and 3124.00.

Median Family Income

The Median Family Income in the region increased by 28.87% from $67,583 in 2000 to $87,096 in 2005-2009. This increase in the region's median family income outpaced the 24.61% increase at the national level, while it lagged behind the 31.71% increase in Massachusetts. The relative position of each region stayed the same between 2000 and 2005-2009, when compared to the state and the nation.

Table 5 below summarizes the median family income for the communities within the Northern Middlesex region in 2000 and 2005-2009, as well as the percentage change between each time period. The greatest percentage change between 2000 and 2005-2009 was experienced by Pepperell (39.68%), Tyngsborough (32.57%) and Dracut (32.37%). Westford had the smallest percentage change in median family income at 22.28%.

Table 5: Median Family Income in the Northern Middlesex Region, 2000 and 2005-2009

Community/Region	2000	2005-2009	Percentage Change
Billerica	$72,102	$94,346	30.85%
Chelmsford	$82,676	$108,494	31.23%
Dracut	$65,633	$86,881	32.37%
Dunstable	$92,270	$115,964	25.68%
Lowell	$45,901	$56,494	23.08%
Pepperell	$73,967	$103,320	39.68%
Tewksbury	$76,443	$96,059	25.66%
Tyngsborough	$78,680	$104,303	32.57%
Westford	$104,029	$127,210	22.28%
NMCOG Region	**$67,583**	**$87,096**	**28.87%**
Massachusetts	$61,664	$80,822	31.07%
United States	$50,046	$62,363	24.61%

Source: U.S. Census Bureau, 2000 U.S. Census and 2005-2009 American Community Survey

Similar to the median household income, Westford ($127,210) and Dunstable ($115,964) had the highest median family income in the region, while the City of Lowell had the lowest median family income in 2005-2009 at $56,494. Within the City of Lowell, the median family income ranged from $16,858 in Census Tract 3110.00 to $97,500 in Census Tract 3125.01.

Poverty Line

Between 2000 and 2005-2009, the number of residents below the poverty line in the Greater Lowell region actually decreased from 22,877 to 22,763, or by -0.5%, while the percentage of residents below the poverty line decreased from 8.31% to 8.24%. Table 6 below summarizes the changes in the population and percentage of population below poverty in the Greater Lowell region. As expected, the City of Lowell experienced the greatest poverty levels within the region and its share of the regional poverty levels increased from 74.6% in 2000 to 77.1% in 2005-2009. This increase in regional share was due to the increase in residents below the poverty line in Lowell from 17,066 in 2000 to 17,550 in 2005-2009, for an increase of 2.84% and a decrease in the number of residents below the poverty level in the region for the same time period.

Table 6: Residents below Poverty Line, 2000 and 2005-2009

Community	2000 Population Below Poverty Line	2000 Percentage Below Poverty Line	2005-2009 Population Below Poverty Line	2005-2009 Percentage Below Poverty Line	Percentage Change - 2000 to 2005-2009
Billerica	1,414	3.75%	946	2.46%	-33.10%
Chelmsford	938	2.81%	1,346	4.01%	43.50%
Dracut	1,055	3.70%	852	2.95%	-19.24%
Dunstable	55	1.95%	173	5.27%	214.55%
Lowell	17,066	16.78%	17,550	17.67%	2.84%
Pepperell	411	3.69%	342	3.03%	16.79%
Tewksbury	1,074	3.77%	1,072	3.79%	-0.19%
Tyngsborough	519	4.69%	234	2.02%	-54.91%
Westford	345	1.67%	248	1.14%	-28.12%
NMCOG Region	**22,877**	**8.31%**	**22,763**	**8.24%**	**-0.50%**

Source: U.S. Census Bureau, 2000 U.S. Census and 2005-2009 American Community Survey

Dunstable (214.55%), Chelmsford (43.5%) and Pepperell (16.79%) experienced increases in their number of residents below the poverty line between 2000 and 2005-2009. During the same time period, the number of residents below the poverty line in Tyngsborough (-54.91%), Billerica (-33.1%), Westford (-28.12%), and Dracut (-19.24%) decreased. Tewksbury registered a slight decrease (-0.19%) in the number of residents below the poverty line between 2000 and 2005-2009.

E. Demographic Forecasts

The population, household and employment projections for the Northern Middlesex Region were developed utilizing a methodology developed by the Massachusetts Department of Transportation (MassDOT). Over the past ten years, the region has continued to grow, albeit less dramatically than in past decades. Based upon population projections developed by MassDOT with input from NMCOG, the region is expected to grow by an additional 10,099 residents (3.52%) between 2010 and 2020 and by another 23,000 residents (7.74%) between 2020 and 2035. The region, as a whole, is projected to grow by 8.88% between 2010 and 2035, which represents a much greater growth rate than that experienced between 2000 and 2010 (2.02%). The data summarized in Table 7 reflects anticipated population trends over the next two decades.

Table 7: Population Projections for the Northern Middlesex Region

Community	2000	2010	2020	2025	2030	2035
Billerica	38,981	40,243	40,690	41,340	41,810	42,560
Chelmsford	33,858	33,802	34,750	35,260	35,880	36,480
Dracut	28,562	29,457	32,080	33,140	34,630	36,160
Dunstable	2,829	3,179	3,560	3,950	4,370	4,800
Lowell	105,167	106,519	106,920	108,220	109,820	111,360
Pepperell	11,142	11,497	13,070	13,680	14,660	15,360
Tewksbury	28,851	28,961	30,000	31,020	31,820	32,640
Tyngsborough	11,081	11,292	12,470	13,070	13,740	14,400
Westford	20,754	21,951	23,460	24,320	25,270	26,240
Total	**281,225**	**286,901**	**297,000**	**304,000**	**312,000**	**320,000**

Source: U.S. Census Bureau, U.S. Census for 2000 and 2010; MassDOT projections in consultation with NMCOG

The region as a whole is projected to grow by 13.79% between 2000 and 2035. Between 2010 and 2035, the towns of Dunstable and Pepperell are expected to increase their total population significantly with growth rates of 50.99% and 33.6%, respectively. For those communities that are more developed, such as Billerica, Chelmsford, Tewksbury and the City of Lowell, less dramatic population growth is expected over the next twenty-five years. In general, the growth rates for the remaining towns will range between 12.7% (Tewksbury) and 19.5% (Westford) for this same period of time.

Notwithstanding the current housing slump, the number of households in the region is projected to increase from 104,022 in 2010 to 118,900 households in 2035, an increase of 14.3%. The principal areas of household growth will be in Dunstable (55.2%), Pepperell (38.2%), Tyngsborough (33.8%), Westford (25.8%), and Dracut (25.7%), as outlined in Table 8. The more developed communities, such as the City of Lowell (5.7%), Billerica (10.6%), Chelmsford (11.6%) and Tewksbury (15.8%), will experience more restrained household growth between 2010 and 2035.

Table 8: Household Projections for the Northern Middlesex Region

Community	2000	2010	2020	2025	2030	2035
Billerica	12,919	14,034	14,350	14,700	14,950	15,250
Chelmsford	12,812	13,313	13,900	14,180	14,550	14,850
Dracut	10,451	10,956	12,000	12,490	13,150	13,770
Dunstable	923	1,063	1,210	1,350	1,500	1,650
Lowell	37,887	38,470	38,650	39,370	39,920	40,650
Pepperell	3,847	4,197	4,850	5,130	5,500	5,800
Tewksbury	9,964	10,492	10,980	11,450	11,800	12,150
Tyngsborough	3,731	3,999	4,550	4,800	5,080	5,350
Westford	6,808	7,498	8,310	8,630	9,050	9,430
Total	**99,342**	**104,022**	**108,800**	**112,100**	**115,500**	**118,900**

Source: U.S. Census Bureau, U.S. Census for 2000 and 2010; MassDOT projections in consultation with NMCOG

As mentioned previously, the Northern Middlesex Region has experienced its worst economy since the end of World War II. Even though the Commonwealth of Massachusetts has performed better economically than many other states, the national recession has created unemployment rates in this area that haven't been seen in more than thirty years. However, the state projections anticipate a growth of 21,000 jobs for the region between 2010 and 2035, as shown in Table 9 on the following page.

Table 9: Employment Projections for the Northern Middlesex Region

Community	2000	2010	2020	2025	2030	2035
Billerica	26,612	20,583	22,620	22,590	22,810	22,810
Chelmsford	22,798	20,736	23,200	23,520	23,710	23,920
Dracut	4,711	4,826	5,720	5,970	6,210	6,420
Dunstable	234	255	320	350	360	390
Lowell	34,677	33,204	36,520	36,680	37,460	37,960
Pepperell	1,568	1,379	1,750	1,950	2,170	2,300
Tewksbury	17,256	15,213	17,190	17,610	18,050	18,400
Tyngsborough	4,286	4,123	5,040	5,160	5,380	5,650
Westford	11,474	11,681	13,640	14,170	14,850	15,150
Total	**123,616**	**112,000**	**126,000**	**128,000**	**131,000**	**133,000**

Source: U.S. Census Bureau, U.S. Census for 2000 and 2010; MassDOT projections in consultation with NMCOG

This employment growth of 18.75% is expected to be fueled by employment growth principally in the City of Lowell (4,756 jobs), Westford (3,469 jobs), Tewksbury (3,187 jobs), Chelmsford (3,184 jobs) and Billerica (2,227 jobs). The expected employment growth in Pepperell (66.8%), Dunstable (52.9%), Tyngsborough (37%) and Dracut (33%) will occur between 2010 and 2035.

II. LAND USE REFORM IN MASSACHUSETTS

It is generally recognized that zoning and land use law in Massachusetts is antiquated and in need of reform. Land use planning and regulation of development are fundamental tools that allow a municipality to adopt a set of rules to guide growth, preserve community character and protect public health. Over the past several years, a number of groups, including the Zoning Reform Working Group, have focused on developing a comprehensive land use bill. Comprised of legislators, municipal officials, development interests, planners and environmental and housing advocates, the Working Group has sought to advance legislative reforms aimed at rectifying existing deficiencies in the state's zoning and subdivision statutes.

New tools are needed to allow communities to plan and create a framework that balances housing production, open space retention and economic development. Numerous reports in recent years have documented a range of problems with land use patterns and housing affordability in Massachusetts, and have identified local regulations as an underlying cause of such problems. In many cases, existing zoning regulations inhibit good design, discourage the production of workforce housing and deplete natural resources through unsustainable development patterns. Massachusetts is losing land to development at a rate seven times its population growth.

A. Overview of the Proposed Land Use Partnership Act (LUPA)

The proposed Land Use Partnership Act (LUPA) modernizes a number of zoning and planning statutes contained in Massachusetts General Law Chapters 40A and 41. In addition, the proposed legislation allows municipalities to opt-in to a higher performance standard, and thereby receive access to additional tools for directing development. These higher standards have been established in accordance with the state's goals for housing, economic development, renewable energy, open space, and water resources. Regional planning agencies (RPA), such as NMCOG, would be responsible for certifying that these standards are met. The following provisions within the proposed legislation would affect all communities:

- Allows communities to regulate maximum residential floor area to control the building of "McMansions";
- Establishes clear authority for cities and towns to create form based zoning codes;
- Allows a simple majority vote for the adoption of a zoning bylaw or ordinance, although communities still have the option of maintaining a 2/3 vote requirement;
- Limits zoning freezes to a specific development proposal rather than applying the freeze to the site itself;
- Establishes a framework for site plan review, with a transparent and predictable process;
- Authorizes communities to implement Transfer of Development Rights (TDR) within a municipality and among municipalities;

- Clarifies and expands the use of "cluster development" to protect open space within a residential development;
- Empowers municipalities to charge impact fees to offset the cost of increased public services; and
- Clarifies the rules for subdivision review.

In order for a community to gain access to additional regulatory tools, it must prepare a land use plan that contains the following components: economic development, housing, open space protection, water management and energy management. The land use plan should also discuss the zoning policies that will be implemented, assess infrastructure needs, and discuss consistency with this RSP, and with the Commonwealth's land use objectives, which are outlined as follows:

- Support the revitalization of city and town centers and neighborhoods by promoting development that is compact, conserves land, and integrates uses;
- Support the construction and rehabilitation of homes near jobs, infrastructure and transportation options to meet the needs of people of all abilities, income levels, and household types;
- Attract businesses and jobs to locations near housing, infrastructure, and transportation options;
- Protect environmentally sensitive lands, natural resources, agricultural lands, critical habitats, wetlands and water resources, and cultural and historic structures and landscapes;
- Construct and promote developments, buildings, and infrastructure that conserve natural resources by reducing waste and pollution through efficient use of land, energy and water;
- Support transportation options that maximize mobility, reduce congestion, conserve fuel and improve air quality;
- Maximize energy efficiency and renewable energy opportunities to reduce greenhouse gas emissions and consumption of fossil fuel;
- Promote equitable sharing of the benefits and burdens of development;
- Make regulatory and permitting processes for development clear, predictable, coordinated, and timely in accordance with smart growth and environmental stewardship; and
- Support the development and implementation of local and regional plans that have broad public support and are consistent with these purposes.

A certified plan may include any material prepared within the past five years, such as a master plan, open space and recreation plan, community development plan or housing production plan.

Once the plan is completed, it must be adopted by the municipality and certified by the RPA. The performance standards for opt-in communities include the following:

- Creation of a certified land use plan and enactment of local zoning that is consistent with the plan;
- Prompt and predictable permitting of commercial and/or industrial development within one or more districts, unless waived by the RPA;
- Prompt and predictable permitting of reasonably compact residential development within one or more districts that can accommodate a number of new housing units equal to 5% of existing year-round housing units over ten years (.5% per year);
- Mandatory residential design to protect open space in developments five units or larger in all zoning districts with a minimum lot size of one acre;
- Mandatory low impact development techniques to help replenish groundwater in all developments greater than one acre; and
- Prompt and predictable permitting of (1) renewable or alternative energy generating facilities, or (2) renewable or alternative energy research and development facilities, or (3) renewable or alternative energy manufacturing facilities, within one or more zoning districts.

Opt-In Communities that meet the above performance standards and have a certified land use place are granted the following:

- Permission to eliminate the approval not required (ANR) exemption for residential projects;
- Reduction of the subdivision zoning freeze period from eight years to three years, or five years if the developer has made a substantial investment in infrastructure;
- Ability to impose reasonable rate-of-growth programs within growth areas;
- Ability to create natural resource protection zoning (very large lot conservation zoning) in areas with environmental resource value;
- Priority for discretionary state funding for infrastructure; and
- Technical assistance grant funding from the state to municipalities to prepare land use plans and implement needed zoning revisions.

B. Compliance with the Commonwealth's Land Use Objectives and the Certification Process

To comply with the Commonwealth's land use objectives, municipalities must establish a prompt and predictable permitting process for commercial and/or industrial development within one or more economic development districts. This means that all local permitting decisions must be made within one hundred eighty (180) days. The RPA may waive this requirement if alternatives for economic development that are more appropriate exist elsewhere in the region. The plan must also address prompt and predictable permitting requirements for: (1) renewable or alternative energy generating facilities, or (2) renewable or alternative energy research and

development facilities, or (3) renewable or alternative energy manufacturing facilities, within one or more zoning districts that are eligible locations.

The municipality must also establish a prompt and predictable permitting process for residential development within one or more residential development districts that can collectively accommodate, as defined by the RPA, a number of new housing units (excluding housing units that restrict the number of bedrooms or age-restricted housing) equal to that community's housing target (5% of year-round housing units). For the initial plan certification, a municipality's housing target number shall be reduced by the number of new housing units for which building permits were issued within two years prior to the effective plan date, provided that those units were located within a residential development district where a prompt and predictable permitting process was already in place when those permits were issued. This standard may be waived or modified upon determination by the RPA that the lack of adequate water supply or infrastructure prevents full compliance with the standard. In the case where a waiver is granted, the municipality may be required to participate in any regional housing plan established by the RPA.

For any zoning district that requires a minimum lot size of 40,000 square feet or more for single-family residential development, any residential development project of five or more new housing units must utilize open space residential design, unless a determination is made that this is not feasible. In addition, all development projects that disturb more than one acre of land, including as-of-right development, must utilize low impact development techniques.

In order for a community to become certified either before or after a plan has been developed, a community must implement and adopt regulatory provisions that meet the minimum land use objectives described above. The community becomes certified once a plan is completed and approved by the RPA, and these regulatory provisions are adopted.

C. Status of the NMCOG Communities Relative to the LUPA Opt-In Provisions

In the past, each of the NMCOG communities have developed a Master Plan document. As shown in Table 10 on the following page, only four communities have a Master Plan that is five years old or less: Chelmsford, Pepperell, Tewksbury and Westford. In addition, within the NMCOG region, none of the community master plan documents include a water management or energy management element. In order to receive certification under LUPA, five NMCOG communities would need to prepare a new or updated master plan document, and four communities would need to add water management and energy management elements to the documents that they currently have in place. NMCOG is now assisting the Town of Tewksbury in updating its master plan. In addition, the City of Lowell is in the process of updating its 2003 Comprehensive Master Plan as a Sustainability Plan.

Only one community in the region has an approved Housing Production Plan in place currently, but four communities (Chelmsford, Tewksbury, Tyngsborough and Westford) are in the process of preparing updated plans that comply with the revised regulations and guidelines developed in 2008. Every community in the Northern Middlesex region has an approved Open Space and Recreation Plan in place.

Table 10: Status of Community Master Plans, Housing Production Plans, and Open Space and Recreation Plans (as of 9/11)

Community	Date of Master Plan	LUPA Elements included in Current Master Plan					Status of Housing Production Plan	Status of Open Space and Recreation Plan
		Housing	Economic Development	Open Space Protection	Water Management	Energy Management		
Billerica	10/2002	yes	yes	yes	no	no	Expired	Current
Chelmsford	10/2010	yes	yes	yes	no	no	Expired, updated plan under development	Current
Dracut	12/1998	yes	yes	yes	no	no	Expired	Current
Dunstable	4/1999	yes	yes	yes	no	no	Expired	Current
Lowell	5/2003	yes	yes	yes	no	no	Not applicable	Current
Pepperell	2007	yes	yes	yes	no	no	Current	Current
Tewksbury	9/2007	yes	yes	yes	no	no	Expired, updated plan under development	Current
Tyngsborough	2002	yes	yes	yes	no	no	Expired, updated plan under development	Current
Westford	5/2009	yes	yes	yes	no	no	Expired, updated plan under development	Current

As shown in Table 11 on the following page, most communities would need to make revisions to their zoning regulations to meet the performance criteria outlined under the LUPA opt-in provisions. Every community, except Dunstable, has provisions within their zoning regulations that allow some amount of commercial, industrial or mixed-use development by right. Most communities have adequate water infrastructure to accommodate future development, except for the Town of Dunstable, which, with the exception of the Town Center, is almost entirely served by private wells. Most communities have some public sewer infrastructure, except for the

Towns of Dunstable and Westford. Most of Billerica, Chelmsford, Lowell and Tyngsborough are served by public sewer, however, the areas served in the Towns of Pepperell and Tyngsborough are far more limited in extent.

The City of Lowell is the only community that permits single-family residential development on a10,000 square-foot lot. In addition, Lowell is the only Northern Middlesex community to allow multi-family development at a density of twelve (12) units per acre. All communities in the region have adequate developable land or infill and redevelopment opportunities needed to increase their number of year-round housing units by 5%, as outlined in LUPA.

All communities in the Northern Middlesex region have zoning regulations in place that accommodate Open Space Residential Development (OSRD) by special permit, but none allow OSRD by right. All communities in the region set minimum land area for OSRD projects, but none have an established minimum number of residential units. Minimum project area ranges from five acres in Dracut and Lowell to fourteen acres in the Town of Dunstable. All communities have established set minimum residential lot size requirements for OSRD projects, which range from 4,250 square feet in Lowell to 35,000 square feet in Tyngsborough. Conventional subdivisions are allowed in all NMCOG communities, although the Towns of Pepperell and Westford regulations express a clear preference for OSRD by requiring that all developers submit an OSRD plan along with the conventional subdivision plan. In those communities, nearly all subdivisions are ultimately permitted as OSRD projects.

None of the communities in the Northern Middlesex region have adopted a Low Impact Development bylaw, although most have some type of stormwater regulation in place. NMCOG has assisted the Town of Dracut in preparing a draft LID bylaw through the DLTA program, and the Town of Westford has also drafted a LID bylaw, but it has not yet been adopted. In most communities, there is nothing within their current regulations that would specifically exclude the use of LID techniques.

Renewable energy bylaws have been adopted in some Northern Middlesex communities. The Town of Pepperell recently adopted a wind energy bylaw, and the Towns of Billerica, Dracut and Tyngsborough have draft wind turbine bylaws that are being reviewed and discussed. In addition, the Towns of Billerica and Tyngsborough and the City of Lowell have adopted PV solar regulations. The City of Lowell and the Town of Chelmsford allow R&D by right and it is assumed that renewable energy R&D would be allowable under the regulations currently in place, although renewable energy is not specifically called out within the regulations. Similarly, the communities of Billerica, Chelmsford, and Lowell have regulations in place that allow manufacturing by right, and it can be assumed that renewable energy manufacturing would fall within the parameters of the current regulations.

Table 11: LUPA Opt-In Status by Community

Community	Economic Development				Housing									Open Space Protection			Water Management		Energy Management		
	Zoning allows commercial, industrial, and/or mixed-use by right	Economic development areas have available infrastructure (transportation, water, sewer)			Zoning allows single-family on ¼ acre lot	Zoning allows for multi-family of 12 units per acre	Housing areas have adequate infrastructure			Year-round housing units (2010 Census)	Housing target (5% of year-round units)	Has capacity to meet housing target (available land, infill or redevelopment opportunities)	Zoning allows for OSRD design	Community has a 40R district	Allows OSRD by right	More than 5 units required for OSRD [1]	Minimum lot size of 40,000 sf required for single-family	LID Bylaw is in place	LID techniques required for project over one-acre	Renewable /alternative energy generating allowed by right	Renewable /alternative energy R&D by right	Renewable/ alternative energy manufacturing by right
		Water	Sewer	Transport-ation			Water	Sewer	Transport-ation														
Billerica	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	14,481	724	Yes	Yes	No	No	No	No	No	No	No	Yes	No	Yes
Chelmsford	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	13,807	690	Yes	Yes	No	No	No	No	No	No	No	No	Yes	Yes
Dracut	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	11,351	567	Yes	Yes	No	No	No	Yes	No	No	No	No	No	No
Dunstable	No	No	No	Yes	No	No	No	No	Yes	1,098	55	Yes	Yes	No	No	No	Yes	No	No	No	No	No	No
Lowell	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	41,431	2,071	Yes, through redevelop-ment	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes
Pepperell	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	4,348	217	Yes	Yes	No	No	No	Yes	No	No	Yes	No	No	No
Tewksbury	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	10,848	542	Yes	Yes	No	No	No	Yes	No	No	No	No	No	No
Tyngsborough	Yes	Yes- limited	Yes- limited	Yes	No	No	Yes- limited	Yes- limited	Yes	4,206	210	Yes	No	No	No	No	No	No	No	No	Yes	No	No
Westford	Yes – very limited	Yes	No	Yes	No	No	Yes	No	Yes	7,876	394	Yes	Yes	No	No	No	No	No	No	No	No	No	No

[1] All Northern Middlesex communities allow the option of developing conventional subdivisions in districts with 40,000 sf minimum lot size requirements

This issue of whether communities have prompted and predictable permitting in place is complicated and highly variable, and is often based on the type of project proposed and the level of permitting necessary. Communities that have adopted Chapter 43D have established streamlined permitting for economic development projects located in these districts. Within the Northern Middlesex region, Chapter 43D communities include Billerica, Chelmsford, Lowell, Pepperell, and Tewksbury. In addition, communities with zoning regulations in place for by right renewable energy generation, R&D or manufacturing, as required in the Green Communities Act, would also meet the prompt and predictable permitting criteria outlined in LUPA and CLURPA. In the Greater Lowell region such communities include Billerica, Chelmsford, Lowell, Pepperell and Tyngsborough.

The requirement for prompt and predictable permitting of residential projects is not met by most communities in the region, as residential development is now subject to a special permit. The City of Lowell, however, does meet this requirement through the Hamilton Canal redevelopment district which is being permitted through form-based code, and is within a growth district, Transit Oriented Development district and a 40R district.

D. Proposed Regional Review Process

As part of its contract with EOHED, NMCOG has developed a proposed regional review process for certifying community land use plans. Such master plan documents provide a vehicle for a community to outline its vision for the future. Should a zoning reform act, such as LUPA or the Comprehensive Land Use Reform Partnership Act (CLURPA), be enacted into law, the RPA will need to establish that future local land use plans and regulations comply with the mandatory and opt-in provisions outlined in the law. NMCOG proposes to utilize the checklist provided in Table 12 on the following pages as a means for review and certification.

Table 12: LUPA Certification and Compliance Review Form

Name of Community:	**Name of Community Contact:**	
Date of Submittal:	**Date of Completion of Certification Review:**	
LUPA Certification Requirement	**Compliance (yes/no)**	**Comments**
Land Use Plan contains all required elements (Land Use, Housing, Economic Development, Open Space Protection, Water Management, Energy Management) or equivalent documents have been provided that are five years old or less.		
An overall statement of land use goals and objectives is included.		
A description of land use regulation policies that will be implemented to achieve the stated goals and objectives is included.		
An assessment of infrastructure improvements needed to support the stated goals and objectives is provided.		
The plan documents consistency with NMCOG's RSP.		
The plan documents consistency with the Commonwealth's land use objectives.		
The public has been given a reasonable opportunity to provide input throughout the plan development process		

Table 12 (cont'd): LUPA Certification and Compliance Review Form

LUPA Certification Requirement	Compliance (yes/no)	Comments
The plan establishes prompt and predictable permitting of commercial and/or industrial development within one or more economic development districts.		
The plan establishes prompt and predictable permitting of residential development within one or more residential development districts that can collectively accommodate the communities housing target number (5% of year round units). Age-restricted units and those projects limiting the number of bedrooms are excluded from this calculation. For those communities seeking first time certification, the housing target is reduced by the number of new units for which building permits were issued within two years prior to the effective date, to the extent that these permits were issued within residential development districts where there was prompt and predictable permitting at the time of building permit issuance.		
Open Space Residential Design (OSRD) provisions are included for any zoning district that requires a minimum lot area of 40,000 sf or more for single-family residential development.		
OSRD is required for development of five or more new housing units, except where this is infeasible.		
The Plan (through zoning) requires that all development that disturbs more than one acre, including as-of-right development, utilize LID techniques.		
The Plan establishes prompt and predictable permitting of (1) renewable or alternative energy generating facilities, or (2) renewable or alternative energy research and development facilities, or (3) renewable or alternative energy manufacturing facilities within one or more zoning districts.		

1. Submittal and Review Process

The Planning Board must hold a public hearing to receive public comments on the plan at least fourteen (14) days prior to submission of the plan to NMCOG. Upon conclusion of the hearing and at the recommendation of the Planning Board, the plan may be submitted to NMCOG by the community's chief executive officer. Within ninety (90) days of the date of the plan submittal, NMCOG must determine if the Plan is complete and complies with NMCOG's RSP and the Commonwealth's land use objectives. A Plan shall be deemed complete if it contains the five land use plan elements outlined in LUPA. The Plan shall be deemed consistent with the Commonwealth's land use objectives if it meets the minimum standards for consistency outlined in the proposed legislation and reflected in the criteria contained on the previous page. NMCOG shall provide the community's chief executive officer with a letter outlining the results of the certification process and the reasons for its determination. If the plan is complete and consistent with the Commonwealth's land use objectives, NMCOG shall issue a certification letter to that effect. In a situation where NMCOG is unable to certify the Plan, it will provide the community with a written statement of the reasons for making this determination. A community may resubmit a revised plan for certification at any time which addresses the deficiencies outlined in NMCOG's determination. If NMCOG fails to issue a certification finding within ninety (90) days, the plan will be deemed certified.

2. Waiver provisions

Communities may request a waiver from the requirement for prompt and predictable permitting of commercial and/or industrial development within one or more economic development districts upon a determination by NMCOG that sufficient alternatives for economic development exist elsewhere in the region in more appropriate locations. The requirement that the Plan establish prompt and predictable permitting of residential development within one or more residential development districts that can collectively accommodate the community's housing target number (5% of year round housing units) may be waived or modified upon a determination by NMCOG that there is a lack of available water and/or wastewater infrastructure within the community to allow for full compliance. Alternatively, the community may be required to participate in any regional housing plan established by NMCOG.

3. Land Use Plan Adoption

Upon receiving certification from NMCOG, a community may adopt the land use plan through a simple majority vote of its legislative body (town meeting or City Council).

4. Certification and Adoption of Implementing Regulations

Once a plan is adopted, a community would enact regulations to implement the plan's recommendations. A municipality may also choose to prepare implementing regulations prior to the adoption of a certified plan. The municipality has the option of submitting its implementing regulations with the submission of the land use plan. In this case, NMCOG will review both the plan and the implementing regulations within the same ninety (90) day period.

To assist communities with this effort, the Interagency Planning Board (IPB) created under LUPA will provide at least one model of implementing regulations for open space residential design, low impact development, and clean energy generation/cogeneration facilities. As outlined in the proposed legislation, the IPB will be comprised of the Secretary of Housing and Economic Development (EOHED), the Secretary of the Executive Office of Energy and Environmental Affairs (EOEEA), and the State Permit Ombudsman, or their designees; along with a representative designated by the Massachusetts Association of Regional Planning Agencies (MARPA), and a representative designated by the Massachusetts Association of Planning Directors (MAPD). The State Permit Ombudsman would serve as Chair of the IPB and the Board would have the power to promulgate regulations to implement the requirements outlined in LUPA.

Implementing regulations must be submitted to NMCOG by the municipality's chief executive officer for certification. Within ninety (90) days of receipt, NMCOG shall determine whether the implementing regulations are consistent with the certified plan. The implementing regulations shall be deemed consistent with the certified plan if they effectuate the minimum standards for consistency as outlined in the LUPA legislation and reflected in Table 12 on the previous pages. If NMCOG determines that the implementing regulations are consistent with the certified plan, a written statement to that effect shall be provided to the community. If NMCOG determines that it is unable to issue such a certification, a written statement of the reasons for this determination shall be provided to the community. A municipality may re-submit implementing regulations for certification that have been modified to address the issues outlined in NMCOG's previously issued written statement at any time. If NMCOG does not issue a certification finding within ninety (90) days after receiving the implementing regulations (including re-submitted implementing regulations), the regulations shall be deemed certified.

Following certification of the implementing regulations by NMCOG, the regulations may be adopted by the municipality by simple majority vote of its legislative body (town meeting or City Council). On the date of receipt by NMCOG of proof of adoption of the certified implementing regulations pursuant to a certified plan, a municipality shall be deemed a "Certified Plan Community". Such date shall be deemed the "municipality's effective date".

A municipality's status as a Certified Plan Community shall expire ten years after the municipality's effective date, unless a renewal plan, together with any necessary implementing regulations, is prepared, certified and adopted prior to the expiration date. Each renewal plan shall expire in ten years.

5. Request for Review of a NMCOG Decision

Any certification by NMCOG with respect to a plan or implementing regulations is subject to review by the IPB. The IPB may, upon the request of a municipality or upon its own motion, review any decision made by NMCOG in an informal, non-adjudicatory proceeding. The IPB may also request information from a third party and may modify or reverse such decision if it does not comply with the provisions of the legislation and/or with procedures established by the RPA and the IPB for reviewing such certifications.

If a municipality provides written notice to the IPB of the certification by NMCOG of a plan or implementing regulations or a material amendment of either, the IPB may only review such certification within sixty (60) days of the certification. The IPB may by regulation define categories of amendments that shall be deemed non-material.

6. Effect of Certified Plan Status on Zoning and Land Use Regulations

Following the "municipality's effective date", local zoning ordinances or bylaws, subdivision rules and regulations, and other local land use regulations (other than certified implementing regulations), which are determined to be inconsistent with the certified plan or the certified implementing regulations, shall be deemed invalid. Any material amendment to a certified plan or certified implementing regulations that had not been prepared, certified and adopted in accordance with the provisions of LUPA would be presumed to be inconsistent with the certified plan.

According to the proposed legislation, following the "municipality's effective date":

- "A zoning ordinance or bylaw that limits the number of new housing units within residential districts for which building permits may be issued in any twelve month period to an amount equal to or greater than one-fifth of the housing target number (but in no event less than ten new housing units) shall not be declared exclusionary or otherwise against public policy;
- A zoning ordinance or bylaw that requires a minimum lot area of two or more acres for single-family residential development upon farmland, forest land or other land of environmental resource value shall not be declared exclusionary or otherwise against public policy;
- If at any time more than two years after the "municipality's effective date", the total number of housing units for which building permits have been applied for within the

residential development districts since the municipality's effective date is greater that the housing target number (adjusted pro rata for the number of years since the municipality's effective date), but the total number of housing units for which building permits have been issued within the residential development districts is less than the pro rata housing target number, then the provisions of Section 7 of LUPA apply. During this time period any applications for building permits or other local land use permits for residential development within such residential development districts shall be deemed constructively approved if not acted upon within one hundred eighty (180) days after the receipt of permit applications…These provisions shall no longer be in effect once the total number of housing units for which building permits have been issued within such residential development districts equals or exceed the pro rate housing target number."

III. LAND USE ELEMENT

Land use refers to the physical arrangement of residential, commercial, industrial and institutional development, along with its transportation network, infrastructure and vacant land. Examining spatial development patterns, rates of change, and trends can provide insight into how the region evolved under varying social, economic and environmental conditions. Understanding land use change within a community or region is a key aspect of the overall RSP, and forms the basis for discussion regarding the future direction of the region.

A. Land Use Trends within the Region

Table 13 on pages 36 and 37 provides an overview of the change in land uses within the Greater Lowell region between 1971 and 2005, based on McConnell land use data provided by the University of Massachusetts. This information is broken out by developed and undeveloped land, as well as by land use category (commercial, industrial and residential). Although more recent land use data has been made available for some communities, the 2005 data was utilized as it provides the most recent information base that is comparable across community boundaries.

In 1971, 18.9% of the land within the region was developed. Approximately 5.3% of the developed land was devoted to commercial purposes, while 10% was utilized for industrial purposes, and 84.8% was devoted to residential uses. By 2005, the acreage of developed land across the region increased by 148%, with commercially utilized land increasing by 97%, industrially used land growing by 52% and residentially used land increasing by 119%.

By 2005, 47.1% of the land within the Greater Lowell region was developed. Even though industrial uses increased from 1971 to 1990, the region lost 27% of its industrial uses between 1991 and 2005. Between 1971 and 2005, the amount of undeveloped land in the region diminished by approximately 35%. Map 1 on the next page shows land uses across the region in 2005.

Between 1971 and 2005, the following communities experienced an increase in developed land area that exceeded the regional average of 148%: Dunstable (365%), Tyngsborough (363%), Pepperell (288%), Tewksbury (208%), Westford (165%), and Chelmsford (150%). The Town of Billerica had the lowest increase (86%), while Lowell (143%) and Dracut (121%) were below the regional average increase. In terms of the loss of undeveloped land, Lowell (-80%), Chelmsford (-51%), Billerica (-40%) and Tewksbury (-39%) exceeded the region's average loss of undeveloped land (-35%).

B. Current Land Uses

The communities of Lowell, Billerica, Chelmsford and Tewksbury have the greatest acreage currently in commercial use, followed by Dracut, Tyngsborough and Westford. Of the nine

Placeholder for MAP 1

Greater Lowell communities, the Town of Billerica clearly had the largest land area devoted to industrial development (1,071 acres), followed by Lowell (632 acres), Tewksbury (586 acres), Chelmsford (561 acres) and Westford (416 acres). In 2005, the overall region had 2,470 acres of land being utilized for commercial development and 3,612 acres devoted to industrial development. Nearly one-quarter of the region's land area currently being used for commercial and industrial development (1,491 acres) is located within the Town of Billerica. This land use pattern is very different from that seen in 1971, when the City of Lowell had the largest land area devoted to commercial and industrial uses, and reflects a continued trend in the suburbanization of employment centers.

Table 13: Land Use in the Northern Middlesex Region, 1971 - 2005

Community	Land Use Category	Acres				Percentage Change (1971 - 2005)	Percent of Region (2005)
		1971	1985	1991	2005		
Billerica	Commercial	216.6	283.80	397.00	419.81	93.82	16.99
	Industrial	324.6	692.28	1,083.57	1,071.70	230.16	29.67
	Residential	4,747.58	5,670.02	6,665.34	7,265.28	53.03	16.46
	Developed	5,288.78	6,646.10	8,145.91	9,831.96	85.90	16.67
	Undeveloped	11,608.93	10,251.61	8,751.80	6,983.72	-39.84	10.55
	Total	**16,897.71**	**16,897.71**	**16,897.71**	**16,815.68**	**N/A**	**13.43**
Chelmsford	Commercial	158.39	216.55	376.89	410.70	159.30	16.62
	Industrial	310.07	503.97	637.32	560.91	80.90	15.53
	Residential	3,249.10	3,914.34	6,866.71	7,162.52	120.44	16.22
	Developed	3,717.56	4,634.86	7,880.92	9,286.53	149.80	15.75
	Undeveloped	11,110.09	10,192.79	6,946.73	5,463.36	-50.83	8.25
	Total	**14,827.65**	**14,827.65**	**14,827.65**	**14,749.89**	**N/A**	**11.78**
Dracut	Commercial	115.88	176.87	215.36	256.82	121.63	10.39
	Industrial	228.49	277.73	425.91	125.47	-45.09	3.47
	Residential	2,159.37	3,024.00	4,502.61	4,837.59	124.03	10.96
	Developed	2,503.74	3,478.60	5,143.88	5,525.23	120.68	9.37
	Undeveloped	11,241.50	10,266.64	8,601.36	8,121.81	-27.75	12.27
	Total	**13,745.24**	**13,745.24**	**13,745.24**	**13,647.04**	**N/A**	**10.90**
Dunstable	Commercial	2.77	2.77	0.00	1.79	-35.38	0.07
	Industrial	26.8	62.75	189.11	0	0	0
	Residential	368.59	586.81	1,064.48	1,725.27	368.07	3.91
	Developed	398.16	652.33	1,253.59	1,850.79	364.84	3.14
	Undeveloped	10,346.39	10,092.22	9,490.96	8,866.62	-14.30	13.39
	Total	**10,744.55**	**10,744.55**	**10,744.55**	**10,717.41**	**N/A**	**8.56**
Lowell	Commercial	424.91	466.57	493.97	549.55	29.33	22.24
	Industrial	465.99	638.01	797.94	632.04	35.63	17.50
	Residential	2,455.18	2,645.16	4,453.35	3,548.46	44.53	8.04
	Developed	3,346.08	3,749.74	5,745.26	8,125.43	142.83	13.78
	Undeveloped	5,990.99	5,587.33	3,591.81	1,174.06	-80.40	1.77
	Total	**9,337.07**	**9,337.07**	**9,337.07**	**9,299.48**	**N/A**	**7.43**

Table 13 (cont'd): Land Use in the Northern Middlesex Region, 1971 - 2005

Community	Land Use Category	Acres				Percentage Change (1971 - 2005)	Percent of Region (2005)
		1971	1985	1991	2005		
Pepperell	Commercial	44.56	55.49	62.13	46.23	3.75	1.87
	Industrial	46.37	131.79	196.12	87.58	88.87	2.42
	Residential	1,041.51	1,801.37	2,595.19	4,013.63	285.37	9.09
	Developed	1,132.44	1,988.65	2,853.44	4,397.52	288.32	7.46
	Undeveloped	13,754.62	12,898.41	12,033.62	10,449.41	-24.03	15.78
	Total	**14,887.06**	**14,887.06**	**14,887.06**	**14,846.93**	**N/A**	**11.862**
Tewksbury	Commercial	194.63	284.85	274.18	342.64	76.05	13.87
	Industrial	338.63	442.83	656.03	586.22	73.12	16.23
	Residential	2,803.53	3,555.56	4,876.41	5,472.25	95.19	12.39
	Developed	3,336.79	4,283.24	5,806.62	7,264.22	207.61	12.32
	Undeveloped	10,234.58	9,288.13	7,764.75	6,247.17	-38.96	9.44
	Total	**13,571.37**	**13,571.37**	**13,571.37**	**13,511.40**	**N/A**	**10.79**
Tyngsborough	Commercial	24.83	82.13	178.98	225.79	809.34	9.14
	Industrial	149.43	256.78	309.28	132.08	-11.61	3.66
	Residential	819.27	1,459.02	2,245.08	3,561.95	334.77	8.07
	Developed	993.53	1,797.93	2,733.34	4,599.05	362.90	7.80
	Undeveloped	10,626.49	9,822.09	8,886.68	6,946.92	-34.63	10.49
	Total	**11,620.02**	**11,620.02**	**11,620.02**	**11,545.96**	**N/A**	**9.225**
Westford	Commercial	71.23	137.91	172.71	217.73	205.67	8.81
	Industrial	477.56	572.81	719.90	416.31	-12.83	11.52
	Residential	2,504.62	3,642.93	4,930.98	6,562.39	162.01	14.86
	Developed	3,053.41	4,353.65	5,823.59	8,086.59	164.84	13.71
	Undeveloped	17,013.72	15,713.48	14,243.54	11,949.75	-29.76	18.05
	Total	**20,067.13**	**20,067.13**	**20,067.13**	**20,036.33**	**N/A**	**16.00**
Region	Commercial	1,253.80	1,706.94	2,171.22	2,471.06	97.09	100
	Industrial	2,367.94	3,578.95	5,015.18	3,612.31	52.55	100
	Residential	20,148.75	26,299.21	38,200.15	44,149.34	119.12	100
	Developed	23,770.49	31,585.10	45,386.55	58,967.31	148.07	100
	Undeveloped	101,927.31	94,112.70	80,311.25	66,202.82	-35.05	100
	Total	**125,697.80**	**125,697.80**	**125,697.80**	**125,170.13**	**N/A**	**100**

Source: McConnell Land Use Data, University of Massachusetts

Today, the largest category of developed land use in the region is residential. This includes all residential dwelling types, from large lot, single-family homes to multi-family apartments and condominiums. Recent development across the region has been largely in the form of large lot, single family subdivisions, although there have been several multi-family projects constructed under Chapter 40B. A significant amount of undeveloped land remains, although it is not evenly distributed throughout the region. This undeveloped land includes land that is vacant and developable, as well as land that may be classified as undevelopable due to various development constraints, such as wetlands.

Land consumption will likely continue at an alarming rate as long as large lot zoning remains the norm in the suburbs. Commercial development continues to be dispersed beyond traditional

centers to locations along state numbered routes and major travel corridors, such as Route 110 in Lowell, Chelmsford and Westford, Route 3A in Billerica, Lakeview Avenue in Dracut, Route 38 in Tewkbury, and Middlesex Road in Tyngborough. The greatest concentration of industrial areas also tends to be in technology parks built near highway interchanges and along major corridors, such as Route 110 in Westford, Route 129 in Chelmsford and Billerica, Concord Road and the Middlesex Turnpike in Billerica and Route 133 in Tewksbury. Such industrial parks are often built in a campus-like setting with large fields of paved parking, resulting in higher land consumption rates than would occur in an urban or compact development setting where higher floor area ratios are typically allowed.

C. Overview of Zoning Within the Region

In the 1900s, local governments began to utilize zoning as a means to regulate the type, amount and location of land development. This practice was validated by the U.S. Supreme Court in 1926. Zoning is simply one tool that local officials may utilize to balance private property rights with the public interest in providing for orderly growth and change. In addition to zoning, growth and development are also regulated through subdivision control, Board of Health regulations, wetlands regulations and, sometimes, special district regulations, all of which have been upheld by the courts.

Under zoning, a community is divided into districts, or geographic areas delineated on a zoning map and designated for specific land uses. An overlay district, which may also be delineated on a zoning map, may encourage or limit certain uses within one or more districts, depending on the purpose(s) of the overlay. Each zoning district has dimensional and use requirements, as well as various procedures for permitting those uses. The uses may be non-discretionary, known as an as-of-right use, or a use may require a special permit, which is an approval granted at the discretion of either the Zoning Board of Appeals or the Planning Board. The Zoning Bylaw determines what activities and uses are allowed in each district, the level of approval required, and the board or commission that is the designated approval body.

Zoning in the Northern Middlesex region is broken down according to the traditional Euclidian zoning classifications: residential, commercial, industrial and miscellaneous, in all nine communities. However, beyond that, there are various permutations of those traditional categories, some having as many as seven subcategories in a community. These subcategories do not take into account that there are more than fifty (50) overlay and special types of zoning classes, e.g. wellhead protection, found throughout the region.

The region's zoning evolved both in response to transportation and other infrastructure improvements, such as sewer service, and as reaction to preventing uncontrolled growth. While local regulations have shaped recent development, it has occurred against the backdrop of older, established neighborhoods, and has responded to pressure from rapid changes in the demographics.

The various zoning classifications and sub-classifications in the Greater Lowell communities and the acreage devoted to each of the major zoning classifications are shown in Tables 14 and 15 which follow. Map 2 on page 42 shows the zoning classifications within the nine Greater Lowell Communities, while Map 2 on page 43 outlines the zoning overlay districts.

Table 14: Zoning Classifications within the Greater Lowell Communities

Community	Residential Zoning Classifications	Commercial Zoning Classifications	Industrial Zoning Classifications	Other Zoning Classifications
Billerica	-Multi Family -Village -Residential -Neighborhood -Residential -Rural Residential	-Commercial -General Business -Neighborhood -Business	-Industrial	-Adult Entertainment -Water
Chelmsford	-Residential A -Residential B -Residential C -Residential Multifamily -Residential Motor Home	-Neighborhood -Comm. Roadside -Commercial -Shopping Center -General Commercial	-Limited Industrial -Special Industrial	-Center Village -Adult -Open Space -Public
Dracut	-Residential 1 -Residential 2 -Residential 3	-Commercial 1 -Commercial 2 -Commercial 3 -Commercial 4 -Commercial 5	-Industrial	-Mill
Dunstable	-General -Residential Single family	-Retail Business -Service Business -Expanded Commercial	NA-no such zone	Commercial-recreation
Lowell	-Suburban Neighborhood Multifamily -Traditional Neighborhood Multifamily -Traditional Neighborhood Single Family -Urban Neighborhood Multifamily -Urban Neighborhood Single Family -Suburban Single Family-SSF -Traditional Neighborhood 2- Family-TTF	-High Rise Commercial -Neighborhood Business -Regional Retail -Downtown Mixed-use	-Light Industry -General Industry	-Office/Research Park -Traditional Mixed-use -Urban Mixed-use -PDMI -INST -SMU

Table 14 (cont'd): Zoning Classifications within the Greater Lowell Communities

Community	Residential Zoning Classifications	Commercial Zoning Classifications	Industrial Zoning Classifications	Other Zoning Classifications
Pepperell	-Rural residential -Recreational Res. -Suburban Residential -Town Residential -Urban Residential	-Commercial	-Industrial	NA
Tewksbury	-Multi Family -Residential	-Commercial -Limited Business	-Heavy Industrial	-Community Development -Farming -Transitional -Park -Office Research -Municipal
Tyngsborough	-Residential 1 -Residential 2 -Residential 3	-Business -Commercial 1 -Bus. Commercial 2 -Bus. Commercial 3 -Bus. Commercial 4	-Industrial	NA
Westford	-Residence A -Residence B	-Business -Business Limited Commercial-Highway	-Industrial A -Industrial B -Industrial C -Industrial D -Industrial Highway	NA

NOTE: The above matrix does not include overlay and water protection zoning districts or classifications

As shown in Table 15 on page 44, 83% of the land area in the region is zoned for residential use, while 3.76% is zoned for commercial use and 9.13% is zoned for industrial use. The communities of Dracut, Lowell and Tyngsborough have the greatest total acreage zoned for commercial use. The Town of Billerica has twice the acreage of land zoned for industrial use than any community in the region. Chelmsford, Tewksbury, Tyngsborough and Westford also have significant acreage zoned for industrial use. There is no land zoned for industrial purposes within the Town of Dunstable.

Placeholder for Map 2- Zoning Districts

Placeholder for Map 3- Zoning Overlay Districts

Table 15: Land Area by Zoning Category

Community	Area within Zoning Category (in acres)				
	Residential	Commercial	Industrial	Other	Total
Billerica	12,371.85	517.98	3,567.46	399.58	16,856.87
Chelmsford	10,735.90	500.73	1,595.62	1,945.40	14,777.63
Dracut	12,114.00	758.00	687.00	20	13,579.00
Dunstable	10,426.14	168.12	0	183.94	10,778.20
Lowell	6,640.02	865.60	637.34	1,138.35	9,281.31
Pepperell	14,332.36	83.42	427.31	0	14,843.09
Tewksbury	9,809.57	613.18	1,570.80	1,436.99	13,430.54
Tyngsborough	9,119.11	728.13	1,382.86	0.67	11,230.78
Westford	18,085.94	456.66	1,533.52	0	20,076.13
NMCOG Region	103,634.89	4,691.82	11,401.91	5,124.93	124,853.55

Sources: NMCOG, Lowell GIS Dept., Dracut Engineering Dept, Westford GIS Dept. Applied Geographics (Chelmsford)

D. Land Use Planning Tools for Sustainable Development

The term *sustainable development* means that builders, architects, designers, community planners, and real estate developers strive to create buildings and communities that will not deplete natural resources. The goal is to meet today's needs using *renewable resources* so that the needs of future generations will be accommodated. Sustainable development attempts to minimize greenhouse gases, reduce global warming, and preserve environmental and financial resources. Sustainable development projects often have some of the following characteristics and features:

- Green architecture and eco-friendly building practices;
- Local building materials;
- Natural, bio-degradable building materials;
- Water conservation measures;
- Use of low impact development techniques;
- Renewable energy sources such as solar and wind;
- Protection of natural habitats;
- Non-polluting construction practices;

- Walkability and proximity to transit service;
- Mixed-uses, combining residential and commercial activities;
- Compact design; and
- Adaptive reuse of older buildings

The concept of sustainable development is often broadened to include the protection and development of human resources. Communities founded on principles of sustainable development may strive to provide abundant educational resources, career development opportunities, and social services.

As described previously in Section II, the Commonwealth has adopted a set of sustainable development principles and has developed a Smart Growth/Smart Energy Toolkit to assist communities in understanding available techniques for embracing sustainable development and smart growth. The next section outlines many of the tools and strategies that are relevant to this region.

1. Form-Based Code

Form-Based Code (FBC) represents an opportunity in Massachusetts to use an innovative zoning approach that can reinvigorate historic town centers while retaining the character of older buildings and street alignments. FBCs can also be used to improve established sprawling subdivisions by encouraging better public realms and mixed use environments. FBCs represent an improvement over separated, single use-based codes because the FBCs allow developers to begin utilizing traditional planning techniques on a building, block and even neighborhood scale. The use of textual and graphic illustrations also makes FBCs a highly intuitive tool for users and regulators alike.

FBCs address community concerns and desires related to the built environment. The FBCs are initially drafted after an extensive inventory of existing physical attributes, and finalized after many public charrettes, workshops and hearings. The FBCs translate the specific goals and policies of a Master Plan into prescriptive evaluation standards and guidelines. This ensures that new development exhibits the highest standards of design, architecture and landscaping, while reinforcing the community's character at the scale of the neighborhood, block, lot and building.

FBCs create a predictable public realm by controlling physical form primarily through local land use regulations, including zoning, subdivision and other regulations, such as wetlands, drainage and shade trees, and historic preservation. FBCs also impact local plans for public improvements usually listed in the community capital improvement plan. They address the relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks. Thus, the regulations in FBCs, presented in both diagrams and text, are keyed to a regulating plan that designates the appropriate form, scale and overall character of development rather than only distinctions in land-use types. This approach is

in direct contrast to conventional zoning, which focuses on the segregation of land use types, permissible uses, and the control of development intensity through simple numerical parameters, such as setbacks, floor area ratios, height limits, and parking ratios.

FBCs are regulatory, not advisory. FBCs are not design guidelines, which generally are limited to the "look" of buildings. While design guidelines may require in depth reviews by public agencies, thereby eliminating the predictability that is the hallmark of a good regulation, well-written FBCs are more objective in terms of architectural style and are easier to implement.

Municipalities have at least three options to incorporate FBCs into their regulatory framework. First, communities may modify existing regulatory codes to include criteria for building forms. This approach may prove time consuming and cumbersome given that most regulations provide for the segregating of use, limited densities, and the accommodation of traffic and parking. Next, communities might opt to replace existing zoning regulations with FBCs. This solution might be best for communities with a strong history of adherence to "smart growth" initiatives. However, at the same time, eliminating the entire existing regulatory framework could be quite controversial and difficult to pass at Town Meeting. Finally, communities may adopt new FBCs expressly for special districts or "overlays" planned for urban expansion or revitalization. With this approach, the existing framework remains and FBCs simply augment the underlying code.

The use of FBCs, like many other “smart growth” tools, saves money for both developers and municipalities by streamlining the permitting process. It also protects neighborhood property values and offers an unique opportunity for municipalities to obtain significant financial benefits from high-quality, higher-density developments. Studies have demonstrated that well-designed developments create superior property values than conventional developments with the same type of housing. This increase in value is the direct result of enhanced site amenities, including uniform and consistent design standards, site layout, views, and the preservation of existing cultural and historic resources.

The City of Lowell has created a form-based code for the redevelopment of the Hamilton Canal District, which is within the boundaries of the Lowell National Historical Park. In addition, the communities of Andover, Tewksbury and Wilmington are drafting a form-based code for the Lowell Junction area, which is comprised of more than 700 acres targeted for mixed-use development.

2. Low Impact Development (LID)

Development patterns based on conventional zoning often result in "sprawl" with its associated large impervious areas, loss of natural resources and habitat, increase in nonpoint source pollution, and alteration of hydrologic systems. Stormwater runoff is generally handled through structural controls, such as catch basins, pipes, and detention ponds.

Low Impact Development (LID) is accomplished through thoughtful site design and the incorporation of natural stormwater best management practices (BMPs). Site design begins with the identification of critical site features, such as wetlands, wildlife habitat, and drinking water protection areas that should be reserved as protected open space. Once these areas are set aside, development areas are identified as "building envelopes". Within the building envelopes, BMPs, such as shared driveways, permeable pavers, and bioretention areas, are used to reduce the level of impervious cover and to improve the quality of stormwater drainage. Other LID design techniques include green roofs, rain barrels, rain gardens, grassed swales, stormwater infiltration systems, and alternative landscaping. Through these techniques, natural drainage pathways are conserved, open space is preserved, and the overall impact from development is significantly reduced.

LID techniques support the following Sustainable Development Principles adopted by the Commonwealth:

- *Concentrate Development and Mix Uses*: The LID site planning process sets aside key natural features and focuses development into clustered patterns on the remaining land.

- *Protect Land and Ecosystems*: The reduction of impervious surfaces reduces the amount of surface runoff and through the infiltration of stormwater, recharges the groundwater system, thereby, restoring the natural hydrologic cycle. This preserves groundwater supplies and base flow to streams and wetlands.

- *Use Natural Resources Wisely*: The LID planning process results in housing that makes more efficient use of land and conserves critical natural features, such as wetlands, vegetated buffers, and drinking water protection areas.

While the Town of Tyngsborough has a stormwater management bylaw in place, none of the Northern Middlesex communities have formally adopted a LID Bylaw. Most communities have some form of stormwater management regulations in place currently, and none of these regulations preclude the use of LID techniques.

3. Mill Reuse/Revitalization District

The reuse of mill buildings tends to be more complicated than building new construction on undeveloped land. Several factors, such as scale, location, and structural integrity, need to be addressed and these buildings are generally larger than most other single use structures. Therefore, unique design and engineering solutions are needed to create functional space that can house multiple uses and tenants.

Mill buildings also require extensive retrofitting of basic service infrastructure to meet building and environmental code requirements. Given the potential for environmental contamination of

both the building and the site, the presence of old wiring and plumbing, the oddly configured space, a lack of ADA certified accessibility, and inadequate parking, redevelopment can require the major investment of capital and a coordinated effort between the State regulators, municipal officials, neighbors, the developers, and the financial community.

Finally, mill districts are generally located in older, developed areas of communities, often within floodplains. The challenges associated with rehabilitating older buildings, developing in riparian buffers, cleaning contaminated soil and complying with local zoning that simply does not account for these sites can be a tremendous deterrent to investment. In order to make these areas attractive to the private sector, communities must provide enough "up front" planning and regulatory flexibility to attract experienced developers.

The reuse of historic mill sites clearly demonstrates a commitment to “smart growth” since revitalization of these neighborhoods relies on existing infrastructure, creates a compact mixed-use environment, and does not stimulate sprawl. This type of redevelopment also includes an opportunity to implement low impact development practices and other” smart growth” techniques that improve environmental quality in adjacent rivers and streams and implement energy efficient technologies.

It is important to analyze where the mill complex fits in terms of the City or Town's master plan and existing zoning framework. If rewriting or amending the existing zoning is necessary, an important first step is to consider the variety of zoning approaches that have been used within the Commonwealth and within the region. Communities should use zoning as a redevelopment tool by leveraging flexible site development provisions. The City of Lowell has completed many successful mill revitalization projects. In addition, the towns of Billerica, Chelmsford, Dracut, and Westford have outstanding examples of mill redevelopment that include residential, commercial and industrial uses.

Depending on the existence of contamination on a site, mill buildings can help increase high-density housing within a community that is eligible for inclusion on the Subsidized Housing Inventory (SHI). Artist loft space, high-end condominiums, or standard affordable condominiums can all be found within mill redevelopment projects across the region. Given the historic and aesthetic value of these sites, and because they are part of local culture, communities may find it politically easier to create high-density affordable units through mill reuse than through new construction.

Within the Northern Middlesex region, the communities of Billerica, Dracut, Lowell and Westford have zoning regulations in place to encourage the adaptive reuse of mill structures for commercial and residential uses.

4. Open Space Residential Design (OSRD)

Open Space Residential Development (OSRD) can help mitigate the effects of sprawl by addressing open space preservation and flexible design. OSRD is an innovative form of subdivision design that maximizes resource protection and economic profit. The process is initiated by determining the number of building lots that could be developed under conventional zoning. This is known as the "base yield". Conservation areas, including wetlands, floodplains, wetland and stream buffers, wildlife habitat and historic resources, are then identified.

Once the maximum number of housing units has been calculated, the buildable area is outlined. Housing lots are then arranged to maximize access to open space. Excess impervious surface is eliminated by reducing the width of streets and paved areas. Ideally, LID techniques are used to address stormwater management.

An effective OSRD bylaw should facilitate a creative and flexible approach to residential development. It should not require a cumbersome permitting procedure, but instead, foster a partnership between the municipality and the developer to preserve existing green space, historic and natural resources, and social character through an equitably viable process. Incentives should be made available to the developer to make OSRD more attractive while meeting specific community goals.

An OSRD bylaw deals specifically with the site design process, so communities should review and amend Subdivision Rules and Regulations and other local provisions (Wetlands Bylaws and Regulations, Board of Health Regulations, etc.) to avoid conflicts among boards, commissions, and departments. OSRD is implemented through a resource-based partnership approach to site development. There should be interagency cooperation formally integrated into the review process from the pre-application stage to the concept plan process to subdivision plan review.

Implementing OSRD in local subdivision development meets several of the Commonwealth's Sustainable Development Principles including:

- *Concentrate Development and Mix Uses*: The use of OSRD will concentrate development on smaller areas of a site than what would generally happen under conventional zoning practice, and provides flexibility to create commercial, civic, educational, and recreational activities with open space and homes.

- *Make Efficient Decisions*: The OSRD permitting structure encourages "smart growth" and facilitates a permitting process that is clear, easy to understand, and cost-effective to developers.

- *Protect Land and Ecosystems*: The planning process for OSRD inherently protects land and water resources and promotes recharge to underlying aquifers. OSRD also preserves significant cultural and historic resources early in the planning process.

- *Plan Regionally*: Implemented on a broad scale, OSRD can have significant regional impacts to watershed hydrology, wildlife habitat corridors and aquifer protection.

- *Expand Housing Opportunities*: Used in conjunction with affordable housing provisions, OSRD bylaws can expand housing opportunities in a community.

As shown in the previous chapter, all communities in the Northern Middlesex region have provisions within their zoning bylaw for OSRD development, however, in every community OSRD is subject to a special permit.

5. Traditional Neighborhood Development

The traditional New England village is walkable, provides a mix of uses, conveys a distinct sense of place, provides housing for residents at all income levels, and is accessible. Classic New England villages have retained their strong identities through time, resisting change and the impulse to completely replace the "old" with the "new". Each village's character is informed by local history and geography and coastal, riverfront, highlands, and farming communities each convey a very different sense of place. Traditional Neighborhood Development (TND) is directed at addressing the most pressing problems associated with recent suburban expansion, such as low-density, auto-oriented development, single-use developments lacking in context or a unique identity or character. TND development mixes uses in a compact area creating a more traditional New England style neighborhood.

Automobile dependence results from the segregation of residential, commercial, and industrial uses as is often required in modern zoning. This design practice results in the loss of community vitality and makes neighborhoods unwelcome to pedestrians and bicyclists. It also increases traffic. TND is characterized by compact, pedestrian-oriented developments that provide a variety of uses, diverse housing types, and are anchored by a central public space and civic activity. TND is based on the principle that neighborhoods should be walkable, affordable, accessible, distinctive, and true to the significant historic context of each community. The following elements are commonly found in TND:

- Parks, schools, civic buildings, and commercial establishments located within walking distance of homes;
- Residences with narrow front setbacks, front porches, and detached rear garages or alley-loaded parking;
- Network of streets and paths suitable for pedestrians, bicyclists, and vehicles;

- Narrower streets with crosswalks, streetscaping, and other traffic-calming measures;
- In-scale development that fits the local context; and
- Buildings oriented to the street with parking behind.

TND can be used to revitalize existing town centers and neighborhoods or build new ones at transit nodes and in other locations. Current and future public transit stops are important places to consider during the planning stages to maximize access to alternatives forms of transport (see Transit Oriented Development (TOD)). However, TND must be distinguished from Transit Oriented Development - TND need not focus as close on transportation areas and parking as components of urban design.

TNDs are usually about ten (10) to fifteen (15) acres in size. However, the incorporation of existing residential or commercial blocks into a TND means a project does not require a wholly undeveloped site, and the project does not have to be completed by a single entity. The key is designing the new elements to fully connect with the “old”. TND projects may include infill development projects within existing downtown or neighborhood areas.

TND will not be appropriate for all neighborhoods in all contexts. Many of the design criteria and standards of TND can be applied to other development projects. However, not every neighborhood is suitable for the density required for a mixed-use TND development to succeed. While auto-oriented strip malls and large-lot developments are fundamentally incompatible with TND, these types of locations present opportunities for conversion to TND over the long term.

TND advances several of the Commonwealth's Sustainable Development Principles, including:

- *Concentrate Development and Mix Uses*: TND increases development densities within the village or town center to promote the ability to work, shop, and live in one neighborhood and provides economical opportunities for mixed use redevelopment of existing properties. In addition, TND is compact, encourages reuse and rehabilitation of existing infrastructure, conserves land, integrates uses, and fosters a sense of place. It creates walkable districts mixing commercial, civic, cultural, educational and recreational activities with open space and housing for diverse communities.

- *Protect Land and Ecosystems*: TND protects land in two ways; first, by providing development opportunities that do not impact "greenfields" and second, by providing economical redevelopment that allows for the correction of existing site deficiencies. TND increases the quantity, quality, and accessibility of open space, expands land and water conservation and promotes development that respects and enhances the region's natural resources.

- *Use Natural Resources Wisely***:** TND encourages efficient use of land and promotes buildings and infrastructure that uses land, energy, water and materials efficiently.

- *Expand Housing Opportunities*: By linking commercial development in the district to the provision of rental and affordable housing opportunities, TND supports the construction and rehabilitation of housing to meet the needs of people of all abilities, income levels and household types. TND coordinates the provision of housing with the location of jobs, transit and services and fosters the development of housing, particularly multifamily, that is compatible with a community's character and vision.

- *Provide Transportation Choice*: By improving pedestrian facilities in the village and town centers and enhancing the viability of transit by increasing residential density, TND maintains and expands transportation options, in all communities, including land- and water-based public transit, bicycling, and walking.

- *Increase Job and Business Opportunities*: By providing for increased intensities of development and encouraging the creation of new jobs in the village center, TND attracts businesses with good jobs to locations near housing, infrastructure, water, and transportation options and supports the growth of new and existing local businesses. TND strengthens the growth of local businesses, in addition to supporting economic development in industry clusters, which are consistent with regional and local character.

- *Plan Regionally*: By implementing recommendations found in the Town's Comprehensive Plan and the Regional Strategic Plan, TND supports the development and implementation of local and regional plans that have broad public support and are consistent with sustainability principles. It also fosters development projects; land and water conservation, transportation and housing that have a regional or multi-community benefit.

The City of Lowell has addressed traditional neighborhood within its zoning ordinance. In addition, the City has design standards in place for TND projects.

6. Transfer of Development Rights (TDR)

Transfer of Development Rights (TDR) is a regulatory strategy that harnesses private market forces to accomplish two “smart growth” objectives. First, open space is permanently protected, for water supply, agricultural, habitat, recreational, or other purposes, through the transfer of some or all of the development that would otherwise occur to a more suitable location. Second,

locations such as town centers or vacant and underutilized properties, become more vibrant and successful as the development potential from the protected resource areas is transferred to these areas. In essence, development rights are "transferred" from one district (the "sending district") to another (the "receiving district"). Communities using TDR are generally shifting development densities within the community to achieve both open space and economic goals without changing their overall development potential. While less common, TDR can also be used for the preservation of historic resources.

The approach begins with a planning process to identify specific preservation district as "sending districts" and specific development districts as "receiving districts". In Massachusetts, this level of town-wide or city-wide planning is best addressed in the master planning process. Once these “districts” are identified, Zoning Bylaw amendments can be adopted which authorize landowners in the “sending districts” to sell their development rights to landowners in the “receiving districts”. The amount of money required to purchase these development rights is influenced by the Zoning Bylaw provisions, but is generally negotiated between the landowners. This approach allows market forces to enter into the transaction and requires land owners to negotiate the final value of development rights.

In return for the purchase, landowners in the “sending districts” place a restriction on their property, which is generally recorded as a deed restriction. This restriction can be determined through explicit zoning provisions or can be negotiated as part of the permitting process, such as through a special permit. Restrictions can limit the level of potential development, the type of development, or some combination of both. Developers who buy development rights are acquiring the capacity to build higher density in “receiving districts”, which can mean different types of the same use (apartments in addition to single family homes), higher densities of the same use (single family homes on quarter (1/4) acre lots instead of one (1) acre), or different higher intensity uses (commercial or industrial use in addition to residential).

TDR can be an effective tool to simultaneously limit development in valuable open space areas, while stimulating additional development in areas well suited to higher densities. Although some transfers are based on a "one to one" ratio (one housing unit in the “sending district” grants one housing unit in the “receiving district”) in order to provide an incentive other programs have increased the value of a development right if it is transferred. For example, a single development right in the “sending district” could provide multiple development rights in the “receiving district”.

Completion of a real estate market analysis (REMA) is highly recommended. The overall purpose of the analysis is to validate the transfer system prior to the adoption of the implementing bylaw or ordinance. Demand for growth is necessary for TDR to succeed, and a REMA will determine market strength. It will also help a community comprehend land values and the types of growth that the market will support. Knowing the economic value of

development rights generated in the “sending district” and the capacity of the market to absorb that value in the “receiving district” is critical. Moreover, a community must ensure that the rate of transfer (the number of development rights generated multiplied by the expected sale price of each right) adequately compensates the landowner in a “sending district” for forgone development on their parcel. Similarly, an understanding of the value of additional density in the receiving area is important to establishing the amount of additional density permitted per credit acquired.

TDR benefits communities by providing a mechanism with which to achieve municipal land protection goals without spending local money. Market forces are harnessed to protect land while also encouraging greater prosperity, and tax revenue, in suitable locations of the community. Local governments also spend less for ongoing maintenance, as roads and other infrastructure are reduced and concentrated in city and town centers and other suitable locations.

Depending on the design of the program, TDR supports many of the Commonwealth's Sustainable Development Principles including:

- *Concentrate Development and Mix Uses*: TDR is designed to curb sprawl and encourage development in areas with adequate infrastructure.

- *Use Natural Resources Wisely*: The preservation of agricultural lands conserves prime agricultural soils. The protection of naturally vegetated open space conserves wildlife habitat and maintains recharge to groundwater.

- *Protect Land and Ecosystems*: Conservation restrictions that may be placed on sending areas can provide permanent protection for wildlife habitat and significant cultural or historic landscapes.

- *Expand Housing Opportunities*: TDR programs create higher density neighborhoods and can be designed with density bonuses or approval contingencies based on the inclusion of affordable housing in the “receiving district”.

Currently, none of the Northern Middlesex communities have TDR provisions within their zoning bylaw or ordinance. The recommendations contained in the Town of Westford’s Comprehensive Master Plan include the adoption of TDR to protect certain resource areas within the community.

7. Transit-Oriented Development (TOD)

Transit-oriented development, or TOD, is an approach to development that focuses land uses around a transit station or within a transit corridor. TOD occurs within one-quarter mile, or a five to seven minute walk, of a transit station. Typically, it is characterized by:

- A mix of uses;
- Moderate to high density;
- Pedestrian orientation/connectivity;
- Transportation choices;
- Reduced parking; and
- High quality design.

TODs often take the form of new development clustered around a station on underutilized or vacant sites. TODs use landscaping, street furniture, street lighting and other urban design features that encourage pedestrian activity. An essential ingredient of any successful TOD, whether in a large urban center or smaller New England village, is connectivity between street networks and adjoining uses, which can be achieved through landscape design, sidewalks and pathways, signage, building façade treatments, parking strategies, and a mix of land uses. Historically, bus transit stops have not generated TODs because bus routes and stops can be relocated at any time.

Successful TODs can only be achieved if supported by public policies and tools that channel development into transit corridors or encourage redevelopment and reuse of land for activities that generate pedestrian activity. Adoption of these tools is the most effective TOD strategy that communities can pursue. Regulatory and incentive-based strategies can include:

- Station area plans: Many communities develop station area plans when new transit facilities are proposed, and plans can be prepared for existing station areas as well. Components of station area plans usually include some or all of the following elements: a market study; a physical plan for infrastructure and utility needs; a land use plan; a phasing plan; redevelopment strategies; and recommendations for regulatory changes and incentives to encourage TOD. Station area plans allow municipalities to address the unique characteristics of individual transit stations, whether located in rural, suburban or urban areas.

- Higher density, mixed-use zoning: Zoning changes are fundamental to encouraging TODs in station areas. These may take the form of changes to the underlying zoning, interim zoning while plans are prepared for the station areas, or zoning overlay districts. Components of the zoning often include providing for mixed uses, density bonuses, parking restrictions, reduced setbacks, and pedestrian amenities.

- Design standards/guidelines: Station area design guidelines help ensure that new development or redevelopment of existing sites and buildings are pedestrian-friendly, attractive, and that there is a connection between the neighborhood and the transit station. TOD design guidelines often address the design of parking, street furniture, signage, street lighting, sidewalk width and materials, ground level building façade design and materials, and respect for neighborhood spaces.

- Public investment policies: The siting of public facilities near transit stations can act as a catalyst for attracting private investment. As these facilities attract a large number of employees and visitors, they provide a built-in market for retail and services.

- Incentives: A number of public incentives exist for encouraging development and redevelopment near transit. These include sharing infrastructure development costs, providing for "brownfield" remediation, streamlining the development process, and adopting District Improvement Financing (DIF).

TOD can help a municipality achieve multiple sustainable development principles. TOD promotes transportation choices, thus reducing auto usage. TOD also results in the efficient use of existing land, infrastructure, and services, and supports the revitalization of community centers and neighborhoods by encouraging reuse and infill.

TOD also advances the following Sustainable Development Principles adopted by the Commonwealth:

- *Concentrate Development and Mix Uses*: TOD is synonymous with concentrated development, promoting mixed uses and residential densities of at least twelve (12) to fifteen (15) units per acre. TOD policies promote increased employment and population concentrations, and a mix of uses that encourage pedestrian activity throughout daytime and evening hours. TOD encourages infill and redevelopment around station areas.

- *Provide Transportation Choice*: A major goal of TOD is to provide a concentration of living, shopping, entertainment, and employment opportunities within walking distance of transit stations so that people can easily use transit in place of cars. TODs include pedestrian amenities and bicycle facilities to promote alternative travel options, and encourage shared parking opportunities.

- *Use Natural Resources Wisely*: Increased transit usage helps to reduce the rate of growth in auto vehicle trips and reduces the use of fossil fuel. Fewer vehicles on the

roadways translate into less congestion, lower vehicle emissions, and better air quality. Furthermore, TOD principles discourage large surface lots that result in the transformation of land into impervious surfaces.

- *Expand Housing Opportunities*: TOD promotes the development of townhouses, condominiums and apartments, which provide housing opportunities for a broader array of households, ranging from lower income families to "empty nesters".

- *Increase Job and Business Opportunities*: Beyond the businesses and jobs created within the TODs, transit provides access to jobs for lower income people, the elderly and the disabled, as well as for suburban commuters.

- *Plan Regionally*: By concentrating economic activity and housing around stations, TOD plays an integral role in shaping regional development, including both public and private investment.

Lowell is the only community within the Northern Middlesex region that has an area designated for Transit-Oriented Development. The redevelopment of the Hamilton Canal District has been designed as a TOD initiative. The City of Lowell received $500,000 in state TOD funding to improve pedestrian connections between the Gallagher Intermodal Center and the redevelopment district. The City has identified other potential opportunities for redevelopment in area around the commuter rail station.

8. Inclusionary Zoning

Inclusionary zoning may be used by municipalities to ensure adequate affordable housing is provided through the development process. It mandates that developers to make a portion of the housing units in their project affordable to low- and moderate-income households. The mandatory zoning approach to affordable housing (often in concert with a density bonus, as is recommended) is an effective means of increasing the number of affordable housing units and creates a variety of affordability levels within a development.

In practice, an inclusionary zoning bylaw may include some flexibility. For example, bylaws may only apply to certain types of development, such as new construction or substantial rehabilitation. Inclusionary zoning bylaws may include "in-lieu-of" payment or construction alternatives providing developers with the option of paying a fee per unit, building affordable units off-site, or rehabilitating units elsewhere, in place of constructing affordable units within the proposed development. Inclusionary zoning bylaws may contain a unit threshold (such as ten (10) units or more), identify income targets for the population to be served, and identify a control

period and mechanism (such as a permanent deed restriction). These specific requirements may be covered by a Regulatory Agreement between the community and the developer.

Inclusionary zoning addresses the following Sustainable Development Principles:

- *Expand Housing Opportunities*: Inclusionary zoning helps provide housing to meet the needs of all abilities, income levels, and household types. Inclusionary zoning can also be used to help coordinate housing with existing jobs, transit and services.

- *Advance Equity*: Inclusionary zoning helps to ensure social and economic justice by encouraging more low- and moderate-income housing.

- *Make Efficient Decisions*: Developers can benefit from a uniform, predicable process.

- *Increase Job and Business Opportunities*: Inclusionary zoning supports the growth of new and existing businesses by increasing the supply of moderately priced housing for workers.

While none of the communities within the Northern Middlesex region have an Inclusionary bylaw in place, affordability incentives are incorporated within the zoning regulations of several communities. The Chelmsford and Westford Master Plans include a recommendation for inclusionary zoning.

9. Village /Town Center Zoning

Village/Town Center Zoning is the creation of a specific zoning district for the unique needs of a small scale mixed use commercial area. Such a District seeks to preserve the existing mixed uses and encourage new construction that is compatible with the setbacks and scale of existing structures. The Town of Chelmsford currently has a Center Village Zoning Bylaw within its zoning regulation. Over the past few years, NMCOG has assisted the towns of Billerica, Dracut, Tewksbury, and Tyngsborough in drafting Town Center Overlay Bylaws through the DLTA program. To date, Tewksbury is the only community to have formally adopted the bylaw and corresponding design guidelines. In addition, the Town of Tyngsborough has adopted a mixed-use overlay bylaw and design guidelines for a 102-acre parcel off Westford Road. This site will include the development of a mixed use village comprised of multi-family residential, commercial and office uses. In addition, the project also includes a solar farm.

E. Issues and Opportunities

Sustainable development supports the integration of compact, mixed land uses as a means to create more vibrant, livable communities. Communities are having difficulty managing the impact of changing land use patterns which have constrained economic development opportunities and affordable housing creation, and have stressed the region's infrastructure and municipal service delivery.

Given the communities' heavy reliance on property tax revenues, the limits imposed by Proposition 2 1/2 and recent state aid cutbacks, many municipalities have tried unsuccessfully to grow their way out of fiscal challenges. While the region needs to encourage growth to finance municipal services and create jobs, it also needs to plan for growth so that it will minimize the impact on community character, demand for services, infrastructure and environmental resources.

More predictable and efficient growth patterns will allow communities to support infrastructure needs. Plans for growth often meet with resistance due to concerns about traffic, community character and visual impact. Conventional zoning and subdivision regulations can promote the "sprawl" that residents generally find objectionable. Wide streets, the lack of public shade trees, buildings set considerable distances from the roadway, and large expanses of paved parking, are among the complaints that residents raise when criticizing the development practices that are in place within most communities. While the majority of communities would object to abandoning their regulatory framework entirely, most are willing to consider modifications to their current regulations that address the consequences associated with conventional zoning. The use of visualization tools can help build community support by allowing residents to better understand the details of the proposal.

By focusing growth in downtowns, village centers and already established economic centers located near transportation services and infrastructure, communities can help preserve both environmental and financial resources that would otherwise be lost to the costs of "sprawl". This type of development pattern can only be achieved if communities are provided with adequate resources and tools to support such changes.

Many suburban office parks and industrial parks are built with individual buildings separated by large areas of parking and landscaping. These low density development are difficult to serve with transit because large number of employees are dispersed across a vast area. Issues of transit access and proximity of workforce will become increasingly more important as transportation costs continue to rise. This fact is supported by the recent efforts of major technology companies along Route 110 in Westford to access regional bus service and commuter rail.

Floor area ratios of 0.25 or less prevent the creation of additional density. If managed properly, more intensive development within existing office parks and industrial parks could produce the following benefits: communities could support additional economic growth while maintaining more open space; higher density employment numbers are more conducive to transit; landowners see a higher rate of return on their property; and new investments can be leveraged to upgrade infrastructure.

Positive relationships between municipalities and the development community can foster the use of sustainable development practices. Inefficient and prolonged approval processes can detract from a developer's ability to expend resources on elements that improve the quality of the development. In fact, developers may instead choose another community in which to locate their project. Application of streamlined permitting does not require a community to lower its standards or to approve a substandard proposal. Communities should consult *A Best Practices Manual for Streamlined Local Permitting* developed by MARPA, for guidance on how to improve the permitting process without compromising local expectations and standards.

Many municipalities have one-size-fits-all parking standards that are easy to administer but that fail to take into account the needs of specific development projects or the unique characteristics of the site being developed. Allowing shared parking, off-site parking or payments in lieu of parking call facilitate the development or redevelopment of highly constrained sites, and can lead to the establishment of a rational methodology for determining how best to meet parking needs.

The region's rural landscapes are slowly vanishing as open spaces and agricultural enterprises give way to development. Vistas of historic homes, farms, fields and forests play a defining role in the region's sense of place. Presently, there is no inventory of the region's rural landscapes or special scenic areas, and there are no regulatory mechanisms or design standards in many communities for safeguarding these important resources. An inventory should be completed in the future so that communities are aware of the importance of these areas and can put measures in place to protect them from the impacts of growth and development.

Many communities have updated their planning documents in recent years to incorporate sustainable development principles but have lacked the resources to follow through with implementation. Modernized zoning codes and development regulations, attention to design issues, and efficient and predictable permitting are essential to achieving the recommendations contained with this document and within municipal master plans. The District Local Technical Assistance (DLTA) Program has provided some of the resources needed for the regional planning agencies to provide such assistance to their member communities. Through this program, NMCOG has assisted communities with a number of mixed-use zoning bylaws and design guidelines, as well as with the drafting of renewable energy bylaws, but additional resources are needed.

IV. ENVIRONMENTAL PLANNING & PRESERVATION

Open space conservation is essential to the quality of life in the region. Open space resources should be viewed as "green infrastructure" that supports and links the built and natural environments. Such resources consist of a network of waterways, wetlands, woodland and forests, parks and conservation lands, and working farms, and provide ecological, social, economic and health benefits which can be described as follows: [2]

- **Ecological benefits**: Open space provides natural water filtration, drinking water protection, flood and erosion control, wildlife habitat and migration stopovers, and biodiversity conservation. Biodiversity encompasses all life and includes genetics, species, ecosystems and ecological processes.

- **Social benefits:** Open space contributes to community and individual quality of life by providing opportunities for recreational, civic, social and education interactions. It can contribute to community identity and sense of place by connecting residents to their natural and cultural heritage and by linking neighborhoods to the larger community.

- **Economic benefits:** Open space is often important for attracting and maintaining businesses in a community and a region. Proximity to open space often increases land values, and recreation and leisure activities can make significant economic contributions. Natural processes, such as water filtration, are much less expensive for communities than engineered alternatives, such as water treatment plants.

- **Health benefits:** Access to parks, greenways and trails creates recreational opportunities and encourages a physically active lifestyle. Open space helps to ensure clean and safe water supplies and food production resources. It also mitigates air, water and noise pollution.

Green infrastructure must be managed and enhanced to support natural systems, protect groundwaters, minimize flooding, improve economic viability, build community, and increase the well-being of residents. Environmental management should include water resources and quality, solid waste disposal, hazardous waste management, air quality and brownfields. Addressing each of these components in a positive manner provides the basis for increased private investment in the region's economy.

NMCOG has worked closely with its member communities and other stakeholders to identify those resources that are critical to the region and that warrant preservation and protection from

[2] American Planning Association, "Seven Principles of Green Infrastructure", December 2002.

future development. The goal of this plan is not to slow or stop growth, nor to preserve all remaining open space, but to direct new growth to areas best able to accommodate development, and to provide a framework for conserving the ecological resources of the region.

A. Open Space/Conservation Land

Presently, there are 16,497 acres of permanently protected open space within the Northern Middlesex region. These lands range from large tracts of state-owned land located across multiple communities, to small tracts held by private land trusts and municipalities. Table 16 below shows the acreage of protected open space in each community. Map 4 on the following page show the location of open space and conservation properties within the region. Region-wide, nearly 3,000 acres are held by the Commonwealth, while the municipalities own more than 7, 600 acres collectively. Approximately, 828 acres are under an agricultural preservation restriction, and another 680 acres have been set aside for water supply protection. Over 1,550 acres are owned and protected through a non-profit organization, such as the local land trust. A summary description of some of the significant open space resources and initiatives within each community is provided in the section that follows.

Table 16: Permanently Protected Open Space by Community

Community	TOTAL ACREAGE							
	State	Municipality	Land Trusts	Conservation Restriction	Water Supply	Agricultural Preservation Restriction (APR)	Other	Total
Billerica	448.57	1,114.12	60.33	77.40	0	19.65	122.25	1,842.32
Chelmsford	56.00	798.00	80.00	66.00	2.77	0	0	1,004.00
Dracut	554.88	358.58	68.80	85.82	99.65	222.90	0	1,390.63
Dunstable	228.14	845.69	700.07	475.01	14.39	210.00	0	2,473.30
Lowell	347.16	360.72	8.41	0	0	0	11.74	728.03
Pepperell	445.79	592.29	318.39	1	132.63	315.13	62.10	1,867.33
Tewksbury	412.53	974.76	0	0	0	0	0	1,387.29
Tyngsborough	480.43	536.82	68.70	65.13	71.7	20.00	0	1,242.78
Westford	13.00	2,040.51	251.26	1,715.00	358.90	39.97	142.79	4,561.34
Total	2,986.50	7,621.49	1,555.96	2,485.36	681.27	827.65	338.88	16,497.11

1. Billerica

The Town of Billerica contains over 1,842 acres of permanently protected open space. The Warren Manning/Billerica State Forest, the Middlesex Canal, and the Concord River and Shawsheen Rivers are among Billerica's most significant cultural and open space resources.

Placeholder for Map 4

Billerica's Open Space and Recreation Plan was approved by the state in 2007. The following were among the goals cited in the plan:

- Promotion of environmentally healthy water and wetlands resources;
- Preservation of key open space, cultural and historic resources;
- Improved public awareness and access to open space;
- Establishment of greenways for recreational trails and habitat networks, improving local and regional links;
- A balanced approach to the use of open space for conservation, passive recreation and active recreation;
- Development of land management and facilities maintenance plans;
- Increased quantity and quality of athletic fields, parks and playgrounds;
- Public education relative to the values of conservation and recreation resources and the need for stewardship;
- Establishment of land use and permitting practices that promote "Smart Growth" principles and protect resources areas; and
- Creation of partnerships between the public sector, private sector, non-profit organizations and civic organizations in order to advance the plan's goals and objectives.

Lampson Park in Billerica provides a variety of both active and passive recreational opportunities.

2. Chelmsford

Approximately 1,004 acres of open space in Chelmsford are considered permanently protected. In 2008, the town had 4,950 acres of undeveloped land[3], of which 680 acres were considered to be developable.[4] Much of the town's open space and recreation land is fragmented and isolated. Establishing linkages and connections between these parcels is a priority for the town. The acquisition and protection of parcels adjacent to existing conservation and recreation lands is critical.

[3] McConnell Land Use Data, University of Massachusetts
[4] 2008 Chelmsford Buildout Analysis Update, Northern Middlesex Council of Governments

Chelmsford owns two town beaches at Freeman Lake and Heart Pond. The recently opened Bruce Freeman Rail Trail traverses the town for more than six miles. The entire Phase I section of the trail extends from the Lowell line to the intersection of Routes 27 and 225 in Westford. The section of the Phase I project located in Chelmsford is 5.2 miles in length. The trail is widely used by hikers, bicyclists, inline skaters and runners. The Rail Trail is a key link in completing the larger Bay Circuit trail which loops around the Boston metropolitan area, extending from Newburyport to Duxbury.

The town has several other marked trails, mostly located on Conservation land, across fields and along waterways. These trails offer a variety of passive recreation opportunities including hiking, jogging, bird watching, mountain biking, horseback riding, and cross-country skiing. Chelmsford has the only public boat launch on the Merrimack River between Lowell and the New Hampshire border at Southwell Park.

3. Dracut

The *Dracut Open Space and Recreation Plan* was updated in 2008. Despite the strong pace of residential development in Dracut over the last quarter century, the town has been fortunate to retain substantial open space, particularly in the farm lands of East Dracut. However, the semi-rural character of the town, valued by its residents, is by no means permanently protected. Only 1,390 acres of the 3,507.66 acres classified as open space is considered permanently protected.

Preservation of farmlands and natural areas remains the principal concern of the community and is the primary goal of the 2008 Plan. The state owns approximately 555 acres of protected land, while Agricultural Preservation Restrictions cover 223 acres and Conservation Restrictions protect 85 acres. Approximately 1,700 acres are in the Chapter 61, 61A or 61B forest, agricultural or recreational tax abatement programs. These properties are not permanently protected.

4. Dunstable

Since the late 1970s, Dunstable has worked to retain its rural character through the active preservation of its farms and open spaces. Since 1976, public and non-profit owned permanently protected lands have increased to over 2,473 acres. The Dunstable Rural Land Trust owns approximately 700 acres. Over 475 acres are under a conservation restriction.

The Nashua River Rail Trail extends from Ayer, through Groton, Pepperell and Dunstable to the New Hampshire state line, covering a distance of 11.3 miles. The abandoned Red Line trolley right-of-way extends from Westford to the west side of the Salmon Brook Valley, and some sections are currently used for passive recreation.

The Merrimack River Watershed Council completed a detailed open space plan for the Salmon Brook Watershed in 2003. Based on the findings of that study, the Town is interested in completing a greenway along Salmon Brook to improve linkages between conservation lands and to create wildlife corridors. The most important issues for the Town, as outlined in their *2010 Open Space and Recreation Plan Update*, are the protection of water resources, maintaining the scenic and rural character of the Route 113 gateway into town from Tyngsborough, and protecting farmlands and wildlife habitat.

5. Lowell

Based upon its location at the confluence of the Merrimack and Concord rivers, the City of Lowell has created a strong network of downtown historic open spaces that includes existing and planned river and canal walkways. Lowell has a number of large city and neighborhood parks, many of them designed by Frederick Law Olmsted and Charles Eliot, a farm, an orchard, brownfield sites with open space potential, and new open space sites, such as East Pond and the UMass Lowell West Campus. The 1,140 acre Lowell-Dracut-Tyngsborough State Forest is a major, underutilized conservation parcel in the City. In total, there are 728 acres of protected open space within the city's borders. Approximately half are owned by the City and half by the Commonwealth.

Nearly everything within the City revolves around its historic and cultural attributes, and there is a strong determination to preserve and build upon the past. Numerous open space initiatives include the Flowering City Initiative, the Lowell Heritage Partnership and a number of Lowell Parks and Conservation Trust projects. The Friends of the Forest, a non-profit volunteer organization, has purchased almost seven (7) acres of land adjacent to the Lowell-Tyngsborough-Dracut State Forest.

The Lowell Parks and Conservation Trust (LPCT) is focusing its regional efforts on the completion of the Concord River Greenway, which is part of a larger vision to create a walking path from Concord to Lowell reflecting the journey from "American Revolution to Industrial Revolution". Linking Rogers, Fort Hill and Shedd Parks and the Lowell Cemetery, this greenway will eventually connect to the Bruce Freeman Rail Trail at Cross Point, thus tying into the Bay Circuit Trail.

The creation of Lowell National Historical Park in 1978 acknowledged Lowell's significant contribution to the Industrial Revolution in America. The city and its textile mills represent the first large-scale planned industrial city in American history. Today, the National Park is woven into the modern City of Lowell – a testament to the high integrity of Lowell's historic and cultural landscape.

6. Pepperell

Pepperell has approximately 1,867 acres of permanently protected open space, including conservation land and agricultural preservation restrictions. The Commonwealth owns approximately 445 acres, while the town controls 592 acres. Over 315 acres are under an agricultural preservation restrictions, while 132 acres have been set aside for water supply protection. Over 318 acres have been preserved through a non-profit land trust.

The Town's Open Space and Recreation Plan contains the following goals:

- Preserve Pepperell's public and private water supplies, protect sensitive natural resources and the rural character of the Town;
- Provide for long-term sustainability of open space and recreation efforts;
- Increase access for people of all demographic groups to Pepperell's open opace and recreation lands and programs; and
- Promote a cooperative and regional approach to open space and recreation planning.

7. Tewksbury

According to the town's 2009 Open Space and Recreation Plan, a substantial amount of land has been set aside for open space and recreation. Approximately 9.5% of the Town's total land area, or 1,387 acres, is permanently protected. Over 412 acres are owned by the Commonwealth, while the town holds nearly 975 acres. There are no properties within the community protected under the state's agricultural preservation program. In addition, there are no open space properties held by a private non-profit land trust or placed under a conservation restriction.

The town's principal open space goals, as reflected in the 2009 Plan, are to:

- Preserve and protect the rivers, brooks, ponds, wetlands, and floodplain in Tewksbury;
- Preserve and protect the Town's natural resources and outstanding natural features for future generations;
- Provide accessible, well-balanced recreation opportunities for all Town residents;
- Ensure adequate maintenance of conservation areas, open spaces and recreation facilities in the interest of protecting the Town's investment and reducing long-term costs;
- Educate the town's residents regarding the importance of open space and recreation areas to the town's quality of life - encourage enjoyment, use, and stewardship;
- Preserve important historical and archaeological sites;
- Enhance and protect the scenic and aesthetic character of the Town;
- Work with regional, federal and state agencies, and non-profit organizations to develop a trail network linking open spaces within Tewksbury, as well as establishing linkages to other trail facilities located in adjoining communities;
- Protect the Merrimack River as the Town's water supply; and

- Promote efforts to preserve and protect open space for conservation, agriculture, and active and passive recreational needs.

8. Tyngsborough

Approximately 31% of the Tyngsborough's land area is classified as open space, while approximately 1,242 acres are considered permanently protected, including 223 acres within the Lowell-Dracut-Tyngsborough State Forest. The Commonwealth owns 480 acres, while the Town controls 537 acres. There are 20 acres along Farwell Road that are protected through an agricultural preservation restriction. In addition, 71.7 acres have been set aside for water supply protection, and 65 acres are under a conservation restriction. The Sherburne House, which covers approximately 80 acres, was donated to the Town and The Trustees maintain a Conservation Restriction on the land. The property will be transformed into a Community History and Nature Center focusing on local history projects and research. Nearly 69 acres have been protected through a non-profit land trust.

Recent town open space acquisitions have focused on access to water bodies (the Merrimack River and Lake Mascuppic) or on border parcels that abut protected lands in neighboring communities. This approach is intended to maximize the value of the purchase by creating larger habitat areas through combined parcels.

Due to the substantial development that has occurred in the western portion of Tyngsborough during the past decade, the town has become increasingly focused on preserving its open space resources. The Town voted to implement the local option Community Preservation Act at a three-percent tax surcharge level, which is the highest rate permitted.

The Town updated its Open Space and Recreation Plan in 2009, whereby residents expressed their desire for the protection of critical parcels to preserve the town's semi-rural visual character, scenic views and wildlife habitat. The Plan contains the following goals:

- Increase the quantity and quality of recreation space and facilities;
- Develop maintenance and management plans for existing recreation and conservation areas;
- Revitalize the Town Center;
- Educate the residents on the value of open space in the Town and region;
- Increase accessibility of all recreational resources, facilities and programs;
- Promote land use and permitting practices that foster "smart growth" and protect historic assets, open space, cultural assets and resource areas;
- Improve the overall water quality of the Town's surface water bodies and wetland resources; and

- Establish greenways for recreation and habitat networks, with a focus on creating local and regional links.

9. Westford

There are over 4,561 acres of permanently protected open space in Westford. The town controls 2,040 acres, and 1,715 acres are under a conservation restriction. Approximately 40 acres are included in the state's agricultural preservation program. These open spaces include properties along Stony Brook, a working orchard, the former East Boston Camps property and a working farm. Nearly 359 acres have been set aside for water supply protection. Local land trusts own an additional 251 acres.

More than fifty permanent trail easements have been created and trail connections are already established between Westford and Chelmsford, Acton and Carlisle. The Bruce Freeman trail, previously discussed in the Chelmsford section above (Item 2), extends through Westford for a distance of 1.6 miles.

Hill's Orchard in Westford

B. Petapawag Area of Critical Environmental Concern (ACEC)

The Petapawag ACEC is located along and to the east of the Nashua River, from the Town of Ayer north to New Hampshire. The Petapawag ACEC includes the Nashua River corridor and its associated physical, biological and cultural resources and history. The area is comprised of

25,630 acres of which 8,720 are located in the Northern Middlesex region, including 6,610 acres in the Town of Dunstable, 2,040 acres in Pepperell, and 70 acres in Tyngsborough.

Sixteen state-listed rare species are known to occur within the boundaries of the Petapawag ACEC. According to the 2001 State BioMap project, approximately 54% of the Petapawag ACEC is BioMap Core Habitat, and approximately 15% of the ACEC is designated as Supporting Natural Landscape. There are 15 State-Certified Vernal Pools within the ACEC, as well as 332 potential vernal pools, as identified through photo interpretation by the 2001 Massachusetts Aerial Survey of Potential Vernal Pools. There are also important community drinking water resources present within the ACEC.

The area contains unique and highly significant archaeological and historical resources, as well as scenic landscapes of statewide significance. Nearly 30% of the ACEC is comprised of protected open space and land under Chapter 61, 61A and 61B tax classification status.

C. BioMap 2 Core Habitat Areas

The BioMap 2 was released in 2010 and serves as a guide to strategic biodiversity conservation across the Commonwealth. It focuses on land protection and stewardship of areas that are most critical for ensuring the long-term survival of rare and native species and their habitats, exemplary natural communities and diverse ecosystems. BioMap 2 also includes habitats and species of concern as identified within the State Wildlife Action Plan. Such areas include the following:

- Habitat for rare, vulnerable and uncommon mammal, bird, reptile, amphibian, fish invertebrate and plant species;
- Priority natural communities;
- High quality wetland, vernal pool, and aquatic habitats; and
- Remaining forest ecosystems.

These areas have been considered when identifying Priority Preservation locations incorporated within the RSP.

D. Regional Inventory of Recreation Assets

The region's natural resources and open spaces provide a broad array of recreational opportunities within each community, which are summarized as follows.

- **Billerica**
  1. *Great Meadows National Wildlife Refuge* (55 acres)
     Hiking, nature observation, cross-country skiing, canoeing

2. *Vietnam Veteran's Memorial Park* (200 acres)
   Located off Treble Cove Road, this park was deeded to the Town from Middlesex County in 1995 via a legislative act. Features include Concord River frontage, walking trails, show horse rink, soccer fields, radio control airport, fishing, canoeing, cross country running trail, cross country skiing, community gardens, special events, nature observation and the first in the nation Vietnam Veterans Memorial.
3. *Lampson Recreation Complex*
   Basketball courts, tennis courts, football field, softball fields, multi-use field, ice-skating, recreation office.
4. *Akeson Park*
   Soccer fields, canoe put-in/take-out site for Shawsheen River.
5. *Pollard Park*
   Kids Konnection (children's playground), picnicking, baseball field.
6. *Micozzi Beach*
   Swimming, picnic area, playground, sand volleyball court, basketball, handicapped accessible fishing pier, canoe launch, nature observation.
7. *Billerica Public Schools*
   Many of the Town's athletic fields are located on school property. The Marshall Middle School facilities include an outdoor hockey rink. All elementary schools have a children's playground.
8. *Country Club of Billerica*
   Eighteen hole public golf course, driving range, Barrie Bruce Golf School.
9. *Rangeway Golf*
   Driving range and miniature golf course.
10. *Minuteman Sportsman Club*
    Rifle target range, archery
11. *Boys and Girls Club of Greater Billerica*
    Gymnasium, pool, ropes course, game rooms, before/after school program, special events.
12. *Nutting Lake, Winning Pond, Concord River, Shawsheen River.*
    Fishing or Canoeingb
13. *Warren H. Manning State Forest and Park*
    Located off Route 129 in North Billerica and is comprised of 207 acres. The park consists of hiking trails through the forest, a small pond, a picnic area and a children's wading pool.
14. *Gilson Hill State Forest*
    Consists of 168 acres with hiking trails located off Treble Cove Road.
15. *Town Conservation Land owned by Conservation Commission.*
    Sixteen parcels totaling over 200 acres located throughout the Town.

- **Chelmsford**
  1. *Cranberry Bog Reservation* (164 acres)
     Hiking, wildlife observation, fishing.
  2. *George B.B. Wright Reservation* (110 acres)
     Hiking, nature observation.
  3. *Lime Quarry Reservation* (64 acres)
     Hiking, nature observation.
  4. *Lowell Sportsman Club* (64 acres) private)
     Fresh water fishing, target archery, shooting.
  5. *Chelmsford Country Club* (31.5 acres) (municipal)
     Golf, sledding.
  6. *Chelmsford High School* (52 acres)
     Baseball/softball, cross country skiing, football/soccer, general play, hiking, nature observation, organized events, tennis.
  7. *Russell Mill Pond and Forest* (132 acres)
     Hiking, horseback riding, nature observation, fishing, boating, soccer.
  8. *Thanksgiving Ground Forest* (48 acres)
     Fresh water fishing, swimming, hiking, nature observation, boating
  9. *McCarthy Jr. High School* (42 acres)
     Baseball/softball, football/soccer, general play, nature observation, tennis, walking/jogging.
  10. *Freeman Lake* (77 acres)
      Swimming, boating (non-motorized), skating.
  11. *Warren Wildlife Sanctuary (24 acres)*
      Wildlife observation.
  12. *Bruce Freeman Rail Trail*
      Bicycling, walking, rollerblading, jogging, cross country skiing.

- **Dracut**
  1. *Lowell Dracut Tyngsborough State Forest* (1,140 Acres)
     ATV motoring, bicycling, non–motorized boating, camping, cross country skiing, fresh water fishing, hiking, horseback riding, hunting, ice skating, nature observation, organized events, snowmobiling, walking/jogging.
  2. *Dracut High Complex* (89 Acres)
     Baseball/softball, football/soccer, freshwater fishing, organized events, team activities, and walking/jogging.
  3. *Municipal Landfill* (70 Acres)
     Baseball/softball, football/soccer.
  4. *Centerville Sport Club* (35 Acres)
     Fresh water fishing, hunting, nature observation, target archery.

5. *Polubinski Land* (23 Acres)
   Baseball/softball.
6. *Colburn Land* (19 Acres)
   Nature observation, picnicking.
7. *Parker Avenue School* (7 Acres)
   Baseball/softball.
8. *Dracut Tennis Center* (6 Acres)
   Tennis.
9. *Town Conservation Land owned by Conservation Commission*
   Sixteen parcels totaling over 325 acres located throughout the Town.
10. *Veteran's Memorial Park*
    Sports fields, Water Park, skateboarding
11. *Centralville sportsman's Club*
    Target shooting, trap shooting
12. Methuen Road and Gun Club
    Archery, fishing

- **Dunstable**

1. *Town Forest* (119 Acres)
   Cross country skiing, hiking, horseback riding, hunting, nature observation, and snowmobiling
2. *Camp Massapoag (106 Acres)*
   Non-motorized boating, cross country skiing, fresh water fishing, swimming, hiking, nature observation, target archery.
3. *Spaulding Proctor* (91 Acres)
   Non-motorized boating, cross country skiing, fresh water fishing, swimming, hiking, nature observation.
4. *Salmon Brook Area* (35 Acres)
   Fresh water fishing, hiking, hunting, nature observation.
5. *Spectacle Hill Lot* (23 Acres)
   Cross country skiing, hiking, hunting, nature observation
6. *Swallow/Union School Area* (913 Acres)
   Fresh water fishing, hiking, nature observation, tennis
7. *Nashua River Trail*
   Bicycling, walking, rollerblading, jogging, cross country skiing, horseback riding

- **Lowell**
  1. *Lowell Dracut Tyngsborough State Forest (1,140 Acres)*
     ATV motoring, non-motorized boating, cross country skiing, fresh water fishing, hiking, hunting, ice skating, nature observation, organized events, sight seeing, snowmobiling, walking/jogging.
  2. *Lowell Heritage State Park (118 Acres)*
     Bicycling, non-motorized boating, cross country skiing, fresh water fishing, fresh water swimming, hiking, horseback riding, ice skating, nature observation, organized events, picnicking, walking/jogging.
  3. *University of Massachusetts Lowell* (103 Acres)
     Assorted facilities.
  4. *Longmeadow Golf Club* (62 Acres)
     Golf.
  5. *Leblanc Park* (60 Acres)
     Camping, general play, hiking, organized events, picnicking, and pool swimming.
  6. *Shedd Park* (52 Acres)
     Baseball/softball, basketball, bicycling, cross-country skiing, football/soccer, general play, hiking, organized events, other team-related activities, pool swimming, tennis, walking/jogging.
  7. *Fort Hill Park* (34 Acres)
     Bicycling, cross country skiing, downhill skiing, hiking, picnicking, and walking/jogging.
  8. *Boulevard Park* (24 Acres)
     Bicycling, non-motorized boating, camping, fresh water fishing, general play, hiking, ice-skating, organized events, picnicking, walking/jogging.

- **Pepperell**
  1. *Nissitissit River W.M.A* (294 Acres)
     Cross country skiing, fresh water fishing, hiking, hunting, nature observation, and snowmobiling.
  2. *Hays and Swett Lots* (125 Acres)
     Non-motorized boating, cross country skiing, fresh water fishing, hiking, hunting, nature observation, snowmobiling, target archery.
  3. *Conservation Commission Land Trust* (100 Acres)
     Cross-country skiing, fresh water fishing, hiking, horseback riding, and nature observation.
  4. *Town Forest* (83 Acres)
     Cross country skiing, hiking, horseback riding, hunting, nature observation, picnicking

5. *Orchard Lot* (80 Acres)
   ATV motoring, cross country skiing, hiking, nature observation, picnicking, sightseeing, snowmobiling.
6. *Nashua River Trail*
   Bicycling, walking, rollerblading, jogging, cross country skiing, and horseback riding

- **Tewksbury**
  1. *Trull Brook Golf Course* (126 Acres)
     Golf, tennis, nature observation.
  2. *Memorial High School* (55 Acres)
     Baseball/softball, football/soccer, general play.
  3. *Livingston Street Park* (31 Acres)
     Basketball, general play, tennis.
  4. *Rogers Park* (27 Acres)
     Nature observation.
  5. *Center School* (25 Acres)
     General play, tennis.
  6. *Longmeadow Golf Course (52 acres)*
     Golf.
  7. *Tewksbury Country Club (31 acres)*
     Golf.
  8. *Camp Pohelo*
     Summer youth programs.
  9. *Frasca Field (40 acres)*
     Athletic fields.

- **Tyngsborough**
  1. *Lowell, Dracut, Tyngsborough State Forest* (1,140 Acres)
     ATV motoring, bicycling, non-motorized boating, cross country skiing, fresh water fishing, hiking, horseback riding, hunting, ice skating, nature observation, organized events, picnicking, sightseeing, snowmobiling, walking/jogging.
  2. *MIT Property* (251 Acres, Private)
     Nature observation.
  3. *Notre Dame Academy* (199 Acres, Private)
     Hiking, nature observation, pool swimming, tennis.
  4. *Vesper Country Club* (170 Acres, Private)
     Golf, hiking, nature observation, pool swimming, tennis.
  5. *Elbow Meadow* (132 Acres)
     Hiking, nature observation.

6. *Tyngsborough Country Club* (87 Acres)
   Golf, hiking, hunting, nature observation, picnicking.
7. *Greater Lowell Regional Vocational Technical High School* (85 Acres)
   Baseball/softball, basketball, football/soccer, general play, organized events.
8. *Lake Mascuppic*
   Town Beach, swimming, boating.
9. *Tyngsborough Elementary School* (70 Acres)
   Athletic fields.
10. *Tyngsborough High/Middle School complex* (45 Acres)
    Athletic fields, basketball courts.
11. *Community Center Fields*
    Athletic fields.
12. *Wicasse Field* (9 Acres)
    Athletic fields.
13. *Bridge Meadow* (37 Acres)
    Athletic fields, hiking, nature observation.
14. *Sherburn Property* (79 Acres)
    Hiking, nature observation.
15. *Lakeview School* (11 Acres)
    Athletic fields
16. *Tyngsborough Sportsman's Club* (43 Acres)
    Target shooting, fishing.
17. *Clover Hill Road School* (26 Acres)
    Athletic fields.
18. *Innovation Academy* (177 Acres)
    Athletic fields.

- **Westford**
  1. *Nashoba Brook Area* (350 Acres)
     Cross country skiing, hiking, hunting, nature observation, and snowmobiling.
  2. *Bruce Freeman Bike Path*
     Bicycling, walking, rollerblading, jogging, cross country skiing.
  3. *Nabnasset Lake Golf Course*
     Golf, sledding.
  4. *East Boston Camps* (241 Acres)
     Camping, swimming, picnicking, fishing, boating (non-motorized), snowshoeing, cross country skiing, hiking, jogging.
  5. *Slifer Conservation Land*
     Hiking, bird watching, cross country skiing.

6. *Nonset Brook – Vine Brook* (174 Acres)
   Hunting, nature observation.
7. *Graniteville Ball Fields*
   Baseball, softball, basketball, playground.
8. *Tadmuck Swamp Area* (142 Acres)
   Fresh water fishing, hunting, nature observation.
9. *New Westford Academy* (111 Acres)
   Baseball/softball, football, track, other team sports.
10. *Stony Brook School*
    Tennis, lacrosse, basketball, soccer.
11. *Jack Walsh Field*
    Soccer, tennis, basketball.
12. *Mystery Spring* (106 Acres)
    Cross country skiing, hiking, hunting, nature observation, and snowmobiling.
13. *Nashoba Valley Ski Area* (50 Acres)
    Downhill skiing, 4 chair lifts, 3 rope tows, 9 trails.
14. *Butter Brook Golf Course*
    Golf.
15. *Edwards Beach*
    Swimming, boating (non-motorized), fishing, nature observation.
16. *Forge Pond Beach*
    Swimming, boating (non-motorized), nature observation.

E. Water Resources

The region possesses an abundance of water resources, including rivers, streams, brooks, lakes, ponds, reservoirs, marshes and wetlands, as shown on Map 5 on the following page. The entire region falls within the drainage basin of the Merrimack River, the second largest in New England. The Concord, Nashua, Nissitissit and Shawsheen Rivers are other rivers in the region and are tributaries of the Merrimack River. More than fifty streams and brooks, including Beaver Brook, Black Brook, River Meadow Brook, Stony Brook and Trull Brook, are tied into this river system and connect with the lakes, ponds and wetlands in an elaborate hydrologic system.

More than twenty-five (25) major lakes and ponds are found in the region. Most are natural water bodies over ten (10) acres in area and, therefore, are defined as “Great Ponds”, according to DEP.

Placeholder for Map 5-Water Resources

The larger bodies of water in the region include Forge Pond in Westford and Mascuppic Lake in Tyngsborough, which are greater than 200 acres in area. Long Pond in Tyngsborough and Dracut, and Long Sought For and Nabnasset Ponds in Westford and Pepperell Pond in Pepperell and Groton are greater than one hundred (100) acres in area. In general, the ponds with the best water quality are Long Pond in Tyngsborough, Burgess Pond in Westford, and Massapoag Pond in Dunstable. Two swamps, the Great Swamp in Tewksbury and Tadmuck Swamp in Westford, are more than one hundred (100) acres in area as well.

F. Water Quality

Abundant, high quality water sources are essential to the region's long term growth and economic vitality. The Merrimack River suffers from a number of impairments including pathogens (bacteria), metals, nutrients, priority organics and unionized ammonia, according to the *Massachusetts 2006 Integrated List of Impairments* [MA 303(d) List]. In addition to pathogens, nutrients are listed as impairments in the MA 303(d) list from the Pawtucket Dam to the confluence of the Merrimack River with Creek Brook in Haverhill. The Massachusetts Department of Environmental Protection (MA DEP) Watershed-Based Plans also list nutrient impairments in the Merrimack from Nashua, New Hampshire to the confluence of the Concord River in Lowell, Massachusetts.

Problems with the quality of water are worse in drought situations during the summer when the bacteria levels in the rivers, lakes and ponds increase. No formal studies of the water quality in the region have been done since the federal 208 program was in effect thirty years ago. However, ongoing efforts by environmental groups, such as the Merrimack River Watershed Council and the Nashua River Watershed Association, have focused on the quality and quantity of water in the region through a watershed approach.

Wetlands are protected from development by the state Wetlands Protection Act and, in some cases, by local wetlands protection bylaws. Freshwater wetlands support high biodiversity, including unique plant communities and many animal species that are dependent on wetlands for various lifecycle needs. Wetlands also capture heavy rains and prevent flooding downstream, absorb greenhouse gases from the atmosphere, and store and purify groundwater. Despite federal, state and local regulations, wetland destruction, habitat fragmentation, unsustainable water withdrawals, pollution, invasive species and climate change threaten the quantity and quality of the region's wetland resources.

The region contains a number of municipal water supply sources, including the Merrimack River and Concord River, which supply drinking water to the communities of Billerica, Chelmsford, Dracut, Lowell, and Tewksbury. Surface water reservoirs and groundwater aquifers meet the daily water supply needs of the remainder of the region.

It is essential that the region protect both the quantity and quality of its water supply through effective land use controls and health regulations. Toward this end, most municipalities have adopted water supply protection district regulations consistent with DEP drinking water source protection requirements. These regulations prohibit high-risk commercial and industrial uses within the protection district. The following table provides an overview of the region's primary water supply lands (Zone A and Zone II), as mapped by DEP and summarized in Table17 below.

Table 17: Municipal Drinking Water Supplies – Primary Protection Zones

Municipality	Zone A (acres)	Zone II (acres)	Zone A and Zone II protected area (acres)	% Permanently Protected	
				Zone A	Zone II
Billerica	710.85	1055.00	1765.85	67.41	10.24
Chelmsford	173.22	4704.58	4877.80	15.21	21.11
Dracut	115.02	128.00	243.02	0.00	30.52
Dunstable	0	443.28	443.28	0.00	21.13
Lowell	882.15	83.23	965.38	7.29	1.08
Pepperell	0	702.34	702.34	0.00	61.01
Tewksbury	56.57	2562.19	2618. 76	2.26	16.87
Tyngsborough	547.83	428.59	976.42	11.52	20.20
Westford	0	4298.64	4298.64	0.00	39.21
Region	2485.64	14408.92	16894.56	25.52	26.85

Source: Massachusetts Department of Environmental Protection

Zone A lands are hydrologically connected with and contribute recharge to surface water supplies. These lands consist of the following:

- The land area between the surface water source and the upper boundary of the bank;
- The land area within a 400-foot lateral distance from the upper boundary of the bank; and
- The land area within a 200-foot lateral distance from the upper boundary of the bank of a tributary stream or associated surface water body.

Zone II lands are hydrologically connected with and contribute recharge to groundwater supplies, and include areas of an aquifer which contribute water to a well under the most severe pumping and recharge conditions that can be realistically anticipated. Zone IIs are bounded by the groundwater divides that result from pumping the well, and by the contact of the aquifer with less permeable materials such as till or bedrock. In some cases, streams or lakes act as recharge boundaries. In all cases, the Zone II extends up gradient to its point of intersection with prevailing hydro-geologic boundaries.

As indicated in Table 17 above, 25.52% of the region's Zone A land area and 26.85 % of the region's Zone II land area are currently considered permanently protected through fee simple ownership or conservation/deed restriction. The remaining areas, although regulated, are still potentially vulnerable to impacts from some level of land disturbance and/or development activity.

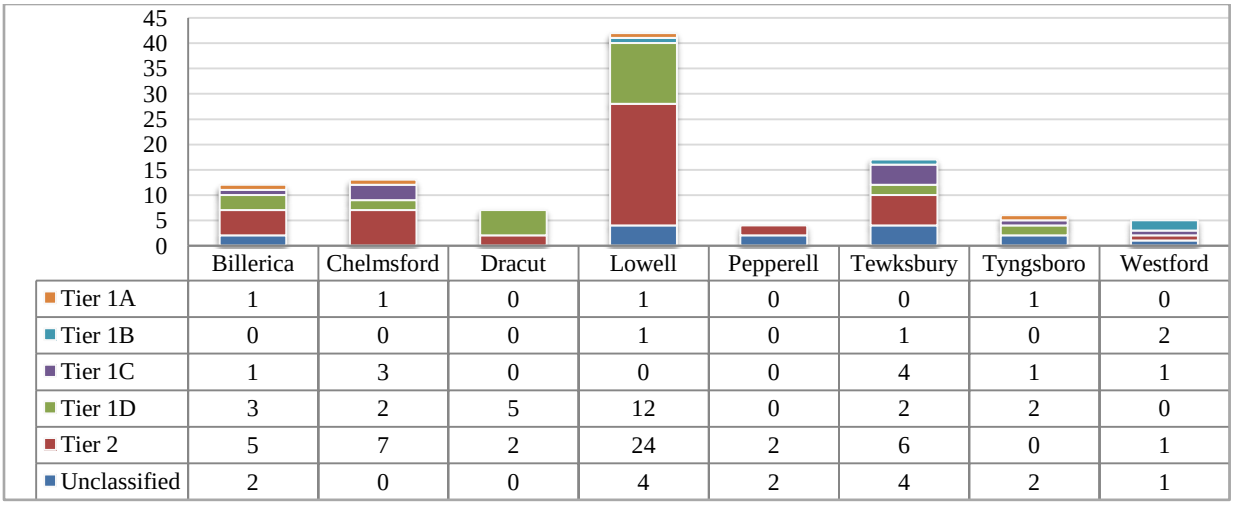
G. Environmental Contamination

The Commonwealth of Massachusetts has developed a numerical Tier Classified System for these so-called Chapter 21E sites as a means of assessing sites where contamination has occurred. Properties are classified according to several variables, including site complexity, the type of contamination, and the potential for human or environmental exposure to the contamination. These 21E sites are designated within one of six categories:

- *Tier IA* sites have received a Numerical Ranking Score (NRS) equal to or greater than 550. These sites require a permit and the person undertaking response actions must do so under direct supervision from DEP. Additionally, some sites are automatically classified as Tier 1A if they pose an imminent hazard, affect public water supplies, or miss regulatory deadlines.
- *Tier 1B* sites (NRS 450≤ 550) require a permit but response actions may be performed under the supervision of a Licensed Site Professional (LSP) without DEP approval.
- *Tier 1C* sites (NRS 350≤450) require a permit, but response actions may be performed under the supervision of an LSP without prior DEP approval.
- *Tier 2* sites (<350) do not require a permit and response actions may be performed under the supervision of an LSP without prior DEP approval. All pre-1993 transition sites that have accepted waivers are categorized as Tier 2 sites.
- *Tier 1D* sites are sites where the responsible party has failed to provide a required submittal to DEP by a specified deadline.
- *Unclassified* sites are sites that haven't reached their Tier Classification deadline and Response Action Outcome (RAO) statements, Downgradient Property Status (DPS) submittals, or Tier Classification forms have not been received by DEP.

Figure 1 on the following page breaks out the one hundred six (106) identified 21E sites in the region by community and tier classification. Every community in the Greater Lowell region has at least one 21E site, except for Dunstable. Four of these sites have been classified as Tier 1A sites - Iron Horse Park in Billerica, the Silicon Transistor Corporation site in Chelmsford, the former Costas Dump in Lowell, and the Charles George landfill in Tyngsborough. The remediation strategy for Iron Horse Park has been implemented and the environmental clean-up is presently underway. The Silicon Transistor Corporation site is in Phase IV of the remediation process and the cleanup plan is being implemented. The former Costas Dump has reached Phase V, which means the long-term treatment processes have been implemented and the focus has shifted to the monitoring and tracking of the cleanup process. The Charles George Landfill was completed in 1998 through the construction of a full synthetic landfill cap, but the collection and treatment of leachate and flaring methane continues.

Figure 1: Tier Classified C21E (Brownfield) Sites in the NMCOG Region



	Billerica	Chelmsford	Dracut	Lowell	Pepperell	Tewksbury	Tyngsboro	Westford
Tier 1A	1	1	0	1	0	0	1	0
Tier 1B	0	0	0	1	0	1	0	2
Tier 1C	1	3	0	0	0	4	1	1
Tier 1D	3	2	5	12	0	2	2	0
Tier 2	5	7	2	24	2	6	0	1
Unclassified	2	0	0	4	2	4	2	1

Source: Massachusetts Department of Environmental Protection

Four Tier 1B sites have also been identified - the School Street right of way in Lowell, Tewksbury Auto Parts in Tewksbury, and Rustlick, Inc. and the Westford Highway Garage in Westford. The School Street right-of- way site has been worked on by two LSPs and there are some businesses on the site. The Tewksbury Auto Parts site is in Phase IV of the remediation process, while the Rustlick, Inc. and Westford Highway Garage sites are in Phase II, during which a comprehensive site analysis is conducted and risks to public health, welfare, and the environment are determined. In addition to the Tier 1A and 1B sites, there are ten sites classified as 1C sites, twenty-six sites classified as 1D, forty-seven sites classified as Tier 2 sites, and fifteen unclassified sites. Nearly 40% of the 21E sites in the region are located in Lowell, while 16% are located in Tewksbury, 12.3% in Chelmsford, 11.3% in Billerica, 6.7% in Dracut, 5.7% in Tyngsborough, 4.7% in Westford and 3.8% in Pepperell.

In addition to the sites identified by DEP, EPA maintains a National Priorities List (NPL), which is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which sites warrant further investigation.

Presently, there are twenty-one NPL sites in the NMCOG region. Three of these sites – the former Silresim Chemical Corporation in Lowell, the Sutton Brook Disposal Area in Tewksbury and the Charles George Reclamation Trust Landfill in Tyngsborough - have completed the NPL designation process and are listed as Superfund sites. Additionally, there are eleven sites on the NPL List awaiting designation, three sites have been identified as Short Term/Removal sites, two

sites have been identified as "Brownfield" sites, and one site has been identified as a Resource Conservation and Recovery Act (RCRA) Corrective Action site.[5]

H. Habitat Areas

The Massachusetts Natural Heritage and Endangered Species Program (NHESP) is charged with ensuring that the Commonwealth's natural diversity is maintained by protecting the species and natural communities that are most threatened and endangered. There are a total of 435 native plant and animal species listed under the Massachusetts Endangered Species Act (MESA) and 108 types of natural communities currently described within Massachusetts and tracked by the Natural Heritage Program. Over fifty-five (55) species listed under MESA have been observed in the Northern Middlesex region.

The long-term sustainability of the region's biological resources requires a determined commitment to land and water conservation, which includes the preservation of priority habitat areas. Priority Habitat is based on the known geographical extent of habitat for all state-listed rare species, both plants and animals, and is codified under MESA. Habitat alteration within Priority Habitats may result in a "take" of a state-listed species, and is subject to regulatory review by the Natural Heritage & Endangered Species Program. The Priority Habitat areas within the Northern Middlesex region are shown on Map 4 on page 63. Estimated Habitats are a sub-set of the Priority Habitats, and are based on the geographical extent of habitat of state-listed rare wetlands wildlife and is codified under the Wetlands Protection Act, which does not protect plants. Species on the MESA list are categorized as endangered, threatened or of special concern, depending on the likelihood of extinction or extirpation. State-listed wetland wildlife species are protected under the Massachusetts Endangered Species Act, as well as the Wetlands Protection Act.

There are numerous threats to the long-term viability of the region's ecosystems, resulting in a decrease of many species. The greatest threat is loss of habitat due to residential, commercial and industrial development. In addition, areas surrounding development are often degraded by invasive species, pollution, noise and runoff. Habitat fragmentation results from the construction of roads, other infrastructure and associated development.

I. Historic and Cultural Resources

The preservation of historic and cultural resources must be carefully considered in order to protect the character of the region's city, town, and village centers. Many colonial era residences, mill structures, and village greens are already protected to some extent through the establishment of historic districts. However, important historic resources often lie outside the

[5] For information about how the EPA defines NPL status, visit: http://www.epa.gov/superfund/sites/npl/status.htm.

boundaries of an historic district and these resources are not afforded the same level of protection. Historic inventories and plans are essential in guiding historic preservation initiatives. Effective preservation requires active stewardship and support of the overall community.

Historical Commissions should actively participate in their community's master planning process in order to ensure that historic resources are emphasized in the planning process. Adequate levels of funding are essential for preserving historic resources and for promoting adaptive reuse of historic structures. The Massachusetts Historic Rehabilitation Tax Credit program provides a source of funding for this purpose, but given the current annual cap on the program, demand far exceeds available funding. Project proponents can wait for years to access these monies. The Community Preservation Act (CPA) has become a vital source of local funds for historic preservation projects.

Protecting the region's historic resources from demolition and guiding the design of new development in a way that respects the historic value and integrity of the area, will preserve the history and character of the region for generations to come. The permitting process is also more efficient if the expectations for historic preservation are outlined in an established plan. As shown on Map 6 on page 86, the region has hundreds of properties listed on the National Register of Historic Places, dozens of local historic districts, and numerous well-known archaeological sites. Table 18 below provides a listing of the National Register Historic Districts and the Local Historic Districts in each community. The locations of such areas are shown on Map 7 on page 87.

Table 18: National Register Districts and Local Historic Districts

Community	National Register Districts	Local Historic Districts
Billerica	Billerica Mills Historic District	Billerica Mills Historic District
	Town Hall	Corner Historic District
	Middlesex Canal Historic and Archaeological District	Howe School
	Two Brothers Rocks	Richardson's Mill Historic District
		Sabbath Day House
Chelmsford	Chelmsford Center Historic District	Chelmsford Center Historic District
	Old Town Hall	Old Town Hall
	Fiske House	Fiske House
	Forefathers Cemetery	Forefathers Cemetery
	J.P. Emerson House	J.P. Emerson House
	Middlesex Canal Historic and Archaeological District	
Dracut	None	None
Dunstable	None	None
Lowell	Andover Street Historic District	Andrew J. Calef Building
	Belvidere Hill Historic District	City Hall District
	Andrew J. Calef Building	Downtown Lowell Historic District
	City Hall District	Warren Fox Building

	National Register Districts	Local Historic Districts
Lowell (cont'd)	Colburn School	Hamilton Manufacturing Co.-Counting House
	Eliot Presbyterian Church	Hamilton Manufacturing Co.- Storage House
	Warren Fox Building	Hill Brothers Carriage House
	Hamilton Manufacturing Co.-Counting House	Holy Trinity Greek Orthodox Church
	Hamilton Manufacturing Co. –Storage House	Howe Building
	Hill Brothers Carriage Factory	Hoyt-Shedd Estate
	Holy Trinity Church	Lawrence Manufacturing Co.-Mill #12
	Howe Building	Lawrence Manufacturing Co. – Storehouse #14
	Hoyt-Shedd Estate	Lawrence Manufacturing Co. –Agent's House
	Lawrence Manufacturing Co.-Mill #12	Locks and Canal District
	Lawrence Manufacturing Co. – Storehouse #14	Merrimack-Middle Street Historic District
	Lawrence Manufacturing Co. –Agent's House	Peter Powers Double House
	Locks and Canal District	Saint Anne's Episcopal Church
	Lowell National Historical Park Canal System	Lawrence Manufacturing Co.- Mill #12
	Merrimack-Middle Street Historic District	Lawrence Manufacturing Co. – Storehouse #14
	Middlesex Canal Historic and Archaeological District	Wentworth Block
	John Nesmith House	Whistler House
	Peter Powers Double House	
	Roger Fort Hill Park Historic District	
	Round House	
	Saint Anne's Episcopal Church	
	Saint Patrick's Church	
	South Common Historic District	
	Dr. Joel Spalding House	
	Tyler Park Historic District	
	U.S. Post Office Historic District (Appleton)	
	U.S. Post Office Historic District (Kearney Square)	
	Wamesit Canal-Whipple Mill Industrial Complex	
	Wannalancit Street Historic District	
	Washington Square Historic District	
	Wentworth Block	
	Whistler House	
	Wilder Street Historic District	
	Worcester House	
Pepperell	Pepperell Center Historic District	None
	Pepperell Town Hall	
Tewksbury	Tewksbury State Hospital	None
Tyngsborough	None	None
Westford	Brookside Historic District	
	Forge Village Historic District	
	Graniteville Historic District	
	Parker Village Historic District	
	Westford Center Historic District	

Source: 2010 State Register of Historic Places, Massachusetts Historical Commission

Placeholder for Map 6

Placeholder for Map 7

J. Addressing Climate Change

There is abundant evidence that the earth is experiencing rapid climate change, and that greenhouse gas emissions play a significant role in this phenomenon. Some specific impacts anticipated in the Commonwealth include the following:

- Temperature Increases: Average temperatures across Massachusetts are projected to rise by as much as 6°F to 14°F by the late 21st century;
- Precipitation, drought, and snowfall: Heavy rainfall events have increased in recent decades and the frequency and severity of such events are expected to increase further, exacerbating flooding. Winter precipitation is projected to increase by 20% to 30%, with a shift toward increased rain and less snowfall. As increase in the frequency of summer droughts is also expected; and
- Sea Level rise: Sea level is projected to rise by up to several feet by the end of the century, leading to increased coastal flooding and erosion.

A variety of strategies, collectively known as Climate Change Adaptation, are designed to help ecosystems and people cope with the adverse impacts of climate change. Many of these strategies are relevant to the recommendations and actions set forth in the Regional Strategic Plan.

Focusing on planning initiatives that create more compact development patterns will benefit climate changes by reducing VMT, conserving energy, and reducing impervious surface which contributes to flooding. The generation of renewable energy and the implementation of energy efficiency initiatives will also help reduce greenhouse gas emissions.

K. Identification of Priority Preservation Areas

The Northern Middlesex region contains innumerable natural resources including wetlands and waterways, forests, fields, farms, and hilltops. Such resources are critical to the overall character of the region and the quality of life for its residents. Many of these resources protect our water supply, provide migration corridors and habitat for wildlife, provide natural buffers to mitigate flooding and high winds, and provide recreational opportunities for residents and visitors.

There are numerous threats to the long-term viability of the region's ecological resources including the following:

- Habitat loss and degradation resulting from the direct destruction of habitat by residential, commercial and industrial development;
- Habitat fragmentation resulting from the construction of roadways, residential and commercial development, and infrastructure that breaks up tracts of forest, wetlands, and waterways, isolates populations, and interrupts wildlife movement;

- Invasive species that lead to the degradation of ecosystems and rare species populations;
- Air and water pollution from point and non-point sources; and
- Remaining farmland is shrinking and will continue to be imperiled in the future.

To identify priority preservation areas, NMCOG staff mapped existing protected open space, based on MassGIS data and data contained in the Open Space and Recreation Plans for each member community. Priority habitat areas, water resource areas, and historical resources were also mapped. Meetings were also held with municipal staff to review this information and input was gathered through the two public visioning sessions conducted for this project.

In addition to lands that are already protected, the municipalities identified other select parcels that are considered a priority for future preservation, through either acquisition in fee, easement or a conservation restriction. Many of these parcels are currently under private ownership and the property owners have not yet been approached. In some cases, communities are reluctant to publicize their interest out of concern that the asking price may become artificially inflated. NMCOG staff has respected the concerns of these communities. Therefore, parcel specific data has not been provided in this plan. The Priority Preservation areas are shown on Map 8 on page 90.

While planning and policy direction can assist communities in protecting natural and cultural resources, continued acquisition and protect of priority areas will be needed to preserve vulnerable or valuable parcels. State, local and non-profit resources will all need to be leveraged and utilized in the years ahead in order to accomplish the goals established by the region and its communities. This is particularly the case in an era of municipal and state budget deficits.

L. Conservation and Environmental Planning Tools for Sustainable Development

Preserving and protecting the region's natural resources in the face of development pressure can be challenging for local communities. This section of the RPS outlines a number of tools and programs to assist in this effort.

1. Agricultural Preservation

High real estate values have increased pressure to develop what remains of agricultural lands in our communities. These lands are generally clear of forest and have topography well-suited to a variety of land use developments. Furthermore, while communities often have a right of first refusal under existing Chapter 61 programs, they often lack the funds to purchase large tracts of valuable open space. Often the result is that farmlands are converted into residential subdivisions at the expense of open space, local agricultural production and community character. As shown in Table 19 on page 91, since 1950, the region has lost over 20,000 acres (or 77%) of its farmland to development.

Placeholder for Map 8

Table 19: Change in Agricultural Land Use in the Northern Middlesex Region from 1950 – 2005

Year	Acres	% Decrease
1950	26,133	---
1971	10,563	(59.57)
1985	9,672	(8.43)
1991	8,505	(12.06)
2005	6,016	(29.27)
➢ **1950-2005**	**20,117**	**(76.98)**

Table 20 below provides a comparative breakout of agricultural land use by community for the years 1971 and 2005. During that time period, the region lost 38.3% of its agricultural lands to development. The largest declines were experienced in Lowell (-83%), Westford (-59.3%), Chelmsford (-49.7%), and Tyngsborough (-37%). In 1971, the principal agricultural communities, as reflected by their percentage of the region's total agricultural land, were Dracut (22.9%), Pepperell (22.8%), Dunstable (13.3%) and Westford (12.7%); while in 2005, the largest remaining agricultural lands were in Pepperell (25.6%), Dracut (26%) and Dunstable (16.7%). Based upon more recent development trends during the 1990s and 2000s, the trend continues to this day.

Table 20: Agricultural Land Use in the NMCOG Region (1971 and 2005)

Community	Acres		Percent of Region in 1971*	Percent of Region in 2005	Acreage Change 1971-2005 (Percent)*
	1971	2005			
Billerica	537.34	262.11	5.1%	4%	51.2%
Chelmsford	827.97	415.81	7.8%	6.4%	49.8%
Dracut	2,420.13	1,690.21	23%	26%	30.2%
Dunstable	1,405.41	1,089.58	13.3%	16.7%	22.5%
Lowell	129.34	21.80	1.2%	0.3%	83.1%
Pepperell	2,411.05	1,664.42	23%	25.6%	31%
Tewksbury	822.91	399.98	7.8%	6.1%	51.4%
Tyngsborough	669.26	418.79	6.3%	6.4%	37.4%
Westford	1,339.25	545.05	12.7%	8.3%	59.3%
Region	10,562.66	6,507.75	100%	100%	38.3%

Sources: McConnell Land Use, University of Massachusetts

Agricultural preservation can provide financial benefits to municipalities and to the development community. Limiting development in outlying agricultural areas can reduce municipal infrastructure and service costs that would result from large scale subdivision development. If development rights are transferred as part of a preservation technique, private developers can realize significant financial gains through an increase in the development potential in "receiving areas" such as village centers.

Other financial considerations include the amount of money that may be needed by a community to purchase lands that are withdrawing from the Chapter 61A program. The likelihood of success of a proposed APR will be increased if a municipality can provide a portion of the funding required to purchase the deed restriction. Potential sources of funding include grants from the Massachusetts Department of Conservation Services and money set aside through CPA.

Another direct economic benefit of agricultural preservation comes from maintaining a viable local agricultural economy. Producing more local agricultural products reduces dependence on foreign and out-of-state operations, reduces shipping expenses and oil consumption, and strengthens local economies. Locally grown products employ Massachusetts farmers and substantially reduce the costs and impacts of large scale interstate transport.

Brox Farm in Dracut

There are a variety of ways to protect or promote agricultural opportunities in Massachusetts. Such agricultural preservation measures directly or indirectly satisfy several of the Massachusetts Sustainable Development Principles including:

• *Plan Regionally*: Preserving farmland and agricultural opportunities has obvious economic significance to the state as a whole and is consistent with long standing Massachusetts policies.

• *Concentrate Development and Mix Uses*: Preservation techniques that mandate cluster development in agricultural areas concentrate development in a way that preserves land while expanding housing opportunities in a municipality.

• *Use Natural Resources Wisely*: The preservation of agricultural lands conserves existing natural resources by maintaining recharge to groundwater and maintaining open space.

• *Protect Land and Ecosystems*: Conservation restrictions that may be placed on existing agricultural lands can provide permanent protection for wildlife habitat and significant cultural or historic landscapes.

• *Increase Job and Business Opportunities*: Efforts to preserve and enhance the viability of existing agricultural operations foster local economies and strengthen sustainable resource-based businesses.

The agricultural preservation tools most appropriate for communities in the Northern Middlesex Region include the following:

Chapter 61A - The Chapter 61 Program provides a tax break to owners of recreational, forest or agricultural lands as long as the land remains in the specified use. Specific information regarding how these incentives are calculated and which lands can qualify can be found in the Massachusetts Department of Revenue (DOR) Division of Local Services Property Tax Bureau's "Taxpayer's Guide to Classification and Taxation of Agricultural/Horticultural Land in Massachusetts" brochure dated October 1997. It is important to note that Chapter 61 is an incentive program, and does not a permanently protect open space or farmland.

Agricultural Commissions – An Agricultural Commission advocates for local farms and farmers, is formed by passing a local bylaw or ordinance. Responsibilities include protecting farmland, providing assistance for natural resource management, and assisting local boards with community development decisions. Ninety-one cities and towns have established Agricultural Commissions in Massachusetts, including the Northern Middlesex communities of Chelmsford, Dracut, Dunstable, Pepperell, and Westford.

Right to Farm Bylaw- The right to farm is vested in all residents of the Commonwealth under Article 97 of the state Constitution. Communities interested in formally re-asserting that right within the community may pass a Right to Farm Bylaw that clearly states the priorities of the community relative to fostering agricultural activities and allowing farms to operate "with minimal conflict with abutters and Town agencies". The bylaw/ordinance also establishes the notification procedure for informing all residents of the community's status as a Right to Farm entity. Within the Northern Middlesex region, the communities of Dracut, Dunstable, Pepperell, and Westford have adopted a Right to Farm bylaw.

Agricultural Preservation Restrictions (APRs) – The APR program is designed to protect productive agricultural lands by establishing permanent deed restrictions protecting them from any use that might diminish the area's agricultural potential. These deed restrictions are purchased with state funds that can be matched by municipal and federal funding.

Community Gardens - Community Garden programs have been successfully developed in cities such as Lowell and provide residents with an opportunity to grow food in urbanized settings. Gardens are often managed by community groups who allocate specific plots of land to citizens on an annual basis. These areas also provide a community gathering place for cultural and educational events.

Farm Viability Enhancement Program (FVEP) - The Farm Viability Enhancement Program (FVEP), under the Massachusetts Department of Agricultural Resources, works to improve the economic health and environmental integrity of farms through the development and implementation of Farm Viability Plans. These comprehensive farm plans, which are developed by teams comprised of farmers and other agricultural, economic and environmental consultants, suggest ways for farmers to increase their on-farm income through such methods as improved management practices, diversification, direct marketing, value-added initiatives and agrotourism. In addition, Farm Viability Plans make recommendations concerning environmental and resource conservation concerns on participating farms.

Zoning Protections - Communities concerned with the development potential of existing agricultural lands can adopt zoning bylaw amendments specifically designed to protect these open tracts of land, including cluster or Open Space Residential Design (OSRD) with provisions for existing farmland. These provisions ensure that the protection of open space will be maximized as lands transition from farmland to residential development.

In order to remain economically viable, many farms have expanded beyond basic agricultural production to include agrotourism, expanded retail and value added processing. Such uses can be facilitated through modified zoning regulations. OSRD in the Northern Middlesex region is discussed in Chapter III-Land Use

Transfer of Development Rights (TDR) – TDR provides an opportunity to blend down-zoning with incentives for increased density. In agricultural communities, undeveloped agricultural lands can be designated as "sending areas" where the amount of development that would ordinarily be allowed on the parcel is transferred to a pre-designated "receiving area". In other words, the development potential of one area is added on to the development potential of another.

2. Community Preservation Act

The Community Preservation Act (CPA) is an innovative financing tool that allows communities to create a Community Preservation Fund through a surcharge of up to 3% of the real estate tax levy on real property. Matching funds are provided by the state. In 2010, the Department of Revenue distributed matching funds of almost $26 million to 142 communities.

The local preservation fund can be used for open space acquisition, historic preservation or the creation of affordable housing. In most communities, CPA has wide appeal due to the local control options:

- All decisions are local;
- Local residents must vote by ballot to adopt the Act;
- The Act stipulates that a Community Preservation Committee composed of 5-9 members representing various boards in the community recommend to the community's legislative body how to spend Community Preservation funds:
- The local legislative body must annually approve the appropriation of the funds for specific projects; and
- CPA can be repealed at the local level.

To date, the following Northern Middlesex communities have adopted the Act: Chelmsford, Dracut, Dunstable, Tewksbury, Tyngsborough and Westford. Table 21 below summarizes the CPA revenues received by the local communities through FY 2011.

Table 21: Community Preservation Act Revenues through FY 2011 in the Greater Lowell Region

Community	Date of CPA Vote	% Surcharge	Total Revenues Since Adoption (local plus state distribution)
Chelmsford	4/3/01 4/3/07	.5% 1.5%	$5,673,812
Dracut	5/7/01	2%	$8,954,524
Dunstable	5/15/06	3%	$1,371,577
Tewksbury	4/1/06	1.5%	$3,440,967
Tyngsborough	5/8/01	3%	3$,635,647
Westford	5/1/01	3%	$17,823,788

Source: Community Preservation Coalition

3. Outright Acquisition

Outright (fee simple) acquisition provides the highest level of protection for a particular piece of property. It also gives the community complete control over how the land is used and managed. However, this approach to preservation is generally the most costly. Funding mechanisms for open space acquisition include the following:

- Municipal funding from a one-time appropriation, an annual contribution to a land protection fund, or the Community Preservation Act;

- Grant funding through programs such as the state's LAND Program, administered by the Division of Conservation Services;
- Private conservation organizations such as the Trustees of Reservations or the local land trust; or
- Donations or "bargain sales" from landowners seeking to conserve their land or who want to gain tax benefits.

4. Conservation Restrictions

A conservation restriction, formerly known as a conservation easement, is a means authorized by Sections 31-33 of Chapter 184 of the General Laws of the Commonwealth of Massachusetts to limit the use of land in order to protect specified conservation values including the natural, scenic or open condition of the land.

Conservation restrictions differ from other kinds of specified restrictions created under state law such as preservation, watershed, and agricultural preservation restrictions. For example, every conservation restriction must be submitted according to the written procedures of and approved by the Secretary of Energy and Environmental Affairs. By way of contrast, preservation restrictions must be approved by the Massachusetts Historical Commission, and agricultural preservation restrictions by the Commissioner of Food and Agriculture. In certain circumstances, communities should consider utilizing these other forms of preservation. For example, if there is an historic building on the property, a preservation restriction ensures that the architectural and historical integrity of the building will be preserved. The Massachusetts Historical Commission is the state agency responsible for approving preservation restrictions on buildings and archaeological sites.

There are five conservation restriction categories:

- The conventional conservation restriction, which is perpetual and for which the donor-landowner may be seeking a charitable deduction for federal income tax, gift and estate tax purposes.

- Historic preservation, watershed or agricultural preservation restrictions;

- The perpetual conservation restriction required by a government agency in the permitting process; for which income tax charitable deductions are not available, but which still require approval by the Secretary of Energy and Environmental Affairs;

- Development rights restrictions, which are purchased by a governmental agency or private, non-profit organization; and

- Other restrictions not falling into one of the first four categories; e.g., restrictions for a term of years.

5. Chapter 61, 61A and 61B Programs

The State's Chapter 61, 61A and 61B programs offer tax incentives for landowners to keep their property in active forestry, agriculture and recreation use. However, these programs do not offer guarantee long-term protection of the land.

The agricultural and horticultural land classification program under Massachusetts General Laws Chapter 61A is designed to encourage the preservation of the Commonwealth's valuable farmland and promote active agricultural and horticultural land use. It offers significant local tax benefits to property owners willing to make a long term commitment to farming. In exchange for these benefits, the city or town in which the land is located is given the right to recover some of the tax benefits afforded the owner and an option to purchase the property should the land be sold or used for any purpose other than to continue raising farm products. Property must consist of at least five (5) contiguous acres of land under the same ownership and be "actively devoted" to agricultural or horticultural use in order to qualify for and retain classification as agricultural or horticultural land under Chapter 61A. An equal amount of contiguous non-productive land may also qualify for classification.

The recreational land classification program under Massachusetts General Laws Chapter 61B is designed to encourage the preservation of the Commonwealth's valuable open space and promote recreational land uses. It offers significant local tax benefits to property owners willing to make a long term commitment to preserving land in an undeveloped condition or for use for outdoor activities. In exchange for these benefits, the city or town in which the land is located is given the right to recover some of the tax benefits afforded the owner and an option to purchase the property should the land be sold or used for any purpose other than to maintain it as open space or for recreational use. Property must consist of at least five (5) contiguous acres of land under the same ownership in order to qualify for and retain classification as recreational land under Chapter 61B. The land must fall into one of the following two categories to qualify:

- It must be maintained in a substantially natural, wild or open condition or must be maintained in a landscaped condition permitting the preservation of wildlife and natural resources. It does not have to be open to the public, but can be held as private, undeveloped, open space land.

- It must be used for certain recreational purposes and must be open to the public or members of a non-profit organization.

6. Zoning Tools

As discussed in Chapter 3-Land Use, there are various zoning tools that address protection of open space and protection of natural resources. These include Open Space Residential Development, Scenic Overlay Districts, Water Resource Protection Bylaws, and LID Development Bylaws.

7. Limited Development

In limited development projects, a conservation group (usually a non-profit) purchases a property that they would like to conserve as open space. A portion of the property that is least important from a conservation perspective is carved out and sold as high-end real estate. The proceeds from the sale are then used to repay the funds borrowed for the land purchase and for future conservation efforts.

8. Local Wetlands Protection Bylaw

Some communities, through their Conservation Commissions, have adopted a local wetlands protection bylaw aimed at providing uniform protection for all wetlands in the community. While the state's Wetland Protection Act (WPA) provides significant protection for wetlands, it does not cover certain resource areas, such as isolated wetlands, buffer zones, vernal pools, and historic and archaeological resources. A local wetlands bylaw typically includes the following provisions:

- The bylaw should apply to all wetlands, even isolated wetlands not covered by the WPA;
- Some communities have chosen to adopt a 25-foot "no disturbance" buffer zone and a 50-foot "no habitable structure" buffer zone around the edge of the wetland;
- Ideally, a minimum 75-foot to 100-foot buffer zone should be established around vernal pools, since amphibian species that breed in these pools require an adjacent upland habitat to survive during the adult stage of their lifecycle;
- Some communities have adopted provisions specifically to protect historic and archaeological resources that are sometimes found adjacent to wetlands and water bodies; and
- A local bylaw allows the Conservation Commission to charge an additional application fee to defray the cost of reviewing projects that fall under the bylaw's jurisdiction. In addition, the applicant can be required to pay a reasonable fee for consultant services to review the applicant's wetland flagging and/or project plans.

9. Stormwater Bylaw

A stormwater management bylaw/ordinance can require all new development to provide a Stormwater Pollution Prevention Plan (SWPPP) and design that incorporates Best Management Practices (BMPs) to reduce runoff impacts. The plan's overall goal is to prevent post-development increases or decreases in the total volume or rate of stormwater discharges from the site, as compared with pre-development conditions. This goal could be achieved using stormwater controls or BMPs, such as vegetated swales, retention or detention basins, oil and grease separators, infiltration basins, constructed wetlands or other measures.

The stormwater plan includes a description of existing site characteristics, including topography, soils, hydrology and floodplains. Calculations for pre- and post-development stormwater volume and rates of runoff are needed to size appropriate BMPs. The bylaw/ordinance contains specific design criteria for handling post development peak discharge for a particular storm event. For example, the bylaw/ordinance might require that the plan contain adequate control measures for a 24-hour storm event that occur every 2, 10 or 25 years. The bylaw/ordinance also includes requirements for inspection and maintenance of BMPs during and after construction, with a performance bond to ensure maintenance.

10. Scenic Roads Bylaw and Scenic Overlay District Bylaw

Massachusetts General Law, Chapter 40, Section 15C allows communities to designate roads in a community as scenic. The process requires that the Planning Board hold a public hearing and review all work within the right-of-way of a designated Scenic Road. State roads may not be designated as Scenic Roads, although they may be included in a Scenic Overlay District, which is a local zoning designation.

A Scenic Roads Bylaw provides a process for reviewing work within the right-of-way of any designated Scenic Road. Rural roads are often meandering and lined with historic stone walls, large shade trees, and have limited sight distances. Projects to alter these roads can significantly affect the character of a neighborhood by removing visually defining features. The Scenic Roads Bylaw can contain design criteria to be considered relative to the removal or alteration of mature trees and stone walls.

Given that scenic road bylaws cannot be used to manage development on private property, some municipalities have also adopted scenic overlay districts that regulate the appearance of development within a certain distance of a scenic road or within view from a certain location. Municipal adoption of a Scenic Overlay District Bylaw would provide additional design and development procedures and guidelines for projects in a designated scenic area. Through site

plan review, new construction would be directed away from the line of view through such controls as height restriction, setback requirements, sign controls and landscaping.

11. Demolition Delay Bylaw

Communities can choose to enact demolition delay bylaws which allow a review of historical significance for any structure over fifty years old that is proposed for demolition. If a building is found to be historically significant, a period of time, usually 6-12 months, must lapse before a demolition permit is granted. This allows the community to work with the owner to find an alternative to demolition.

12. Habitat Management and Restoration Programs

MassWildlife provides grants and technical assistance to both private and public landowners with an interest in managing their properties for the benefit of wildlife. The Upland Habitat Management Program, designed to assist public and private landowners, focuses on habitat management that creates or enhances old fields, grasslands, and shrub lands; important habitats that have been disappearing from the Massachusetts landscape along with associated wildlife such as whip-poor-wills and the New England cottontail.

The Ecological Restoration Program focuses on lands under permanent conservation protection identified from MassWildlife's Natural Heritage and Endangered Species Program database. Box turtles, bobwhite quail and frosted elfin butterflies are among the wildlife which have benefited from prescribed burns and other habitat management activities conducted by this program.

MassWildlife initiated the Landowner Incentive Program (LIP) to engage private landowners in active wildlife habitat enhancement with funding from the U. S. Fish and Wildlife Service. LIP is a cost sharing partnership that provides financial and technical assistance to private landowners interested in developing and maintaining wildlife habitat on their property.

M. Issues and Opportunities

Communities should strive to enhance their capacity to acquire and protect high priority open space through a land bank or conservation land fund, or by adopting the Community Preservation Act. In addition, communities are encouraged to partner with land trusts and other non-profits such as the Trustees of Reservations and the Massachusetts Audubon Society for technical and financial assistance. Many real estate transactions are not only costly and beyond the means of some communities, they are also legally complicated and time-consuming. Depending on circumstances, the process of negotiating and executing a preservation plan may require specialized knowledge and the ability to act quickly. Such time constraints can be difficult to accommodate when town meeting action is needed.

The communities should maintain updated Open Space and Recreation Plans (OSRP), consistent with the Division of Conservation Services (DCS) guidelines. Such plans allow communities to respond to natural resource opportunities and needs within the communities, and maintain the communities' eligibility for state grant assistance. To update the OSRP, and to monitor and facilitate progress toward implementing the five-year action plan, communities should establish a local Open Space Committee that is a standing committee. This Committee should periodically report to the municipal boards and to the residents to ensure that priority projects remain in the spotlight.

Since many since open space resources cross municipal borders, a regional perspective relative to open space protection and management is essential. NMCOG's Regional Open Space Plan is in need of updating and revision. In this era of economic difficulty, NMCOG should also encourage its member communities to pursue future opportunities to meet open space and recreation needs through shared facilities or the development of regional resources.

The greatest single threat to the region's water resources is nonpoint source pollution, including runoff from roads, lawns, gardens, farms, parking lots, golf courses and other developed areas. Nonpoint source pollution can significantly impair rivers, streams, ponds, wetlands, and aquifers through the introduction of contaminants, including sediment, nutrients, bacteria and toxic substances. As most of the region is located in a federally-designated urbanized area, communities are required to comply with EPA Phase II Stormwater Management regulations. As a part of this permitting process, each community has prepared a Stormwater Management Plan (SWMP) that describes a series of best management practices (BMPs) that the community has committed to implement. Issuance of a new permit will require that each community demonstrate significant progress toward addressing its stormwater problems and commit to implementing a new five-year management plan with enhanced pollution control measures. The mandates of the new program include periodic water quality testing of storm drain discharges in order to gauge the program's success in mitigation polluted stormwater discharges into impaired, threatened or highly sensitive receiving waters.

The extent to which communities are successful in implementing these stormwater management plans depends in large part on the financial resources that are available to support the program. Several communities across the Commonwealth (e.g. Chicopee, Newton and Reading) have opted to establish a local stormwater utility to raise the needed revenue. The revenue is derived from a fee assessed to each property based on the properties impervious surface. For residential properties, the annual fee averages $25 to $35. For large commercial and industrial properties, the fee is proportional based on building footprint and the size of paved parking areas. As future stormwater management costs rise, it is recommended that communities explore the feasibility of establishing a stormwater utility or other dedicated funding mechanism for carrying out an effective stormwater management program.

As financial resources permit, the region's communities, in partnership with local land trusts and other nonprofits, should continue to target water supply recharge areas as priority lands for acquisition and protection. In particular, those parcels designated as surface water Zone A or groundwater Zone II should be protected from development through acquisition in fee or through a conservation restriction or easement. Such action will keep these sensitive watershed areas free of human activity so that their natural filtration and recharge capabilities will be maximized and the threat of drinking water quality impairment will be minimized.

In addition to land preservation efforts, there is a need to better conserve water, through local leak detection and repair programs, and through the implementation of less wasteful and inefficient landscaping practices. The region's municipalities, property owners, businesses and developers should incorporate water conservation measures into their development plans and operating practices. Not only will this reduce wasteful consumption of drinking water, it will also lower water treatment costs, and ensure the sustainability of the region's finite water supply resources. At the household level, significant water savings can be realized through the use of "greenscaping" practices.

Creative wastewater management solutions are needed in areas where municipal sewer service is not available. Individual septic systems require a large area on each lot, preventing compact development in many cases. Sites with poor soils, high groundwater, and other environmental and site constraints may be unbuildable. Shared septic systems and small wastewater treatment facilities can improve the design of a development project in that only one location is needed for the project area rather than a separate location for each lot. In addition, these facilities often provide better treatment than a conventional septic system and help protect water quality. Individual and shared septic systems are regulated by local Boards of Health. Some local boards are reluctant to permit shared systems given concerns regarding the institutional and financial responsibility for long-term maintenance. DEP has developed a standard Title V Covenant and Easement form that can be used to establish a legally binding agreement which can address such local concerns.

Communities with sewer infrastructure need to be vigilant in addressing inflow and infiltration issues. Infiltration is defined as groundwater that enters the wastewater collection system through physical defects such as cracked pipes or deteriorated joints. Where sewer pipes run through Zone II areas or other land areas that contribute flow to the water supply, infiltration can reduce the yield of the water supply.

The local communities have had varying levels of success in protecting their historic and archaeological resources through historic districts and other means. Where applicable, communities should update and expand their inventories of historic resources on areas that are not inventoried or are facing significant development pressures. Communities should enact additional methods of protecting their historic resources, such as local historic district

nominations for listing on the National Register of Historic Places, demolition delay bylaws, and subdivision regulations that address potential impacts to historic and archaeological resources.

Pawtucket Dam on the Merrimack River

V. GREEN ENERGY INITIATIVES

In Massachusetts, all fossil-fuels, including oil, natural gas and coal, are transported from other areas of the country or from other nations. Therefore, all monies spent on fossil fuel flow out of the state, providing little, if any, income to in-state workers or businesses. In 2008, an average Massachusetts household spent $5,200 for energy costs - $1,700 for heat, $1,300 for electricity and $2,200 for gasoline.[6] In addition, energy consumers have experienced wild price swings and long-term energy price increases.

Recommendations outlined in the RSP call for policies that will result in reducing fossil fuel use in buildings, power generation, and transportation. Energy efficiency programs, building practices, land use policies, alternative fuel vehicles, and streamlined permitting practices will assist in achieving this objective. In addition, the use of renewable energy sources helps to reduce greenhouse gas emissions, manage energy costs, and reduce the reliance on fossil fuels, thereby creating a sustainable energy future for the region.

Increased reliance on local solar, wind and geothermal energy sources would provide a buffer against the fluctuations in supplies and prices of traditional fossil fuel markets. In addition, increased use of renewable energy technologies along with a well-trained workforce of local installers and service contractors for conservation, efficiency and renewable energy systems could help create an emerging clean energy cluster within the regional economy.

A. Legislation and State Initiatives

With the Green Communities Act, the Global Warming Solutions Act, and the Green Jobs Act of 2008, the Governor and the legislature established a comprehensive energy market policy for the Commonwealth, updating the market framework established by the Restructuring Act to give it a new and more explicit purpose that is focused on energy security, cleaner energy resources, and economic development resulting from the transition to clean energy. The state level initiatives mandated by or developed in response to these laws fall within one of four categories:

- Energy Efficiency;
- Renewable and Alternative Energy;
- Clean Energy Imports and Transmission; and
- Innovation and Sector Development.

The Green Communities Act set an aggressive target for the amount of electricity generated by renewable and alternative energy sources, using portfolio standards. A renewable portfolio standard requires retail sellers of electricity — both distribution companies and competitive suppliers — to buy a minimum and increasing percentage of the electricity they sell to customers

[6] Energy Price and Expenditure Estimates, 1970-2008, Massachusetts, U.S. Energy Information Administration

from cleaner energy technologies. The Green Communities Act changed the growth rate of the Renewable Energy Portfolio Standard (RPS), originally created in 1997, from one-half to one percent, and created Portfolio Standards for additional technologies.

All retail sellers, competitive electricity suppliers, as well as utility companies; currently meet this commitment by buying credits from the electricity generation sources. This accounting mechanism ensures that every unit of eligible electricity generated is only counted once, and it provides a price premium to power generation sources that may not yet be price competitive compared to fossil fuels. There are a number of eligible classes based on the technology and the date that the plant went into service. Class I are post-1997 renewable plants including wind, solar, small hydro, eligible biomass and anaerobic digestion. Class II Renewable Energy consists of pre-1998 renewable plants that would not continue operating were it not for the standard. Class II Waste Energy consists of pre-1998 Massachusetts waste-to-energy plants. The RPS sets a target that Class I resources should account for 15% of Massachusetts energy sales by 2020.

The Alternative Energy Portfolio Standard (APS) includes primarily combined heat and power and a number of other technologies, such as flywheel storage, paper-derived fuel cubes, coal gasification with permanent carbon sequestration, and energy efficient steam technology. The APS is an innovative initiative that has received national recognition and has enabled a number of large businesses to substantially reduce their energy costs by installing combined heat and power units at their sites.

The Green Communities Act required the Commonwealth's electric distribution utilities to seek proposals from renewable energy projects in the state and in the region for long-term contracts of 10 to 15 years, in order to facilitate their financing and create jobs. Long-term power purchase agreements, or PPAs, have been recognized over the past few years as an important element needed for financing power plants of any kind, particularly in restructured electricity markets. Under this section of the law, National Grid entered into a power purchase agreement with the first offshore wind farm that will be built in North America, Cape Wind. That contract was reviewed and approved by the Department of Public Utilities (DPU).

The Green Communities Act also expanded the rights of customers who install small or community-scale solar and wind projects that use net metering, whereby they sell the excess electricity they generate to the distribution company. In addition, the new net-metering rules require the meter to essentially run backwards, providing retail prices rather than wholesale prices for the excess generation. Net-metering is facilitating the installation of local renewable energy projects by improving their economic viability.

Given the high level of interest in the development of municipal renewable energy, the Legislature has raised the net metering cap from one percent of a utility's peak load to three

percent, with 2 percent reserved for public projects. The Legislature also broadened the eligibility of government projects beyond those owned by the public entity and located on public land to include privately-owned installations on public or private land, as long as the electricity generated is purchased by the public entity.

The Green Communities Act required that the electric and gas utilities pursue all cost-effective energy efficiencies, *i.e.*, eliminating energy waste whenever it is cheaper to do so than buying additional supply. In the past utility-operated energy efficiency programs funded by fixed charges on electric bills were limited in size and had to turn people away. Now every home and business in Massachusetts has been given the opportunity to participate in programs that save energy and money. Furthermore, the Green Communities Act required each electric utility to propose smart grid pilot programs in order to reduce peak and average loads by a minimum of five percent. A smart grid program would send automated information to customers showing how much energy they use and when. Smart meters would be installed allowing consumers to make informed choices such as the best times to run certain appliances.

B. Solar Energy

Solar energy has long been recognized as one of the largest, most readily available renewable energy resources. While solar photovoltaic technology is not cost-competitive today with renewable energy technologies like wind, the cost of solar has been falling quickly and has the potential to be a leading renewable generation technology within a few years.

Commonwealth Solar, launched in 2008 and funded by $68 million of existing renewable energy funds, began introducing a simple rebate program which, when combined with federal incentives, sharply reduced the cost of solar for commercial and residential consumers. CommSolar has added 27 MW to the 3.5 MW of solar previously installed statewide, and quadrupled the number of firms engaged in solar installation. The Massachusetts Clean Energy Center (MassCEC) institutionalized the rebate program for small installations with CommSolar II, and Massachusetts devoted a significant portion of energy-related federal Recovery Act funds to further stimulate solar growth.

As a result, Massachusetts is in the midst of a 30-fold increase in installed solar power compared with four years ago, with over 60 MW now installed and over 90 MW expected to be installed or in process by the end of 2011. As this dramatic expansion of solar power takes place, Massachusetts is becoming one of the top solar markets in the country.

Solar hot water systems generate heat from sunlight to make hot water. Roof mounted solar ‘collectors’ for hot water systems look very similar to solar photovoltaic (PV) panels, which generate electricity rather than hot water. A solar hot water system can be connected to a home’s

existing hot water tank to heat water and usually provides 50 to 75 percent of total household hot water needs. Some solar hot water systems can also connect with the heating system to provide space heating. Because about 20 percent of the energy a consumer uses at home goes to heating hot water, solar hot water systems can generate significant savings by decreasing the amount of gas, oil or electricity used to heat the water. The Clean Energy Center provides rebate funding and other incentives for thermal renewables, such as solar thermal, as part of their mandate under the Green Communities Act of 2008.

The legal and regulatory framework in a community forms the foundation for building a sustainable solar infrastructure. Effective and streamlined local rules and regulations help reduce installation costs and can significantly improve the market environment for solar energy technologies. State and local governments have overlapping authority in some regulatory areas; other areas fall exclusively under local jurisdiction. In fact, some of the most critical barriers to widespread adoption of solar energy can be removed only by local governments.

C. Wind Energy

Utility-scale wind energy developments are significant, energy-generating infrastructure projects. As with all utility-scale energy facilities, it is expensive to permit, design, and build a project, and the actual power-generating equipment is a large capital expense. Energy facility developers must invest substantial sums at the start of a project and recover those costs over time through the sale of electricity. In addition, power sale revenue must cover the cost of lease payments for land, tax payments, and other economic benefits to the community in which the development is located. Factors such as the strength of the wind resource and cost of land in different locations also impact the economic viability of wind energy facilities, and in New England, these factors tend to make the economic margins very tight. There is relatively less land and the locations with good wind can be physically difficult to access.

Governor Patrick has set a goal of 2,000 MW of wind generation, enough to power 800,000 homes, by 2020. Much of that will come from offshore wind projects. Cape Wind will be the first offshore wind project in the country, and will generate 468 MW. The Wind Technology Center, located in Charlestown, will bolster the state's emerging role as a center for renewable energy. This facility is the first in the country capable of testing large-scale wind turbine blades. While this region is not on the coastline, there are still opportunities to site smaller scale wind energy generation facilities and to grow the clean energy economy within the region. Currently, 40 MW of wind energy generating capacity has been installed in Massachusetts, of which 36.74 MW was installed since 2007.[7]

[7] Massachusetts Department of Energy Resources, September 2011.

One significant benefit of wind is an infusion of additional revenue to the host city or town, which can support municipal services or alleviate pressure on the property tax. The receipt of revenue can happen in one of two ways. A municipality may value and assess the wind power generating facility as it would any other real property, resulting in property taxes paid to the town. Alternatively, the Electric Utility Restructuring Act of 1997 creates a mechanism for municipalities to negotiate voluntary tax agreements (also called payment-in-lieu-of-taxes or PILOT agreements) with energy facilities. The latter option may be preferable for both the developer and the municipality, as it will provide payment/revenue certainty and stability for both parties.

Publicly-owned projects do not provide tax revenue, but the project is owned by the community, which can use the power generated to either offset municipal energy use or sell the power to create revenue. In Massachusetts, wind power generation creates Renewable Energy Certificates (RECs) in addition to electricity. These certificates can be sold separately from the power for additional revenue.

Wind systems are one of the most cost-effective home-based renewable energy systems, and can lower a residential electric bill by 50%-90%, depending on available wind resources. Turbines used in residential applications typically range in size from 400 watts to 100 kilowatts. A typical home uses approximately 9,400 kilowatt-hours of electricity per year. Depending on the average wind speed in the area, a wind turbine rated in the range of 5 to 15 kilowatts would be required to make a significant contribution to this demand. A small turbine can cost from $3,000 to $35,000 installed, depending on size, application, and service agreements with the manufacturer.

Currently, there are no wind energy conversion systems located in the region. However, the City of Lowell and the Town of Pepperell have wind energy regulations in place, and the Towns of Billerica, Dracut and Tyngsborough have developed draft regulations which are under discussion. Map 9 on page 109 shows the wind speeds across the region which may indicate suitable areas for siting wind turbines. The Northern Middlesex region is not an ideal area for siting commercial wind energy facilities based on the topography and average wind speeds.

D. Renewable Energy Initiatives in the Northern Middlesex Region

In the Northern Middlesex region, solar energy is the most prevalent source of renewable energy in use. Large and small scale solar generators are currently in place and others are being

Placeholder Map 9

planned. Table 22 below provides a summary of current solar energy installations across the region. There are thirty five solar installations across the region. More importantly, there are two solar farms currently in the permitting process. The first installation is planned for a 22-acre site in the Town of Westford, along Route 3 at Exit 33. This solar farm would generate 4.5 MW, and is anticipated to cost $30 million. The proponent has received a $5.8 million Qualified Energy Conservation Bond as part of its financing package. The project anticipates receiving a solar renewable energy certificate from the state, which allows suppliers to sell to other energy companies under the Massachusetts Renewable Portfolio Standard. The second solar farm is proposed for a site in Tyngsborough near Exit 34 on Route 3. This proposed project would generate 5 MW and is estimated to cost $23 million. The proponent intends to apply for federal renewable energy grant funding.

Table 22: Solar Energy Installations by Community

Community	Residential Installations		Commercial, Industrial and Public Installations		Comments
	Number of Installations	kW generated	Number of Installations	kW generated	
Billerica	5	15-30	2	100-200	
Chelmsford	4	15-30	1	Less than 25	
Dracut	1	5-15	1	Less than 200	
Dunstable	1	Less than 5	0	0	
Lowell	1	Less than 5	1	Less than 25	
Pepperell	4	15-30	0	0	
Tewksbury	4	15-30	2	100-200	
Tyngsborough	2	5-15	0	0	5 MW solar farm currently in permitting; Trans Med USA awarded ARRA funds for 99.82kW PV
Westford	5	15-30	1	Less than 200	4.5 MW solar farm in permitting

Source: Massachusetts Clean Energy Center

Additional solar projects are under construction at the following locations: the Lowell Regional Transit Authority Maintenance Facility in Lowell, the Lowell Regional Wastewater Treatment Facility, United Teen Equality Center in Lowell, and the Stony Brook School in Westford. There is the potential for additional solar projects at a number of locations throughout the region including capped landfills, and large commercial, industrial and institutional buildings with flat roofs.

E. Green Communities

Municipal governments, through zoning, play a major role in the siting of renewable energy facilities. The Green Communities Division of the Department of Energy Resources (DOER) works closely with municipalities to help lower energy costs and adopt energy efficient technologies, add renewables to their energy mix, and make their fleets more energy efficient.

As provided for in the Green Communities Act of 2008, the DOER's Green Communities Grant Program uses funding from auctions of carbon emissions permits under the Regional Greenhouse Gas Initiative to reward communities that win Green Communities designation by meeting five clean energy benchmarks:

- Adopting local zoning bylaw or ordinance that allows "as-of-right-siting" of renewable energy projects;
- Adopting an expedited permitting process related to the as-of-right facilities;
- Establishing a municipal energy use baseline and a program designed to reduce use by 20 percent within five years;
- Purchasing only fuel-efficient vehicles for municipal use, whenever such vehicles are commercially available and practicable; and
- Requiring all new residential construction over 3,000 square feet and all new commercial and industrial real estate construction to reduce lifecycle energy costs (i.e., adoption of an energy-saving building "stretch code").

Within the Northern Middlesex region, the communities of Chelmsford, Lowell, Tewksbury and Tyngsborough have received Green Community designation. Being designated as a Green Community provides grant funding to a municipality to support all or a portion of the cost of the following:

- studying, designing, constructing and implementing energy efficiency activities, including but not limited to energy efficiency measures and projects;
- procuring energy management services;
- installing energy management systems;
- adopting demand-side reduction initiatives or energy efficiency policies; and,
- siting activities and construction of a renewable energy generating facility on municipally-owned land.

Table 23 on the following page provides an overview of the Green Community grant awards received by communities in the Northern Middlesex region.

Table 23: Green Community Designation and Grant Awards in the Northern Middlesex Region

Community	Designation Date	Green Community Grant Award	Project Summary
Chelmsford	5/25/10	$187,224	Installation of a 30-kW PV system at the Parker Middle School
Lowell	5/25/10	$546,506	Residential and commercial retrofits and energy management services contract buy-down
Tewksbury	7/19/11	$207,725	To be determined
Tyngsborough	5/25/10	$161,649	Building envelope improvements in municipal buildings

Source: Massachusetts Department of Energy Resources

F. Energy Efficiency and Green Building Techniques

According to the EPA, buildings and homes in the U.S. account for 68% of the nation's energy consumption and 38% of its carbon dioxide emissions. In Massachusetts, buildings consume more than 50% of the energy used, and are responsible for the greatest greenhouse gas emissions of any sector. Energy use in buildings comes from two primary areas: (1) fuel for heating (primarily oil and natural gas), and (2) electricity for air conditioning, lighting, ventilation, and appliances.

As part of the Green Communities Act of 2008, the state has committed to adopting the latest International Energy Conservation Code (IECC) from the International Code Council (ICC), which develops and maintains model building codes for the United States. In addition to this energy code baseline, which is updated every three years, the Massachusetts Board of Building Regulations and Standards (BBRS) adopted a local-option "stretch" energy code for municipalities in 2009. The 2009 stretch code for commercial buildings has become the basis for the 2012 IECC code for commercial buildings.

The Massachusetts Clean Energy and Climate Plan for 2020 proposes to move away from the traditional approach of prescriptive codes, which set minimum standards for each building component or system, toward "performance" or "outcome-based" codes, which set a maximum energy usage criterion for buildings, but allow flexibility in terms of how criterion are met. In addition, the Commonwealth's Plan proposes to use energy rating and labeling of buildings to create greater markets for energy-saving investments in existing structures.

A greater emphasis on energy use will require earlier attention to building design and performance considerations. Through improved siting, design, construction, operation and maintenance practices, resource consumption can be significantly reduced, and adverse

development impacts on the natural environment can be minimized. Green buildings have the following characteristics:

- Incorporate energy and water efficient technologies;
- Use recycled materials in their construction;
- Minimize construction and demolition waste;
- Are sited and landscaped for energy and water efficiency;
- Employ renewable energy technologies
- Improve indoor air circulation and air quality;
- Provide healthier and more comfortable environment; and
- Enhance long term economic performance.

For commercial buildings the Leadership in Energy and Environmental Design (LEED) green building rating has become something that the market is demanding for Class A office space. In addition, a growing number of relatively energy efficient buildings have opted into the Energy Star Portfolio Manager program, which allows buildings above the 75th percentile in energy performance to receive Energy Star designation. For the residential market, the Energy Start Homes program has achieved significant market penetration in the Massachusetts. These voluntary programs have shown that there is market interest in energy conservation and green programs for new buildings.

Retrofitting existing buildings with higher levels of insulation, less air leakage, and better windows would support even deeper energy improvements over time. National Grid currently offer incentives for whole-house retrofits that include energy efficiency measures. In addition, there have been a number of federal programs aimed at providing incentives for efficiency improvements.

The City of Lowell was awarded $5 million through a Recovery act BetterBuildings grant (formerly known as Retrofit Ramp-Up). These funds are used to target energy efficiency retrofit projects that achieve results, can be replicated, solve technical hurdles, and create or maintain jobs. Lowell's project focuses on energy efficiency retrofit projects that are compatible with historic preservation. The grant has been leveraged through a partnership with National Grid and the Lowell Development Financial Corporation (LDFC). Several local banks are also participating in the loan program. LDFC administers low-interest loans for energy efficiency retrofits within the Downtown Historic District. Projects include new boilers, insulation, lighting, air sealing and other energy efficiency upgrades to commercial and multi-family properties. Projects must achieve a whole building energy use reduction of 15% or more. In addition to the BetterBuildings grant, the City received $954,700 in ARRA funds to establish a loan program for residential energy efficiency improvements throughout the City. These funds can be applied to residential structures containing one to four units.

G. Green Jobs

Massachusetts has a core of companies and jobs in clean energy, and the industry has continued to grow even during difficult economic times. According to the Massachusetts Clean Energy Center (MassCEC), more than 11,000 workers were employed in clean energy at the end of 2010. Approximately 3,500 people were employed in the manufacturing of energy efficiency products – this represents a growth rate of 20% since 2007.[8] Furthermore, it is estimated that the implementation of the Massachusetts Clean Energy and Climate Plan for 2020 will induce the creation of nearly 20,000 jobs.

The Green Jobs Act of 2008 created the MassCEC to accelerate job growth and economic development in the state's clean energy industry. MassCEC serves as a clearinghouse and support center for the clean energy sector, making direct investments in new and existing technologies, clean energy companies, and workforce development to meet the skill needs of the industry. In November 2009, An Act Relative to Clean Energy transferred the state's Renewable Energy Trust Fund to MassCEC. The Trust Fund was created in 1998 by the Legislature to provide financial support for the development of renewable energy projects. With funds and programs to support clean energy development, entrepreneurship, workforce development and installation, MassCEC is a one-stop shop for the clean energy economy.

From 2010 to 2020, it is estimated that the Massachusetts RPS classes will stimulate $360 million in annual investment or $3.9 billion in cumulative investment in clean power generation than would not have otherwise occurred. This is expected to create 900 full-time construction jobs over that ten-year period.

According to the Massachusetts Clean Energy and Climate Plan for 2010, between 2007 and 2010, photovoltaic systems installed or scheduled for installation increased by a factor of twenty, with jobs in solar manufacturing, installation and services nearly tripling. Wind energy installations increased ten-fold during that same time period. In addition, Massachusetts has launched the most aggressive energy efficiency program in the nation, saving consumers $ 6 billion and creating 4,500 jobs.[9]

Expanding solar thermal energy will create and increase businesses in Massachusetts, as has already happened with the solar PV market, where 1,800 new jobs have been added since 2008. Such jobs include system marketing, design, finance, installation and maintenance, manufacturing and fabrication.

[8] A Future of Innovation and Growth: Advancing Massachusetts' Clean Energy Leadership, Clean Edge, April 2010, Massachusetts Clean Energy Center.
[9] Massachusetts Clean Energy and Climate Plan for 2020, Executive Office of Energy and Environmental Affairs, December 29, 2010.

H. Tools and Incentives for Renewable Energy and Energy Conservation

Residents of Massachusetts are offered several options for funding the installation of renewable energy systems. State lawmakers have ensured that renewable energy is, and will remain, a lucrative and ever-growing source of both energy and revenue. The Massachusetts Clean Energy Center uses funds that are collected from all electricity ratepayers in the state to finance grants and rebates for individuals and companies interested in installing renewable energy systems. The goal is to expand the role of renewable energy sources in meeting residential, commercial, industrial, institutional, and municipal energy needs. The following is a concise description of some of the programs that are currently available.

Qualified Energy Conservation Bond

A Qualified Energy Conservation Bond or "QECB" is a taxable bond issued by a State or local government to finance one or more "qualified conservation purposes." To date, the Commonwealth has awarded $36 million of the $50 million available for projects aimed at reducing energy consumption in public buildings by at least 20% and generating clean renewable energy across the state. QECBs provide a Federal income tax credit to bond holders (project investors, such as banking institutions) that allow issuers (municipalities/public entities) to obtain a very low rate of financing for their energy projects. From a municipality's perspective, the Federal income tax credit results in the Federal government paying a significant portion of their interest, which results in a significantly lower net interest rate than other borrowing mechanisms available for these types of projects.

Personal Income Tax Credits

An individual who installs a renewable energy system to generate electricity or provide mechanical energy for his/her primary residence in Massachusetts can claim the Solar and Wind Energy Credit of 15% of the net expenditure for the system, or $1,000, whichever is less. This credit does not apply to commercial users.

Corporate Income Tax Deduction

A business that purchases a qualifying wind or solar powered climatic control unit or water heating unit is allowed to deduct from its net income, for state tax purposes, any costs incurred from installing the unit, provided the unit is located in Massachusetts and is used exclusively in the trade or business of the corporation.

State Sales Tax Exemption

State law exempts from the state sales tax the sales of equipment used directly in a wind, solar, or heat pump system to be used as a primary or auxiliary power system for heating or otherwise supplying the energy needs of a person's principal residence in Massachusetts. This exemption does not apply to commercial users.

Green Loan Program

MassDevelopment's Green Loan Program helps businesses optimize energy efficiency and reduce energy costs by bridging the gap between energy efficiency project costs and the rebates or subsidies provided by utility companies and state/federal incentive programs.

To be eligible, an organization must be a non-profit or for-profit business in Massachusetts, have been in existence for at least five years, and demonstrate an ability to repay the loan. Loans are available in the amounts of $50,000 to $500,000 and are net of project-related rebates or subsidies.

Loans may only be made for projects that receive approval for a utility rebate under a public utility sponsored energy efficient program authorized by the Massachusetts Department of Public Utilities or approval for a subsidy from a state/federal energy efficiency incentive.

Commonwealth Solar II Rebate Program

The Commonwealth Solar II Rebate Program provides rebates through a non-competitive application process for the installation of photovoltaic (PV) projects by professional, licensed contractors at residential, commercial, industrial, institutional and public facilities. The Host Customer (and project site) must be a customer of a Massachusetts electric distribution utility that collects the Renewable Energy Systems Benefit Charge from their customers and deposits those funds into MassCEC's Renewable Energy Trust Fund. The rebates are based on the size and other characteristics of the PV project. MassCEC has reserve funds from its Renewable Energy Trust Fund to support the Commonwealth Solar II Rebate Program, which will provide rebate funding in a block structure for commercial PV projects up to 10 kW (10,000 watts DC @ STC) in nameplate capacity and residential systems (regardless of size) with a rebate calculation capped at 5 kW.

Recipients of the Commonwealth Solar II rebate will also be eligible to earn Solar Renewable Energy Certificates ("SRECs") through participation in the RPS Solar Carve-Out program, managed by the Department of Energy Resources (DOER). DOER has developed a price support mechanism for SRECs, referred to as the Solar Credit Clearinghouse, to facilitate solar

project development and financing in the SREC market. As with RPS Class I RECs, SRECs will be traded on the New England Generation Information System.

Solar Hot Water Programs

The Commonwealth Solar Hot Water Programs provide funding through a non-competitive application process for the installation of solar hot water (SHW) projects by professional installers at residential, multi-family and commercial-scale buildings. Systems may supplement any fuel type, but must serve facilities that are located in an electric utility territory that contributes to MassCEC's Renewable Energy Trust Fund, which includes customers served by National Grid. MassCEC's Renewable Energy Trust Fund has reserved $1 million in funds to support the commercial one year pilot program, and $1 million in funds to support the residential one year pilot program. Funds are available until expended.

Micro Wind Initiative Program

The Commonwealth Wind Incentive Program – Micro Wind Initiative provides rebates for the installation of small wind projects with power capacities from 1 kW to 99 kW and located at residential, commercial, industrial, institutional, and public facilities. The project site must be located in the territory of either a Massachusetts investor-owned electric distribution utility or a Municipal Light Plant Department that pays into the Massachusetts Renewable Energy Trust Fund. Applications are received on a rolling, first come first served basis.

Through the Micro Wind Initiative, MassCEC has funded more than 70 awards to small wind projects. More than 60 of those projects are now installed and operating. MassCEC's goal is to provide incentives for the installation of well-performing and responsibly-sited projects using commercially-proven technologies. Micro wind systems are supported through a hybrid rebate consisting of two parts:

- Rebate 1: Based on the rated capacity of the system at 11 meters/second (taken from the system's power curve); and
- Rebate 2: Based on the verified estimate of kilowatt-hours produced by the system for its first year of operation.

Ninety percent of the rebate is paid after project completion and ten percent after 12 months reporting of electricity production and monitored wind data.

Commercial Wind Initiative Program

Commercial Wind seeks to reduce the early stage risk associated with commercial wind development projects. It provides funding for site assessments, wind resource assessments,

feasibility studies, and development activities including interconnection. The program does not provide funding for construction activities.

MassCEC defines Commercial Wind projects as land-based projects that are greater than 2 MW and cannot be net metered. A project is defined as all of the unit(s) and the site at which the generating facility is located and the other assets, tangible and intangible, that compose the generating facility, for which a single set of permits is obtained. The wind project must have three turbines or more.

Community Wind Program

The Commonwealth Wind Community Scale Initiative provides grants through a competitive application process for the installation of Wind Projects by professional, licensed contractors at commercial, industrial, institutional, residential, and Public Entity facilities. The Applicant and project site must both be served by distribution utilities that pay into the Massachusetts Renewable Energy Trust Fund administered by the Massachusetts Clean Energy Center (MassCEC). The grants are based on the size and other characteristics of the Wind Project. MassCEC offers grant funding for the in-depth study of the feasibility, the design and construction of eligible wind projects. MassCEC also offers site assessment grants of services to qualified public entities for high level reviews of potential sites. Site assessment applications are accepted on a rolling basis.

Net Metering

Qualifying commercial, industrial or residential wind facilities with a generating capacity of 60 kW or less are eligible for the state's net metering program, in which all state utilities participate. Any net energy generated by the qualifying facility during the course of a month will be credited at the average monthly market rate to the next month's bill.

Distribution companies are prohibited from imposing special fees on net metering customers, such as backup charges and demand charges, or additional controls, or liability insurance, as long as the generation facility meets the interconnection standards and all relevant safety and power quality connections.

I. Issues and Opportunities

New building construction and significant renovation/rehabilitation projects should be designed for higher energy efficiency. Appropriate building design standards may also expand opportunities for the cost-effective use of distributed energy systems designed to meet localized needs for electricity and/or heating fuel. Communities should consider adopting sustainable management practices for community facilities, including the completion of a baseline inventory,

the development of local energy action plan, updating vehicle fleets with alternative fuel vehicles, adopting green building standards for municipal projects, adopting Energy Star standards for municipal projects, and purchasing renewable energy such as wind, solar, geothermal, and biomass.

As-of -right siting and simplified permitting requirements and processes would increase solar and photovoltaic installations, and save significant time and money for local governments, contractors and system owners. Creating consistent permitting processes across the region would benefit solar installers by providing a standard set of operating procedures, reducing uncertainty, and allowing them to produce more accurate estimates. Standardization can also enable jurisdictions to pool resources and share inspection staff. By reducing local permit fees, or adopting fast-track permitting for renewable energy projects, local governments can demonstrate their support for community investment in renewable energy and energy efficiency initiatives.

Compact mixed-use development within walking distance of village or town centers should be encouraged in order to reduce the need for auto trips, and make use of alternative modes of transportation, such as transit, walking and bicycling. As communities work to improve local policies and programs by adopting a more sustainable approach to development, technical assistance and policy advice will be needed. A coordinated regional technical assistance program, as well as a cooperative purchasing program for energy services (such as performance contracting, energy audits, or energy procurement) would be of considerable benefit to the local communities within the Northern Middlesex region. Few communities currently have the resources to devote staff to these types of activities. A regional energy circuit rider shared among municipalities could provide such services in a cost effective manner.

By accomplishing the energy related strategies outlined in the RSP, the region will be doing its part to prevent global warming, and to decrease our reliance on petroleum. Regional policies and plans can help coordinate efforts across municipalities, which can be critical for promoting clean energy and renewable energy development. The development of an in-depth energy plan for the region would identify opportunities for clean energy production, capital investments, and inter-municipal cooperation.

VI. ECONOMIC DEVELOPMENT ELEMENT

The Economic Development Element of the Regional Strategic Plan is largely driven by the foundation established by the *Greater Lowell Comprehensive Economic Development Strategy (CEDS) for 2009-2013*. The CEDS document was completed under a Short-Term Planning Grant with the Economic Development Administration (EDA) of the U.S. Department of Commerce and reflects the input of numerous economic development stakeholders in the region in terms of establishing a "blueprint" for successful economic development initiatives within the region. NMCOG staff has also worked closely with each community on their Chapter 43D, EDIP, Growth District and MassWorks initiatives to identify potential development sites and to address infrastructure issues that present a barrier to future economic development activities. The approach that NMCOG has utilized in all of these federal and state initiatives is consistent: provide support to the private sector and local communities to maximize economic development opportunities so as to create high-skill, high-paying jobs, while maintaining the quality of life in each community and the region as a whole.

A. Economic Development Goal-Setting Process

In developing the Five-Year CEDS for the Greater Lowell region, NMCOG staff and the Greater Lowell CEDS Committee formulated a "grass-roots" strategy to encourage input from the economic development stakeholders and residents in the region. Through the scheduling of two Strengths, Weaknesses, Opportunities and Threats (SWOT) sessions, the economic development stakeholders in the Greater Lowell area identified the region's strengths and weaknesses, future economic growth opportunities and external trends and forces, which can be summarized as follows:

1. Strengths

Business community and related issues focused on the economic and industry diversity in the region. It was stated that there were a number of growing companies in the region, as well as growing retail activity related to the new Target and Lowes facilities in Lowell. The region's ability to reinvent itself after every economic downturn was cited as a major strength. The cluster of "growth industries", including "green" jobs, cultural and creative economy, solar, nanotech, high tech and health care, was emphasized as positive for the future. The local financial institutions were identified as major contributors to the strength of the region. This region was identified as having a strong core manufacturing base, as compared to other parts of Massachusetts.

The quality of the workforce was seen as a major strength in attracting businesses and encouraging local businesses to expand. Participants cited both the educational levels of the workforce and the quality of the educational institutions in the region. The exceptional skills and strong work ethic of the workforce are an attraction to high technology and biotech firms, which

already represent a cluster industry in the region. The active participation of UMass Lowell and Middlesex Community College in training the current and future workforce for these firms is a comparative advantage for the region.

The region's infrastructure was cited as a significant advantage and strength as compared to other parts of the country. The extensive highway network provided by I-495, I-93 and Route 3 offers an opportunity for residents, workers and visitors to travel anywhere in New England effectively and efficiently. The highway network provides access to freight facilities throughout New England and creates options for shipping by air, rail, sea or highway. The public transit system, both in terms of the Lowell Regional Transit Authority and the Massachusetts Bay Transit Authority, was identified as an advantage for the Greater Lowell region. The availability of other infrastructure – water, sewer, and electric – was seen as a strength for the region.

The diversity in the region, both in terms of the cultures and ethnic groups, was an identified strength. Immigrants – Irish, French Canadian, Greeks, Latino, and Cambodian- came to Lowell and began their residence in the Acre and then moved to other parts of the city and region as each generation became part of American society. Diversity has always been cited as an important element for the economic growth in the Greater Lowell region.

Affordability, particularly in relation to Boston and other parts of Massachusetts, was identified as a strength in attracting homeowners and businesses that would otherwise locate elsewhere. Residential and commercial real estate is thought to be competitively priced and affordable relative to the Greater Boston area.

Location, in terms of proximity to Boston, New Hampshire, the ocean and mountains, represented a significant strength. Residents, workers and visitors have access to international airports in Boston and Manchester, as well as to the tourist areas on the North Shore, in Boston and throughout the rest of New England. Most participants felt that this region was ideally located.

Quality of life and related issues were cited as strengths for this area. The region's livability, in terms of historical and cultural resources, and access to the area's natural resources make this an enjoyable place to live, work and visit. Economic, social and educational opportunities were cited as other quality of life issues.

2. Weaknesses

The high cost of living covered many different areas – housing, health care, energy, taxes and the cost of living overall. The cost of housing and energy, relative to other parts of the country, were significant weaknesses according to the participants. Health care costs were identified as a weakness for families and small businesses. The relatively high tax rates, particularly the sales and property taxes, were identified as disadvantages in competing with New Hampshire. In general, the participants felt that it cost more to live in the Greater Lowell region.

The high unemployment rates in both the City and suburban communities were cited as a weakness, as were the high poverty rates in pockets of the City. The perception of a high crime rate in the City of Lowell was identified as a weakness. Empty store fronts and closed businesses added to the negative feelings about the quality of life in the region.

The aging infrastructure in the City and the lack of infrastructure in some towns was seen as a serious weakness. Insufficient telecommunications and high tech infrastructure to support the business community was identified as another weakness. The lack of additional sewer capacity in the region was seen as an impediment to future economic growth. Outdated sewer and water infrastructure were thought to only add to these capacity issues. The road network was described as both "distressed" and "cow path like" in some locations. The limited schedule for public transit was seen as a barrier to the workforce. The lack of responsiveness by electric and utility companies was thought to be unfriendly toward the business community. The lack of sidewalks offered significant challenges to pedestrians.

Business costs were cited as a weakness in the Greater Lowell region. These business costs included the cost of development and doing business. Due to the built out nature of the region, there is less undeveloped land available compared to other regions. "Brownfield" sites that are available are more costly to develop as well. The cost of development, relative to other regions, creates an imbalance between project cost and viability. Many of the commercial and industrial buildings are outdated and not conducive to high tech industries. According to one participant, "the costs associated with starting up or expanding businesses in the region are prohibitive".

Budget and financing represented another weakness. Due to the current national recession, state and local budgets have been cut significantly. These cuts have had an impact upon the local school systems and, therefore, on the quality of education for the region's students. There are limited funds for nonprofits and the state funding for economic development groups has been cut. In terms of financing, small and medium-sized businesses can't access loans through their financial institutions due to the global and national economy. The development of stricter underwriting standards, due to the economic crisis, creates gap financing problems, and access to capital has been considerably reduced.

Housing was identified as another major weakness. The lack of rental housing in the suburban towns makes it difficult for workers to find housing. The increase in foreclosures and higher vacancy rates causes problems for adjacent properties. The relatively high cost of housing makes it difficult for families to own their own homes.

3. Future Economic Opportunities

Economic development tools received the most responses related to future economic opportunities. The utilization of federal designations, such as the Renewal Community designation from the U.S. Department of Housing and Urban Development (HUD) and the

Economic Development Designation (EDD) from the Economic Development Administration (EDA), would increase private investment in the region. The available federal stimulus funding under the ARRA legislation was identified as an opportunity for funding the Hamilton Crossing project and other economic development initiatives in the region. An increased focus on "green" industries in the region was a distinct possibility given the Green Communities Act at the state level and the availability of ARRA funding for these initiatives. The utilization of "brownfield" funds was cited as an opportunity to return idle property to productive use. Marketing initiatives were seen as an opportunity to identify and promote the Greater Lowell region, as well as to promote incentives and fill vacancies. The development of more public/private partnerships modeled after the City's Lowell Plan and Lowell Development and Financial Corporation (LDFC) was encouraged. Groups, such as the Tewksbury Economic Development Committee, have moved forward with this concept to promote active dialogue between the public and private sectors.

Economic opportunities for businesses included taking advantage of commercial vacancies and lower rents due to the decline in the real estate market. Participants expressed the opinion that emerging industries should be targeted for the region and that entrepreneurship opportunities should be encouraged. The health care industry, which plays a significant role in the regional economy, should be supported to create higher-skill, higher-wage employment opportunities. Opportunities in the biotechnology and nanotechnology fields should be pursued and the relationship with the Biotechnology Council should be strengthened.

Regional services should be encouraged in order to share resources on a regional basis. The utilization of NMCOG to establish these regional agreements should be pursued. The regionalization of the 911 dispatch services should be studied to see if there are any cost savings and opportunities for shared services. Inter-municipal collaboration, such as the Woburn Street Corridor project, should be expanded in an attempt to attract businesses to vacant facilities and to provide employment opportunities for the regional workforce.

Opportunities in education focused principally on the roles of UMass Lowell and Middlesex Community College. The university research center at UMass Lowell should be utilized as a means to attract emerging industries (energy, "green" jobs, high tech, etc.) to the region. Partnerships with both UMass Lowell and Middlesex Community College should be developed to generate higher-skill, higher-wage jobs. It was even suggested that the community college system expand in the Greater Boston area.

Partnerships were encouraged as a means to create new opportunities for economic growth. Collaboration with nonprofits was cited as an opportunity to expand service areas and build inter-organizational partnerships. Opportunities were identified in terms of tapping into volunteerism and promoting civic engagement. Within the workforce development system, there were opportunities identified in working with youth leadership. On the educational side,

increased collaboration among public, technical and parochial high schools was seen as an opportunity to improve the quality of students being prepared for the work world.

The changing demographic groups in the Greater Lowell region will have an impact upon the future workforce. Among the unemployed in the manufacturing sector, the hardest group to re-employ was white, older males. There is a need to increase opportunities for youth so that they stay in this area. Baby boomers, immigrant communities and nontraditional households are moving out of Lowell into the suburban communities. This movement will increase the demand for new livability initiatives in the suburbs. The current workforce is growing older and there will be a need to retain the college and high school graduates in the region in order to meet the manpower needs of growing businesses.

Quality of life was cited as an opportunity for economic growth as well. Through the encouragement of sustainable infrastructure improvements, the region's quality of life will be improved. The linking of community assets, such as sports, across town lines was felt by one participant to be an opportunity to improve the quality of life. The utilization and expansion of recreational resources, such as walking trails or canoe launches, was seen as another means to improve the sense of well being in the region.

4. External Trends and Forces

The state of the economy represents the greatest threat to the economic future of the Greater Lowell region. The high unemployment rates and number of foreclosures continue to take their toll on the regional economy. With the nation mired in the worst recession since World War II, it has been difficult for Massachusetts and the Greater Lowell region to recover. Unlike the recession in the early 2000s, this recession affected Massachusetts later than other parts of the country. Associated with the state of the economy is the current housing crisis. Even though housing prices have not returned to their 2004 levels, it is still difficult for a family to afford housing in this region. Older homeowners are leaving the State and not maintaining their properties. The persistent international geopolitical problems drain funds for addressing local and regional needs.

With the state of the economy, budgets at the state and municipal levels continue to be cut. There has been a deterioration of state and municipal services as a result of these budget cuts. The lack of investment in infrastructure improvements will have a negative impact upon economic growth. Unfunded federal and state mandates exasperate the financial situation at the local level, while unfunded obligations at the state level, such as health insurance and state pensions, are likely to have a negative impact in the future. One participant noted that the re-appropriating of defense spending under the Obama Administration will negatively impact defense-related manufacturing activity in the region. Another casualty of the state of the economy is financing for businesses and housing. The lack of credit and seed funding for real estate and equipment is limiting the business growth in the region.

Another threat to the region relates to the workforce. With an aging workforce and the inability to keep young workers in the region, growing businesses will be forced to relocate to those areas that have a ready supply of workers. With the outsourcing of jobs by some of these companies, employment opportunities for the workforce are reduced. The lack of workforce development and training in schools due to budget cuts was identified as a serious threat to the regional economy.

The environment was cited by several participants as a threat to the regional economy. The impact of changing climate and the need for emergency preparedness was identified as a factor. Other environmental issues identified were some proposed development projects, such as an asphalt and power plant, which could threaten the health of residents. The lack of public information about the environmental impacts of the proposed projects increased the concern about these projects. Toxic waste sites, which have not been remediated due to their extensive redevelopment costs, represent a threat to the economic future of the region.

The lack of regional cooperation in the future will strain federal, state and local budgets beyond their breaking point. The lack of available resources creates competition between communities and threatens regional cooperation. The expansion of the LDFC to serve the suburban communities or the utilization of the nonprofit arm of NMCOG, the Northern Middlesex Economic Development District (NMEDD), would increase the regional focus that will be needed in the future.

Based upon the input provided through the SWOT sessions and previous economic development initiatives in the region, the following Vision Statement was established for the CEDS program:

The Vision for the Greater Lowell region is to build upon the region's historic past and strategic location to develop a regional economic development framework that supports:

- *the creation of high skill, well-paying jobs for a racially, ethnically and economically diverse workforce;*
- *an integrated economic development, workforce development and education system that prepares students and workers for current and future jobs;*
- *affordable and market-rate housing to shelter the regional employment base;*
- *an effective and efficient transportation system and an upgraded infrastructure to support the expansion needs of businesses and homeowners;*
- *private investment matched by public and non-profit funding sources designed to grow the economy; and*
- *the maintenance of the quality of life in the region.*

Based upon the Vision Statement and the priorities to be addressed, the Goals and Objectives established for the 2009-2013 Greater Lowell CEDS are outlined in Table 24.

Table 24: 2009-2013 Greater Lowell Comprehensive Economic Development Strategy Goals and Objectives

GOALS	OBJECTIVES
1. Economic Development	
Develop a regional economic development framework that supports the efforts of private industry, local communities and agencies, Educational institutions, federal and state agencies and private foundations to create jobs and to improve the quality of life in the region.	➢ Create higher-skill, higher-wage jobs within industry clusters to diversify the regional economy. ➢ Target biotech, nanotech, high technology and "green" jobs and focus on the global economy. ➢ Work with state, regional and local economic development entities to improve the region's economy. ➢ Redevelop properties for industrial and commercial uses. ➢ Apply for EDA Planning and Public Works funds and Economic Development District (EDD) designation and maintain an annual CEDS planning process.
2. Workforce Development	
Increase the supply of skilled workers for industry in the region through the integration of the economic development and workforce development systems.	➢ Collaborate with the Greater Lowell WIB, UMass Lowell and Middlesex Community College to address the workforce needs of industry. ➢ Leverage available resources at the federal and state levels to address unemployment and business closure issues in the region. ➢ Expand the use of new technologies, such as online courses and working remotely, to access businesses.
3. Education	
Improve the educational and workforce skills of primary, secondary and college students to meet the current and future needs of industry.	➢ Establish partnerships between the primary and secondary school systems and the colleges in the region. ➢ Attract emerging industries by linking them to the university research centers. ➢ Support the development of certificate programs at UMass Lowell and Middlesex Community College that supports regional industry needs.
4. Affordable and Market-Rate Housing	
Create more affordable and market-rate housing throughout the region to ensure that businesses can expand and relocate to the region with the assurance that their workforce will be able to own, lease or rent quality housing.	➢ Increase the supply of rental housing in the suburban communities. ➢ Work with local communities to develop their Housing Plans. ➢ Target housing for the artist and community in downtown Lowell. ➢ Encourage mixed-use development throughout the region. ➢ Address the housing needs of new businesses.

Table 24 (cont'd): 2009-2013 Greater Lowell Comprehensive Economic Development Strategy Goals and Objectives

GOALS	OBJECTIVES
5. Regional Transportation System	
Develop the infrastructure needed to build upon the strengths of the regional highway system and the public transit networks to enhance access to the economic centers of the region.	➢ Attract businesses to the areas opened up by the Route 3 expansion project. ➢ Implement road, bridge and transit improvements in the region to enhance access. ➢ Support the extension of the commuter rail system to Nashua, New Hampshire.
6. Infrastructure	
Build upon the existing sewer, water, telecommunication and public utility infrastructure to increase capacity so that private businesses and homeowners can grow in the future.	➢ Support projects that increase the sewer and water capacity in the region. ➢ Improve the telecommunications and high tech infrastructure. ➢ Target infrastructure improvements in those areas that support economic expansion.
7. Financial Investments	
Target federal, state, local, non-profit and private funds to those projects that create jobs and improve the quality of life in the neighborhoods, particularly in those areas that have not shared in the economic benefits of the regional economy.	➢ Access funding from the regional banking community and private investment firms to expand local businesses. ➢ Establish regional lending program under the Northern Middlesex Economic Development District, Inc. the non-profit arm of NMCOG. ➢ Apply for federal and state funding, such as brownfields and New Market Tax Credits, which can be targeted to priority projects.
8. Quality of Life	
Maintain the quality of life in the region by preserving and protecting the region's natural, cultural and historic resources and encouraging concentrated development.	➢ Preserve open and recreational space through the implementation of regional and local Open Space Plans. ➢ Support initiatives by the National Park Service and other organizations to maintain and improve access to open spaces along the Merrimack and Concord Rivers. ➢ Build upon the cultural and historic heritage of the region by supporting the creative economy and the Community Preservation Act. ➢ Support the development of Master Plans at the local level to balance economic growth with quality of life initiatives.

As outlined in Chapter I of this Regional Strategic Plan, the Economic Development goals developed through the Visioning Sessions were as follows:

- Create a regional economic development framework that supports the efforts of private industry, local communities and agencies, educational institutions, federal and state agencies and private foundations to create jobs and improve the quality of life in the region;
- Create higher-skilled, higher wage jobs within industry clusters – biotech, nanotech, high technology, "green" industries, and emerging technology – to diversify the regional economy and focus on the global economy;
- Utilize a combination of economic development and redevelopment strategies that reflects the character of each community and address infrastructure barriers (roads, wastewater capacity, telecommunications, etc) to future economic growth; and
- Increase the supply of skilled workers for industry in the region through the integration of economic development and workforce development strategies.

B. The Regional Economy

The economic conditions in the Greater Lowell region have been negatively impacted by the national recession, which began as of December 2007. The full impact of the national recession was not felt in this region until a year later when the unemployment rate in the City of Lowell increased from 7.7% in November 2008 to 8.3% in December 2008. The unemployment rate in the City of Lowell continued to increase steadily until it reached 11.8% in September 2009 and finally reached its peak of 12.1% in January 2010. As of August 2011, the unemployment rate for the City of Lowell had decreased to 9.6%.

During the twenty-four month period from September 2008 to August 2010, the unemployment rate in the City of Lowell increased from 7.5% to 10.6%, while the average unemployment rate for this twenty-four month period was 10.9%. This average unemployment rate was 1.9% greater than the average national unemployment rate for the same period. During the past year, the average unemployment rate for the City of Lowell was 10.3%, which was 1.1% higher than the nation's average unemployment rate for the same period of time.

The unemployment rate for the Greater Lowell region experienced a nearly 3% increase, from 5.8% in September 2008 to 8.6% in August 2010. Since August 2010, the unemployment rate for this region decreased to 7.4%. The City of Lowell and the suburban communities saw a significant increase in the unemployment rates between December 2009 and January 2010. The unemployment rates as of August 2010 showed that the suburban communities had been impacted as well, such as in Dracut (9.1%), Tyngsborough (8.5%), Billerica (7.8%) and Tewksbury (7.8%). However, these unemployment rates have decreased to 7.3% in Dracut, 7.1% in Tyngsborough, 6.5% in Billerica and 6.1% in Tewksbury as of August 2011.

The Greater Lowell region experienced 812 layoffs from July 1, 2007 to June 30, 2008. During FY'09, the number of layoffs in the region increased by 48.1% to 1,203 employees, principally in four communities. The level of layoffs then decreased to 1,146 employees in FY'10 and to 346 employees in FY'11. Thirty (30) businesses and five of the nine communities, including the City of Lowell, were affected by these layoffs during the past two years. These layoffs affected the region as a whole and not just the community where the businesses were located. For instance, Jabil Circuits, located in North Billerica, experienced 315 layoffs in FY'10 and Lowell residents comprised one-third of its workforce.

Additionally, the housing crisis, which initially impacted this region in 2008, continued to negatively impact the economy through 738 foreclosure petitions, 577 foreclosure auctions and 200 bank-owned/REO properties between April 2008 and March 2010. Foreclosure deeds decreased in the City of Lowell from 37 in August 2010 to 17 in August 2011. These statistics illustrate that the critical economic conditions in the region have not improved significantly since the national recession ended, according to some economists.

During the recession in the early 2000s, this region's computer manufacturing and information technology industries were significantly impacted. During the most recent recession, layoffs occurred in high tech manufacturing, information technology and retail industries, but the impact on these industries wasn't as severe and the economic downturn has affected every industry. Due to the diverse and high tech nature of the Massachusetts economy, industries in this region have been able to recover more readily than industries in other parts of the country. Recent statistics show that the Commonwealth of Massachusetts has done better than most states in creating new jobs as we emerge from the national recession.

C. Cultural/Creative Economy

The cultural/creative economy includes those industries that have their origins in individual creativity, skill and talent. Cultural/Creative economy industries include architecture and design, business consulting, research, performing and visual arts, advertising, films and media, software development, and education. Some of these activities occur under the umbrella of large institutions, corporations or nonprofit organizations, but small businesses and sole proprietorships are the major drivers of the creative economy.

Unlike many other sectors, the success of the creative economy is built on a sense of place, which is not typically thought of as an economic factor. Highly educated and skilled creative workers have many options when choosing an area in which to locate. Their skills and abilities are portable, and they generally seek vibrant neighborhoods in a somewhat urban setting, and communities with a high quality of life. Lowell has placed a strong emphasis on growing its creative economy through marketing and initiatives to build partnerships among its many cultural organizations. The City has been a leader in attracting the film making industry, and evidenced by the three motion pictures filmed within the City over the past three years.

The Greater Lowell region has extensive cultural and recreational amenities. Over the past few years, the region has increasingly recognized the importance of its cultural economy. The Creative Economy project was initiated by the Merrimack Valley Economic Development Council (MVEDC) through a small grant it received from the Massachusetts Cultural Council. The focus of this project was to define the creative economy in the Merrimack Valley, quantify its contributions to the overall economy, and promote the growth of the creative economy as a means to diversify the economy and provide a destination location for travelers and shoppers. The communities involved in this project included the nine communities of the Northern Middlesex Council of Governments (NMCOG) and the fifteen communities of the Merrimack Valley Planning Commission (MVPC).

The initial study of the creative economy in this area was undertaken by Mt. Auburn Associates in 2000, when it worked with the New England Council to produce the report entitled "The New England Creative Economy Initiative: The Role of Arts and Culture in New England's Economic Competitiveness". Based upon the results of this study, three specific components were quantified:

1) The Creative Cluster businesses employed 245,000 employees, which represented 3.5% of the New England business workforce; this cluster was growing faster than the rest of the economy, bringing in significant external revenues;

2) The Creative community focused upon quality of life, was a key to downtown revitalization and could be a component of suburban and rural development as well, and

3) The Creative Workforce represented 2% of the New England total workforce; many worked outside the cluster and the workforce was highly entrepreneurial.

In 2007, Mt. Auburn Associates worked with the Lowell Plan to produce "*On the Cultural Road…CITY OF WORLD CULTURE – Strategies for the Creative Economy in Lowell, Massachusetts*". The purpose of this project was to "Utilize and strengthen Lowell's cultural assets in order to enhance community revitalization and pride, develop leadership and build human capital and create new economic opportunities". This strategy document outlined implementation steps in five specific areas: 1) Strengthen Lowell's Cultural Organizations and Artists; 2) Enhance the Cultural Product; 3) Promote Creative Business Development; 4) Build New Leadership and Civic Engagement; and 5) Shape the Image and Improve Marketing. In essence, the Lowell report provided a blueprint for growing the creative economy in the city.

Beginning in July 2007, MVEDC formed an initial steering committee consisting of the Cultural Organization of Lowell (COOL), UMass Lowell and representatives of MVEDC. This steering committee was broadened to include representatives from the Northern Middlesex Council of Governments (NMCOG), Team Haverhill, the Merrimack Valley Planning Commission (MVPC), the Light of Cambodian Children & Southeast Asian Water Festival, Live Lawrence

and the artist community. MVEDC hired Deborah Carey as project manager and Mt. Auburn Associates to provide an overview of the creative economy as part of their outreach efforts. MVEDC conducted two creative economy forums with more than 300 attendees at the Revolving Museum in Lowell (November 2007) and Northern Essex Community College in Haverhill (January 2008). As a result of these forums, four working groups were established: Workforce/Business Development, Marketing and Communications, Festivals, Celebrations and Cultural Products, and New Regional Activities and Events. There was also an active effort to tie together businesses with the arts and cultural organizations to focus upon the economic component of this initiative. MVEDC identified more than 70 annual festivals in the Merrimack Valley and compiled an inventory of "creative economy assets" in the region.

There was an extensive marketing effort and outreach by MVEDC to the Chambers of Commerce in Lowell, Lawrence, Haverhill and Newburyport, as well as the Visitor Centers at the Greater Merrimack Valley and the North of Boston Convention & Visitors Bureau. MVEDC implemented an extensive outreach to the press, cable television and travel bureaus to "brand" the region as a creative economy and destination location. MVEDC and the Steering Committee began planning for two Valley-wide events scheduled for the fall of 2008. The first event was the *ArtsFest Merrimack Valley*, which was the first-ever Merrimack Valley-wide arts and cultural event. Through an active partnership with the Essex National Heritage Commission's annual "Trails and Sails" weekend, Lowell's annual "Lowell Open Studios" and Newburyport's ArtWalk, MVEDC used this framework of activities to schedule the event from September 26th through 28th. The second event was the first Massachusetts Poetry Festival scheduled for October 10th to 12th in downtown Lowell. Based upon a collaborative effort with the Massachusetts Poetry Outreach Project, the Massachusetts Cultural Council and the Massachusetts Foundation for the Humanities, MVEDC modeled this event after the successful Lowell Folk Festival.

MVEDC concluded this project after the two major events were held due to limited funding. The resources developed as a result of this grant from the Massachusetts Cultural Council are available for future efforts to expand the Creative Economy in the Merrimack Valley. This project served to unify, organize and strengthen the cultural community which continues to work with the local communities to promote their role in the economy and in the region's quality of life.

D. Zoning and Economic Development Designations

In determining the economic development potential for the region, it is useful to assess the availability of commercial and industrial land within the region. While the character of the nine communities comprising the Greater Lowell area varies considerably, through zoning, each municipality has designated specific areas of their community for business development. Outlined on the next page in Table 25 is a brief summary of the total land zoned for commercial and industrial use in each community and the percentage of total land area it represents.

Table 25: Land Area Zoned for Commercial and Industrial Uses by Community

Community	Land Zoned for Commercial Use		Land Zoned for Industrial Use	
	Acres	% of Land Area	Acres	% of Land Area
Billerica	517.98	3.12	3,567.46	21.47
Chelmsford	500.73	3.43	1,595.62	10.93
Dracut	758.00	5.54	687.00	5.03
Dunstable	168.12	1.57	0	0
Lowell	865.60	9.30	637.34	6.85
Pepperell	83.42	0.57	427.31	2.90
Tewksbury	613.18	4.63	1,570.80	11.86
Tyngsborough	728.13	6.30	1,382.86	11.97
Westford	456.66	2.28	1,533.52	7.65
NMCOG Region	4,691.82	3.77	11,401.91	9.16

Sources: NMCOG GIS, Lowell GIS Dept., Dracut Engineering Dept., Westford GIS Dept., Applied Geographics d)

Billerica

Billerica's Zoning Bylaw contains four zoning districts which accommodate commercial and industrial development: General Business (GB), Neighborhood Business (NB), Commercial (CM) and Industrial (IND). The General Business and Commercial districts are principally found along the Route 3A corridor and allow for a mix of office and retail uses. The Neighborhood Business district is intended to accommodate small retail and service establishments and can be found in small pockets throughout town. The Industrial District is the largest business zoning district and is found along the Route 3 corridor, and along the southern portion of the Middlesex Turnpike, adjacent to town's border with Bedford and Burlington.

The Town of Billerica has been designated as an Economic Target Area (ETA) under the state's Economic Development Incentive Program (EDIP) and there are nine approved Economic Opportunity Areas (EOAs). The EDIP program allows the Town to offer real estate tax incentives on additional tax base growth in exchange for business investment and local employment. The nine EOAs include:

- North Billerica Park/former Raytheon missile plant;
- Concord Road Industrial Area;
- Middlesex Turnpike North;
- Middlesex Turnpike South;
- Treble Cove Road EOA including Republic, Sterling, and Esquire Roads, along with a portion of Treble Cove and Rangeway Roads;
- The North Billerica Mills EOA including the Talbot and Faulkner Mills;
- The Salem Road EOA including the former Purity/Kmart distribution warehouse; and
- Three single-user EOAs: Parexel International Corporation, EMD Serono and Nuvera Fuel Cells.

In addition, the Town has established a Priority Development Site (PDS) along the Middlesex Turnpike under the Chapter 43D. The PDS was created in conjunction with the expansion of EMD Serono and establishes procedures whereby local permit applications for any project proposed for the PDS site will be acted on within 180 days. The Town has been studying infrastructure barriers to new development along Route 3 and Middlesex Turnpike through a state-funded study. Additional development opportunities at the Route 3 exits and along Route 3A are also being reviewed.

There are several undeveloped parcels of land available within the town suitable for industrial and commercial development, including the 62-acre Sullivan Road parcel. In addition, there are several redevelopment opportunities, including the 500,000 square foot former Raytheon Plant located near the Lowell line.

Chelmsford

With 3.43 % of the town's land area zoned for commercial uses, Chelmsford has a diverse commercial base comprised of retail, hotels, restaurants, financial services establishments, and service type businesses. Shopping center and strip mall development is prevalent along Route 110 between the Center and Route 3, and within the Drum Hill area. Office/R&D development occupies much of the land along Route 129 in the area of the Route 3 interchange. Smaller village style businesses are found in Chelmsford Center and the Vinal Square area of North Chelmsford, while pocket of neighborhood-style retail are interspersed throughout the community.

Nearly 11% of the town's land area is zoned for industrial uses. In 2008, approximately 546 acres, or 4.72% of the town's tax parcels contained industrial uses, which included utilities, manufacturing, research facilities, warehousing and wholesale establishments.

A buildout analysis was performed in 2008 by NMCOG staff as part of the town's master plan process. The analysis showed that the town is nearly built out with only 680.58 acres of developable land remaining, as shown in Table 26 below.

Table 26: Chelmsford Undeveloped/Developable Parcels by Zoning Classification

Zoning Classification	Number of Parcels	Total Acreage
Limited Industrial (IA)	13	96.54
Special Industrial (IS)	3	83.07
Residential A (RA)	10	79.75
Residential B (RB)	46	397.74
Adult Entertainment (CX)	3	23.48
Total	**75**	**680.58**

Source: 2008 Chelmsford Build-out Analysis Update prepared by the Northern Middlesex Council of Governments

As shown above, there is no remaining developable land located in the commercial zoning districts. Therefore, any new commercial development will likely occur as a result of a redevelopment or infill projects. There is approximately 179 acres of undeveloped industrial land remaining.

As part of the Master Plan process, NMCOG staff has worked with the Town to identify future industrial and commercial redevelopment opportunities and found that there are nearly 352 acres of land on 66 parcels that may hold potential as redevelopment sites for future commercial, industrial and mixed-use developments. Furthermore, under Chapter 43D, the town designated a town-owned "brownfield" property (the former site of the Silicon Transistor Corporation located at 25-29 Katrina Road) as a PDS and has secured "brownfield" funds from the state and federal governments. Town officials envision this area becoming a "premiere local retail district". The Town also benefited from the Lowell ETA and established three single-user EOAs. Earlier this year, the Chelmsford ETA was approved by the Economic Assistance Coordinating Council (EACC).

Dracut

The Town of Dracut contains 1,445 acres of land zoned specifically for industrial and/or commercial uses. This represents approximately 10.6% of the town's total land area. According to the McConnell Land Use data compiled in 2005, 262 acres of land are now used for commercial purposes, while 119 acres are in industrial use. Much of the town's commercial and industrial development is located along Lakeview Avenue, Route 38, Route 110 and Route 113.

The Town has established an ETA and EOAs have been designated at the Beaver Brook Mills and in the Navy Yard business area. Dracut has a significant amount of agricultural land remaining in active use, particularly in the eastern portion of town. Approximately, 1,247 acres of land are used as cropland and 182 acres are used as pasture. Agriculture is viewed as an important component of the local economy and the town has actively pursued preservation of these lands through the state's Agricultural Preservation Restriction program.

The lack of municipal sewer and water service limits the types of development that could potentially locate within the community. Agriculture has historically been a vital part of the town's economy and agricultural preservation remains an important quality of life issue for the town's residents. Lack of direct highway access to the community is also an issue.

Dunstable

The Town of Dunstable is predominantly rural with very little commercial activity. Existing retail establishments principally serve the town's residents or the neighborhood in which they are located. There are two areas zoned for business use: the B-1 district located in a small area off Main Street near the Town Center and the B-3 district on the town's eastern border with Tyngsborough. The Town's Master Plan recommends that the area along the Tyngsborough border be developed for future office or high technology oriented businesses. The Master Plan

also encourages additional retail and service development for economic development purposes and to meet the needs of local entrepreneurs.

Lowell

Approximately 18% of the City's land area is used for industrial and commercial purposes, according to a land use survey presented in the 2002 Master Plan for the City of Lowell. This land use pattern was largely established during the city's development as a major manufacturing center. The city's major waterways are lined with mill buildings, some of which remain in industrial use, but many have been converted to residential, institutional or commercial uses, and some remain vacant or underutilized. Lowell's commercial downtown is centered on Merrimack and Central Streets.

With more than 2.5 million square feet of first-class commercial, institutional and retail space, the City is a regional destination for business development. The City is focusing on remediating "brownfield" sites and has been designated as an EPA Brownfields Showcase Community. Currently, the City is focusing on the Tanner Street area. The City is also encouraging small-scale business ventures, and incubator space, and is working toward developing an emerging technologies ordinance to capitalize on business opportunities which spin off from research being conducted at UMass Lowell. The City was one of the first to establish an ETA and currently has eighteen (18) EOAs in operation.

Given the built urban nature of Lowell, much of the City's future economic growth will depend on redeveloping blighted and/or underutilized properties. As discussed in other sections of this document, the Hamilton Canal District is a state designated Growth District, Chapter 40R district and Priority Development site. Construction was recently initiated on Phase 1 of the project and it is estimated that project buildout will take ten years. This project will transform a blighted area of the City that has not seen any reinvestment in decades.

Pepperell

Approximately 511 acres or nearly 3.5% of Pepperell's land area, is zoned for commercial and/or industrial use. Pepperell's commercial area has largely developed along Main Street (Route 113), with some smaller areas of commercial activity located along Route 119 and Route 111. Lomar Industrial Park, an industrial subdivision comprised of industrial, service and office uses is the major business complex within the community.

The town has created a Mixed Use Overlay District within the area surrounding Railroad Square in order to provide developer incentives for revitalization projects. In addition, the Town recently became part of the Ayer/Devens/Groton ETA and designated Lomar Industrial Park as its first EOA. Through the use of financial incentives under the EDIP program and the designation of the former Pepperell Paper Mill site as a PDS, the potential redevelopment of the site has been enhanced. A marketing study and detailed Master Plan for the mill site and

surrounding area was completed. The property owner has razed the mill structure and is identifying development opportunities for the vacant parcel.

Tewksbury

Approximately 2,184 acres of land in the Town of Tewksbury are zoned for commercial and/or industrial uses. This represents nearly 16.5% of the town's land area. Except for a small, eight (8) acre area at the junction of River Road and Andover Streets, all of Tewksbury's commercially zoned land lies in a classic strip formation along Main Street (Route 38). Industrial uses are located in the north and western sections of town where land zoned for heavy industry is accessible from I-495, and along East Street, not far from the Andover town line.

The Town of Tewksbury established a PDS under Chapter 43D within the Lowell Junction development area. The redevelopment of this area is being planned in cooperation with the communities of Andover and Wilmington, and is focused on the construction of a new I-93 interchange, which will open up access to 700 acres of land that is currently landlocked. In addition, the town worked with the Town of Andover to establish an ETA. The town will be establishing its first EOA in the fall and will also be working to help redevelop the former Raytheon site on Woburn Street.

Tyngsborough

Most of the land zoned for business within Tyngsborough is located along the Westford Road and Middlesex Road corridors, west of the Merrimack River. There are four such zoning districts incorporated into the town's Zoning Bylaw. The B-1 zone (Neighborhood) provides for small neighborhood-oriented businesses and is found along the north side of Lakeview Avenue, at the east end of the Tyngsborough Bridge, and on the west side of Middlesex Road. The B-2 zone, which covers the Town Center, is intended for office and professional uses, but also allows retail uses of less than 5,000 square feet. The B-3 zone (General Shopping), provides for larger business areas along arterial roadways, and is principally located along Middlesex Road, north of the Town Center. The B-4 zone has been created to accommodate adult entertainment and is located along a remote area on Cummings Road.

In June 2006, the Northern Middlesex Council of Governments assisted the Town of Tyngsborough in completing the *Tyngsborough Economic Development Plan* which focused on five areas of the community: (1) the Middlesex Road corridor; (2) the Westford Road corridor (3) Pawtucket Boulevard; (4) Kendall Road; and (5) Boston University/Sycamore Networks parcels. The total acreage of these areas (2,245 acres) represents about 20% of the town's land area. More than twenty-two percent (22%) of the land within these five areas is vacant (511 acres), according the Tax Assessor data base. The Town's Economic Development Committee works to promote the community and to attract additional businesses. The Committee is working to address the town's need for additional sewer infrastructure, in order to accommodate the development of large parcels, such as the so-called Sycamore Networks parcel located between Middlesex Road and Westford Road.

The Town completed a Master Plan for the Town Center which envisions the creation of a mixed-use overlay zoning district focused on the adaptive reuse of vacant municipal properties. The Town issued an RFP for the redevelopment of these properties and hoped that the reuse of these buildings will serve as a catalyst for additional investment in the Town Center area and along other sections of the Middlesex Road corridor. Since the issuance of the RFP, the Town has changed its approach and rescinded the RFP.

Westford

The Town of Westford has zoned approximately 1,990 acres of land for commercial and/or industrial use, representing nearly 10% of the town's land area. Commercial development is located along the Route 110 corridor and within the town's villages. The two largest industrial districts are located along Route 110 and Route 40 near Route 3. The town has created a mill reuse overlay district to encourage the redevelopment of four mill complexes located along Stony Brook.

As a matter of policy, Westford has designated the Route 110 corridor as the town's business corridor. The town is currently working with EOHED and the Town of Littleton to brand Route 110 as an "Information Technology Corridor". There are two large development projects along Route 110 that have been permitted by the Town, but are not yet constructed: Westford Technology Park West (725,000 sf office/R&D) and Cornerstone Square (226,000 square foot high-end retail). Federal stimulus funds were recently utilized to construct traffic improvements along a section of Route 110 adjacent to the Westford Technology Park West in order to stimulate further economic investment. The Town has also submitted a Growth District application in conjunction with the Towns of Littleton and Boxborough and an Exceptional Opportunity Application for the expansion of the Red Hat facility on Route 110.

E. Economic Development Tools for Sustainable Development

A wide variety of tools can be used to focus economic growth in locations consistent with the RSP and the region's CEDS document. The ability to utilize these economic development tools varies with the level of staff capacity in each municipality and the participation of volunteers who live or work in the community. NMCOG will continue to work with the Economic Development Committees in each community, as well as the Lowell City Council and Boards of Selectmen, to take full advantage of the economic development tools that are available at the federal, state, non-profit and private levels. Outlined in this section are the various economic development tools that enable a community to target the types of development in those specific areas most appropriate for development. These economic development tools assist a community in strengthening its economic development framework and include the following items: infrastructure (water systems, sewer systems, and utilities (electric services, natural gas delivery and telecommunications)), marketing/branding, workforce development, brownfields, the Economic Development Incentive Program (EDIP), streamline permitting, Chapter 43D Priority

Development Site (PDS) Process and other state initiatives for economic development. This section will summarize the current status of these components and outline the opportunities available to build upon them in the future.

1. Infrastructure Development and Maintenance

The state of a region's infrastructure plays a major role in its economic development potential. The Greater Lowell region has enjoyed a highly developed transportation infrastructure, which was enhanced during the past six years through the expansion of Route 3. This region has yet to see the direct economic benefits from the highway expansion, but is likely to experience these economic benefits during the next decade. Apart from the excellent highway network, access to public transit, multiple airports, freight transportation and bicycle and pedestrian facilities remains an enormous advantage for this region. The status of the region's water and sewer systems varies from community to community, yet there is a demonstrated need to address regional sewer capacity in the future if private economic development investments are to continue. Utilities in the region have provided the Greater Lowell communities with the necessary electric and natural gas services, as well as telecommunications and internet support. Continued public investment in the region's infrastructure, particularly sewer and water systems, will be needed to maintain and expand economic growth for the next decade. Outlined below are brief descriptions of the water, sewer and utilities within each community. For a detailed description of the transportation network, please refer to the region's *2012 -2035 Regional Transportation Plan.*

a. Water Systems

The sources and development status of the water systems in the region vary from community to community. Outlined below are brief summaries on the water systems in each community:

Billerica

Due to problems with the existing water treatment plant, the Town broke ground in 2003 on a new $25 million treatment plant located off Treble Cove Road, with a capacity of 14 million gallons per day (gpd). The new water treatment plant was in response to numerous problems with the existing plant in not being able to meet current water quality standards. The new plant did not increase the amount of water withdrawn from the Concord River; however, it was designed to improve the quality of the drinking water.

The Concord River is the sole source of all drinking water for the Town of Billerica, with public water available to the entire Town. The Town has MassDEP approval to withdraw 5.26 million gdp on an annual average. The town's annual water consumption is approximately 1 billion gallons, with an average of 4.95 million gallons of water used per day.

Chelmsford

The Town of Chelmsford is served by three water districts, which cover, in total, 95% of the Town: The Chelmsford Water District, North Chelmsford Water District, and the East Chelmsford Water District. The Chelmsford Water District pumps from fifteen (15) wells, with a combined yield of 5,800 gallons per minute. The District serves approximately 7,900 customers. The Chelmsford Water District sells 26.7 million gallons of water to the East Chelmsford Water District. The Chelmsford Water District withdraws approximately 1.42 million gallons of water daily from the Concord River basin, and an additional 1.53 million gallons daily from the Merrimack River Basin. According to the 2009 Water Management Act Annual Report for the District, the actual withdrawal of water from these basins is nearly at the capacity permitted to be withdrawn.

The North Chelmsford Water District owns four wells within the Bomil Wellfield off Richardson Road, with a combined yield of approximately 1,450 gallons per minute. The District serves approximately 2,400 customers. In June 2009, the district received the regulatory approval to move forward with constructing a new 13,000 square foot, $7.8 million water treatment plant intended to improve the quality of drinking water for residents and reduce the district's dependence on the City of Lowell for drinking water. The North Chelmsford Water District does not operate with any significant constraints in terms of capacity at present; however, studies have projected that the District will need to install two additional wells to meet future demand.

The East Chelmsford Water District owns two wells located on Canal Street with a combined yield of 700 gallons per minute. The District serves approximately 700 customers, including 324 residences and 70 businesses. East Chelmsford is fairly built out, and at this point no capacity constraints are being experienced by the District.

Dracut

Dracut is served by the Dracut Water Supply and Kenwood Water Districts. In addition, rural areas of Town are supplied by private drinking water wells. The Dracut Water Supply District serves the neighborhoods of Dracut Center, the Navy Yard, and Collinsville. The District's main well fields are located off Hildreth Street in Dracut and off Frost Road in the Town of Tyngsborough. The District also purchases water from the City of Lowell. The District maintains three storage facilities: (1) a 3,000,000 gallon stand up concrete tank located on Marsh Hill, (2) an 800,000 gallon cement tank located on Thortleberry Hill, and (3) a 2,500,000 gallon steel water tower located on Passaconaway Drive. The District supplies approximately 9,000 households, including about 1,000 residents in Tyngsborough.

The Kenwood Water District distributes water to approximately 1,500 households in East Dracut. The Kenwood District has no water supply of its own, and provides only the water distribution service. The Kenwood Water District purchases water from the City of Lowell and

the Town of Methuen, which supplies it to many of the residential and businesses in the eastern portion of the town. The Merrimack River is the source of water for both Lowell and Methuen. Dracut's current average demand is approximately 1.5 million gallons of water per day.

Dunstable

Dunstable has a very limited public water supply system, with most of the homes and businesses relying on private wells as its water source. Only 5% of Dunstable's population living near the Town Center is served by municipal water supply. Currently, Dunstable operates off of Salmon Brook Wells #1 and #2, which are located off of Main Street, and pumps approximately 25,000 gallons per day. The pumping station is located adjacent to Salmon Brook. Water mains extend from the pumping station to Lowell Street, along Pleasant Street, to the Town Center. Only one well operates at a given time, with the other well used as a backup. The wells are approximately 90 feet deep, with a current capacity of 250 gallons per minute. The town's water system includes over one mile of water main, and less than 1,000 users. In 2008, the wells produced and delivered over 10,925,100 gallons of water, an average of over 29,931 gallons per day.

Lowell

The only drinking water supply for Lowell's Water Treatment Plant is the surface water from the Merrimack River, which has its source in the White Mountains of New Hampshire. The Greater Lowell Regional Water Utility (LRWU) is responsible for the treatment and distribution of the water supply. LRWU also provides water to parts of Dracut, Tyngsborough and Chelmsford on a daily basis, and to parts of Tewksbury as needed.

The LRWU produces more than 4.8 billion gallons of drinking water which is distributed to over 135,000 people and businesses in the communities of Lowell, Dracut, Tyngsborough, and Chelmsford. Approximately 15 million gallons per day are pumped with a maximum capacity of 30 million gallons per day. The Lowell system contains two underground storage facilities with a capacity of 11 million gallons located on Christian Hill. The City also has two freestanding storage tanks with a capacity of 1 million gallons located on Wedge Street.

In 2007 and 2008 the LRWU was granted State Revolving Fund (SRF) loans to continue water system improvements. These loans funded further upgrades to the LRWU's treatment facility, as well as water main replacements, water meter replacement, construction of a new water storage tank and several other minor system improvements.

Pepperell

The Pepperell Water Division supplies approximately 259,925 million gallons of water through approximately 3,000 service connections, with an average production of .710 million gallons per day. Water is supplied by three gravel packed wells located on Jersey Street and Bemis Road, and a fourth well off Route 111 at the Pepperell/Hollis line. The fourth well is permitted to

provide an additional 500,000 gallons per day. There is also an emergency water connection to Townsend. This connection is rarely used but is provided for the benefit of both towns. The water distribution system currently serves 85% of the Town. There are two reservoirs: (1) a one million gallon underground storage tank on Heald Street, and (2) a 1.5 million-gallon standpipe on Townsend Street. Residents who are not connected to the public water system are served by private wells.

Tewksbury

The Merrimack River supplies all of the drinking water for the Town of Tewksbury. The Massachusetts Surface Water Quality Standards classify the River as a Class B waterway, which means that the water withdrawn for drinking purposes must be treated. The Town operates its water treatment plant and manages the distribution system. In 2002, the Town increased the capacity of its water treatment plant from 3.5 to 7.0 million gallons per day. Total water consumption in 2008 was approximately 3.5 million gallons per day, with residential water users accounting for approximately 65% of the demand. Municipal water is available to 98% of the town.

The location of the town's first storage tank located at Catamount Street (aka Ames Hill), which is still in use, is home to the two (2) underground storage tanks which were built circa 1951 and 1958. Each tank can hold up to 500,000 gallons of water. In 1971 an elevated storage tank was constructed at Astle Street, which was just recently refurbished and can store up to 1,000,000 gallons of water. In August 2007, the Town completed the construction of a wire wound pre-stressed concrete tank that can hold 5 million gallons of water, which is located on Colonial Drive. This tank is the largest pumped tank in New England and provides a low profile.

Tyngsborough

Public water service currently serves approximately 30% of the town. The remaining 70% of the town is served by on-site private wells. Within the Town of Tyngsborough, three water districts operate a total of five water distribution systems that access various supply sources in neighboring communities including Dracut, Chelmsford, Lowell and Nashua. Management of the water supply infrastructure and the related contractual agreements is relatively complex.

The largest water distribution network is comprised of three separate water systems and operated by the Tyngsborough Water District (TWD). The TWD is the only Town-based provider of public water, which is supplied through the communities of Dracut and Lowell, and through the Pennichuck Water Works Corporation of Nashua, New Hampshire. The TWD was formed by the legislature in 1983 to serve the neighborhood impacted by groundwater contamination emanating from the Charles George Landfill. According to the 2003 Comprehensive Water Resources Management Plan (CWRMT), prepared for the Town by SEA Consultants, the water

demand for the TWD is estimated at 200,000 gpd. The CWRMP also found that the water supply available to the TWD through the communities of Lowell and Dracut appears adequate to meet future needs. In 1999, the TWD signed a ten-year agreement, with two five-year renewal options, with the Pennichuck Water Works Corporation of Nashua, NH to purchase up to 500,000 gpd.

The Dracut Water Supply District (DWSD) has one water system serving the area north of Mascuppic Lake. A smaller distribution system operated and maintained by the Tyngsborough Water District is located in this same area and is connected to the larger DWSD system. The water supply for these two systems has been a connection in Dracut to a distribution line in Lowell, a well field sited in Dracut and, during peak demands, a well field operated by the DWSD that is located off Larsen Avenue on the northwestern bank of the Merrimack River in Tyngsborough. The current inter-municipal agreement between the TWD and DWSD for water furnished to the TWD operated system provides an initial maximum allowance of 100,000 gpd with increases for each new unit of residential housing and commercial service. The Whortleberry Hill Reservoir located in the Town of Dracut provides the primary system storage.

The North Chelmsford Water Supply District (NCWSD) services a small area along the western bank of the Merrimack River near Tyng's Island. The water supply is just capable of meeting current demand on the NCWSD, although additional water supplies are potentially available through neighboring districts in Chelmsford. This system consists of mostly 6-inch mains, with a few 10-inch mains

Of the various water supply systems serving the town, the EPA system operated by the TWD is the most extensive. The system connects to the Lowell system at a booster pump station located on Pawtucket Boulevard on the southeastern bank of the Merrimack River. Water is conveyed across the River to a 550,000-gallon storage tank on Oak Hill at Flints Corner. Distribution then continues northwest to serve the area impacted by the Charles George Landfill. The EPA system also branches off to serve the Town Center area to the northeast and residential areas to the west.

Westford

Approximately 75% of the town residences and 90% of business are serviced by the public water system. Pumping capacity of the eight municipal wells is 3,580 gallons per minute. For the fiscal year of 2008, 1.37 million gallons of water was used per day on average. In 2010, the 1.72 miles of new water main were added, for an existing total of 133.7 miles of water main, with a storage capacity of 4.85 million gallons, and a total of 551.88 million gallons of water pumped annually.

b. Sewer Systems

The geographic coverage of the region's sewer systems is reflective of each community's overall development pattern. The City of Lowell, which is the most developed community in the region, has approximately 95% of its community supported by the municipal sewer system. Over the past several years, some communities within the Greater Lowell region, such Billerica, Chelmsford and Tewksbury participated in intensive sewer expansion projects. Dunstable and Westford do not have municipal sewer systems and rely on on-site septic systems. A summary of the sewer systems available in each community is provided below.

Billerica

The Town is in the process of completing an aggressive $15 million dollar sewer expansion program. The Town's public sewer system currently covers 76% of the community, up from 70% in 2004. The Town operates a Grade 7 Wastewater Treatment Plant with design capacity of 5.5 million gallons per day (MGD). Billerica is making approximately $2 million in upgrades to the Shawsheen River Pump Station (aka George Brown Street Pump Station). In addition, the Letchworth Avenue Wastewater Treatment Facility just completed a CoMag process in an effort to reduce phosphorous from the wastewater that enters the Concord River. Average daily flow at the plant is approximately 4 MGD, a significant increase (>2 MGD) from 2002 levels. There are 27 pump stations located throughout town.

Chelmsford

The Town of Chelmsford has purchased 3,010,000 gallons per day of average daily flow sewer capacity from the Greater Lowell Wastewater Utility. The Town has, in turn, sold 350,000 gallons of that capacity to the Town of Tyngsborough. This leaves the town with a remaining capacity of approximately 2,660,000 gallons per day. The current flow sent to the Greater Lowell plant is approximately 2,450,000 gallons per day. Currently, 90% of the Town of Chelmsford is sewered, up from 70% in 2004, with plans to sewer the remainder nearly complete.

The town is in the process of assessing various strategies for increasing its wastewater treatment capacity, including partnering with Billerica, or creating a sewer "bank", which involves implementing a variety of water conservation measures with the ultimate goal of reducing demand.

Dracut

The municipal sewer system services about 65% of the Town's population. Existing sewered areas include most of Dracut Center, Collinsville, and the Navy Yard area. The remainder of the town is supported by on-site septic systems. Discharge from the sewer system is sent to the

Greater Lowell Wastewater Utility. Dracut owns approximately 11% of the facility, or 3.6 million gallons per day of capacity. Of these 3.6 million gallons per day, Dracut must provide Tyngsborough with 1.0 million gallons per day, based on a 1977 inter-municipal agreement. Currently, Dracut is utilizing about 1.4 million gallons per day of its allocation.

The Town of Dracut has developed a Comprehensive Wastewater Management Plan (CWMP) to sewer most of the Town over the next twenty years, which received final MEPA approval in May 2007. Construction will involve approximately 30 miles of new sewer lines to areas of Wheeler Road, Colburn Avenue, Marsh Hill, Methuen Street, and Peter's Pond. Loon Hill, Mammoth Road and Gumpus Road and will also add nine new pump stations to the system. An additional 73,000 gpd will be added to the system, all of which will go to the City of Lowell's Treatment Facility and approximately 600,000 gpd of inflow and infiltration (I&I) will be removed from the system. The removal of I&I will help the Town stay within the limits of its Inter-municipal agreement with the City of Lowell.

Dunstable

The Town of Dunstable does not have a municipal sewer system. All wastewater is disposed of by private on-site septic systems.

Lowell

Lowell's existing sewer system consists of approximately 210 miles of sewer line. Sixty percent of the system is a combined system designed to carry both sewage and stormwater. There are eight direct discharge points for this system that come into play during significant storm events. The City is under a federal court order to begin to eliminate these discharges. During 2008 and 2009, construction was started and/or completed on this sewer separation project in the Gorham Street, Chelmsford Street and Boston Road areas of the City to begin to eliminate the combined sewer systems and the direct discharges into the river systems.

The Greater Lowell Wastewater Utility plant, located on Duck Island, has a design capacity of 32 million gallons per day (mgd) and serves the City of Lowell, and the Towns of Chelmsford, Dracut, Tyngsborough and Tewksbury. The plant has the design capacity to handle a peak flow of 75 mgd, and a peak primary flow of 110 mgd. In actual practice, a peak flow of only 50 mgd can be treated to secondary standards and 100 mgd to primary standards.

Greater Lowell Wastewater Treatment Facility

Pepperell

The Pepperell Wastewater Treatment Plant, located at 47 Nashua Road, went on line in 1979. In 2008- 2009, the Town expanded the sewer system, installing almost 2,600 feet of new main line sewer on Nashua Road and Mill Street. The Town is currently processing approximately 178 million gallons per day. The system has over 1,500 connections, serving approximately 40 % of the Town. The Town has an inter-municipal agreement in place with the Town of Groton. Groton purchased 120,000 gallons per day of capacity to connect the Groton Center area to Pepperell's plant. Approximately 60% of the town is supported by on-site septic systems.

Tewksbury

Currently, ninety-eight percent of the Town is supported by the municipal sewer system. The sewer program, which is now complete, was funded through an enterprise fund. The Town of Tewksbury's sewer collection systems consists of over 90 miles of pipe and 31 pump stations. The sewage is treated at the Greater Lowell Wastewater Utility in the City of Lowell. Some of these stations have been in continuous operation for 23 years and these upgrades are critically needed.

Tyngsborough

Tyngsborough's wastewater management system was first developed in the 1970s and has continued to grow through subsequent decades. The Town has an existing sewer system that serves approximately one-third of the community. Wastewater flows generated in Tyngsborough are received and treated at the Lowell Regional Wastewater Utility, via connections with Chelmsford, Dracut, and Lowell. Tyngsborough has executed intermunicipal agreements (IMAs) with the Towns of Chelmsford and Dracut, and the City of Lowell. The Town's IMAs with the Towns of Dracut and Chelmsford establish a capacity of 1.6 million gallons per day (mgd) and 0.35 mgd respectively. Currently, Tyngsborough utilizes about half of these

capacities. Tyngsborough's IMA with Lowell, which provides a capacity of 0.02 mgd, does not allow for the current sewer flow. At times, flow from Tyngsborough to Lowell is nearly 0.04 mgd. Modifications to the Lowell IMA are needed to provide additional capacity in order to meet existing demand and accommodate future growth. The three IMAs are summarized below:

- Chelmsford – Tyngsborough has a series of gravity sewers and pumping stations in the Dunstable Road/Worden Road area and the area of southern Middlesex Road. On October 11, 1995 Tyngsborough and Chelmsford entered into an IMA that allows Tyngsborough to discharge an average of 350,000 gpd to the Chelmsford wastewater collection system. Tyngsborough has compensated Chelmsford for reserving this capacity. The agreement also limits peak hourly flow from Tyngsborough to Chelmsford to 1.3 mgd. Additional restrictions, including limits on Biochemical Oxygen Demand (BOD) and Suspended Solids (SS) also apply.

- Dracut- A system of gravity sewers and pumping stations currently serves the northeast area of Tyngsborough in the vicinity of Mascuppic Lake. On May 25, 1977, Dracut executed an IMA with the City of Lowell that entitled Dracut to an average daily flow of 3.6 mgd. Dracut deeded 1.0 mgd of that capacity to the Town of Tyngsborough on July 6, 1977. Additional restrictions, including limits on peak flow, Biochemical Oxygen Demand (BOD) and Suspended Solids (SS) are contained in both IMAs.

- Lowell-Tyngsborough also has a series of gravity sewers in the eastern portion of Town that discharges directly to the City of Lowell collection system. The IMA between Lowell and Tyngsborough allows for an average daily flow of 20,000 gpd. Additional restrictions, including limits on peak flow, Biochemical Oxygen Demand (BOD) and Suspended Solids (SS) are described in the IMA.

Westford

Public sewer still remains unavailable in the Town of Westford. All wastewater is disposed of by private on-site septic systems.

c. Utilities

The utilities described as part of this regional summary include electric services, natural gas delivery, and telecommunication services.

i. Electric Services

Electric service is provided to all NMCOG communities by National Grid. Small C & I General Service (G-1) rates apply to small commercial and industrial users with average usage

less that 10,000 kWh per month or 200kW of demand. Delivery service under this rate is available for all purposes. The prices are outlined in Table 27 below:

Table 27: (G-1) Rates for Delivery Service

Customer Charge	$10/month
Unmetered Charge	$ 7.50/month
Distribution Charge	
First 2000 kWh	3.407¢/kWh
Excess 2000 kWh	5.179c/kWh
Transition Charge	0.013¢/kWh
Transmission Charge	1.779¢/kWh
Energy Efficiency Charge	0.780c/kWh
Renewable Energy Charge	0.050¢/kWh
Cable Surcharge	
Summer	3.118¢/kWh
Winter	2.896c/kWh

Source: National Grid

General Service (C & I) Demand service (G-2) is designed for medium commercial and industrial customers with more than 10,000 kWh per month and demand not exceeding 200 kW per month. It is available for all purposes and includes both demand charges plus energy charges. This rate also contains a variety of special clauses and conditions related to discounts for High Voltage Metering and Transformer Ownership (High Voltage Delivery). This service is priced as outlined in Table 28 below:

Table 28: (G-2) Rates for Delivery Service

Customer Charge	$16.56/month
Distribution Charge	
Demand	$6.00/kWh
Energy	0.451c/kWh
Transition Charge	.0006¢/kWh
Transmission Charge	$1.609¢/kWh
Energy Efficiency Charge	0.780¢/kWh
Renewable Energy Charge	0.050¢/kWh
Cable Surcharge	
Summer	4.131¢/kWh
Winter	3.520c/kWh

Source: National Grid

General Service (C & I) Time-of-Use (G-3) rate structure is designed for large commercial and industrial customers and is mandatory for any customer who has a 12-month average monthly demand of 200 kWh or greater for three consecutive months. This rate also contains a variety of special clauses and conditions related to discounts for High Voltage Metering and Transformer Ownership (High Voltage Delivery). On-peak hours are from 8:00 a.m. to 9:00 p.m. Monday through Friday. Off-peak hours are from 9:00 p.m. to 8:00 a.m. Monday through Friday, all day Saturday and Sunday and holidays. Outlined below in Table 29 are the G-3 rates:

Table 29: (G-3) Rates for Delivery Service

Customer Charge	$200/month
Distribution Charge	
Demand	$3.92/kWh
Energy On-Peak	1.1117c/kWh
Energy Off-Peak	0.364c/kWh
Transition Charge	0.0009c/kWh
Transmission Charge	1.552¢/kWh
Energy Efficiency Charge	0.780c/kW
Renewable Energy Charge	0.050¢/kWh
Cable Surcharge	
Summer	2.857¢/kWh
Winter	2.469c/kWh

Source: National Grid

National Grid offers exceptional customer service, technical assistance and incentives to encourage energy efficiency. National Grid has partnered with renewable energy companies and works closely with the MassEcon to ensure the most innovative services are available to their small and large business customers. The MassEcon offers a free and confidential site-finding service and is the best source of commercial property listings in the Commonwealth.

For small business customers with an average demand use of 200 kilowatts or less (or 40,300 kilowatt-hours or less) per month, National Grid will provide a free energy audit and report of recommended energy efficiency improvements. The utility will pay 70% of the cost of installation of energy efficient equipment and the business can finance the remaining 30% interest free for up to 24 months. Upgrades available through the program include: lighting, energy efficient time clocks, photo cells for outdoor lighting, occupancy sensors, programmable thermostats, and walk-in coolers.

National Grid offers technical and financial incentives to large commercial and industrial customers who are building new facilities, adding capacity for manufacturing, replacing failed equipment or undergoing major renovations. Also, National Grid *Energy Initiative* offers

technical assistance and incentives to encourage energy efficiency. The Custom Project Program provides incentives of up to 45% of the cost of such improvements for existing facilities.

National Grid *GreenUp* renewable energy program is offered to G-1 customers to support the development of renewable energy. *GreenUp* allows customers to choose to have all or part of their electricity generated from renewable resources (wind, solar, biomass or hydro). Remaining a customer of National Grid; your service will be outsourced to a participating *GreenUp* renewable energy company. Energy Profiler Online™ is an additional service provided that allows customers with interval data meters to access their interval load data via the internet, which helps customers better understand their electricity usage over time.

ii. Natural Gas Delivery

In addition to providing electricity to all the NMCOG communities, National Grid also provides natural gas services. As of May 1, 2008, KeySpan Energy Delivery changed its name to National Grid. National Grid provides companies with natural gas delivery and technical assistance regarding incentives and energy services. The company offers an Architect/Engineer Program to assist companies in planning new construction or rehabilitation projects. National Grid also offers the following energy efficiency programs and advising services for commercial customers that will help identify opportunities to save money and operating costs:

- **Commercial High Efficiency Heating Program**- Provides cash rebates to customers for the installation of high-efficiency gas heating and water heating equipment. Rebates are available to multi-family and commercial-industrial customers to help reduce the incremental cost difference between standard and high-efficiency heating equipment as outlined in Table 30 below:

Table 30: Commercial High Efficiency Heating Program Rebates

Product	Rating	Rebate
Furnaces (up to 150 MBH)	90% AFUE* or greater	$100
Furnaces with electronic commutated motor (ECM)	92% AFUE* or greater	$400
Condensing unit heaters (151 to 400 MBH)	90% Thermal Efficiency**	$500
Direct fired heaters/direct fired makeup air (up to 1500 MBH)		$1,000
Direct fired heaters/direct fired makeup air (1501 to 3000 MBH)		$1,500
Direct fired heaters/direct fired makeup air (over 3000 MBH)		$2,000
Infrared heaters (all sizes)	Low Intensity	$500
Steam boilers (up to 300 MBH)	82% AFUE* or greater	$200
Hydronic boilers (up to 300 MBH)	85% AFUE* or greater	$500
Hydronic boilers (301 to 499 MBH)	85% Thermal Efficiency**	$1,000

Table 30 (cont'd): Commercial High Efficiency Heating Program Rebates

Product	Rating	Rebate
Hydronic boilers (500 to 999 MMBH)	85% Thermal Efficiency**	$2,000
Hydronic boilers (1000 to 1700 MBTU)	85% Thermal Efficiency**	$3,000
Hydronic boilers (1701 MBTU and up)	85% Thermal Efficiency**	$4,000
Product	**Rating**	**Rebate**
Condensing boilers (up to 300 Mbtuh)	90% AFUE* or greater	$1,000
Condensing boilers (301 to 499 Mbtuh)	90% Thermal Efficiency**	$1,500
Condensing boilers (500 to 999 Mbtuh)	88% Thermal Efficiency**	$3,000
Condensing boilers (1000 to 1700 Mbtuh)	88% Thermal Efficiency**	$4,500
Condensing boilers (1701 Mbtuh and larger)	90% Thermal Efficiency**	$6,000
Indirect fired water heaters (up to 50 gallon storage)		$100
Indirect fired water heaters (over 50 gallon storage)		$300
On-demand tankless water heaters (with electronic ignition)	Efficiency factor of .82 or higher	$300

* AFUE = Annual Fuel Utilization Efficiency

** Thermal Efficiency = Efficiency of heat transfer in a boiler minus boiler radiation and convection losses

- **Building Practices and Demonstration Program**-In order to showcase the energy savings that can be achieved with new or underutilized commercially available technologies, the company will help pay the cost to install such improvements. Eligible technologies include energy recovery devices, combustion controls, building energy management systems, desiccant units, infrared space heating equipment, and infrared process heating equipment. Approximately ten demonstration projects are selected in New England annually.

- **Commercial Energy Efficiency Program**-Designed to provide support services and financial incentives to help encourage multifamily, commercial, industrial, governmental and institutional customers to install energy efficient natural gas related features. Energy audit services are available for customers who need assistance in estimating energy savings. Participants are typically small to medium size commercial customers, or large customers with relatively simple energy efficiency projects. Engineering services are used to evaluate more complex projects that involve technologies associated with mechanical and/or process equipment, and where technical analysis and engineering support is needed. National Grid will cost share these services with the customer. Prescriptive rebates are available for common energy efficiency measures installed after completion of an energy audit. Customer incentives are available for projects that demonstrate the use of natural gas more efficiently than industry practices, and/or more efficiently than the minimum building code requires. Incentives are available covering up to 50% of project costs, capped at $100,000 per site and/or project.

- **Economic Redevelopment Program- ERP** is an energy efficiency program for commercial customers in state designated economic target areas to help reduce costs and improve productivity and competitiveness. There must be a customer commitment to provide at least 50% matching funds. Only measures that exceed existing building energy code requirements are eligible. Maximum funding per project is $100,000. Princeton Village Apartments in Lowell received $82,990 under this program to install energy efficient windows, patio and storm doors, air infiltration sealing and underground heating system pipe insulation.

iii. Telecommunications

Verizon provides the NMCOG region with basic telephone service, in addition to providing homes and businesses with Verizon FIOS, voice, data and video services. Verizon is the first company in the region and in the telecom industry to begin installing fiber optics on a widespread basis to connect homes and businesses directly to the network. Although Verizon is the largest service provider in the region, several other smaller competitors provide basic telephone, internet access and wireless services.

The communities of Billerica, Chelmsford, Dracut, Lowell, Tewksbury, Tyngsborough and Westford are served by Comcast, which provides digital cable TV, as well as high speed (broadband) internet access, web hosting and e-commerce for businesses. Comcast also provides business solutions for small (less than 20 employees), medium (20 to 100 employees) and large (more than 100 employees) businesses. The Towns of Dunstable and Pepperell are served by Charter Communications, Inc., which provides businesses with cable TV WAN services, high-speed (broadband) internet access, fiber services, telephone and video service.

2. Marketing/Branding

Various public agencies, quasi-public organizations, and public/private partnerships provide statewide and national marketing for designated priority development sites and other key properties. These organizations include the Massachusetts Office of Business Development (MOBD), the MassEcon, MassDevelopment, Merrimack Valley Economic Development Council (MVEDC), and some municipal community development and planning departments.

Within the Route 3 portion of Greater Lowell, the communities of Burlington, Bedford, Billerica, Chelmsford and Lowell have worked with EOHED to develop a marketing/branding program for the Route 3 corridor. In conjunction with the business community, these municipalities have attempted to design a program that would immediately conjure up the image of this area through a creative branding strategy. The work on the branding strategy came about as a result of the Chapter 43D grant administered by the Town of Billerica, whereby they hired a consultant to

identify the barriers to further development along the Route 3 and Middlesex Turnpike corridors for these communities.

On a broader scale, MVEDC outlined an initiative to develop a branding strategy for the area from Pepperell to Newburyport that would reflect the diverse characteristics of the Merrimack Valley communities. Working with the local and regional Chambers of Commerce, as well as the state tourism agencies, MVEDC felt that there were numerous attractions in the region to support its Creative Economy initiative and to encourage more private investment in the region.

3. Workforce Development

The Northern Middlesex region enjoys a unique strength in terms of its education and training facilities. Notwithstanding the fact that Greater Lowell residents live within an hour of the greatest collection of colleges and universities in the world in Boston, the availability of education and training facilities in the Greater Lowell region is quite remarkable for an area this size. The area is well represented by the University of Massachusetts Lowell and Middlesex Community College in terms of higher educational facilities, as well as nearby Merrimack College in North Andover and Northern Essex Community College in Lawrence and Haverhill. Additional higher educational facilities, such as Northeastern University's campus in Burlington, Rivier College and Southern New Hampshire University in Nashua, New Hampshire, and numerous Worcester colleges, such as Worcester State University, Clark University, College of the Holy Cross and Worcester Polytechnic Institute, offer additional educational choices to area residents and employees.

The principal higher education facilities serving this area are UMass Lowell and Middlesex Community College. Both institutions provide employment, education opportunities and research and development initiatives that help the region grow economically. While UMass Lowell was created out of a merger between Lowell Technological Institute and Lowell State, Middlesex Community College expanded into downtown Lowell from its Bedford campus. These institutions provide cost-effective quality education for students of all ages and play a vital role in the lifelong learning goals of the region. The Greater Lowell Workforce Investment Board (GLWIB), which is the region's principal workforce development entity, contracts with both institutions, as well as Northern Essex Community College, to provide quality skill training for area employers. The role each institution plays in the region is as follows:

- **UMass Lowell:** Originally founded in 1894, UMass Lowell has traditionally specialized in applied science, technology and education. UMass Lowell is the second largest campus within the University of Massachusetts system and offers more than a hundred different degree programs leading to associate, bachelor's and graduate level degrees, as well as certificate programs in specialized technical and professional areas. Doctorates are offered in the sciences, education, physical therapy and engineering, while Masters Degrees are offered in science, education, business administration and Arts and Sciences.

UMass Lowell plays a major role as one of Lowell's largest employers and economic development stakeholders in the region. The UMass Lowell campuses in Centerville, South Lowell and Chelmsford have a major impact upon the commercial and residential markets and the university's support for the development of mill space and vacant land has resulted in major tourism magnets, such as the Paul E. Tsongas Arena, and LeLacheur Field, where the Lowell Spinners Single A baseball team plays, and business and residential initiatives in the form of Lawrence Mills and incubator space at Boott Mills. The University's research and development efforts have spurred start-up firms and the partnership with Northeastern University and the University of New Hampshire in the Nanotechnology field. The University has already completed construction on their Emerging Technologies Center and has turned the former Doubletree Inn in downtown Lowell into the UMass Lowell Inn and Conference Center.

- **Middlesex Community College:** This institution, which was established in 1970, has a campus in the heart of downtown Lowell and has played a major role in the renovation and reuse of the former Wang Training Center and the Old Post Office on Merrimack Street. Middlesex Community College offers associate degree programs and has partnered with local secondary schools to prepare their students for college. The College's Business and Industry Program responds to the training needs of employers in the region by developing customized training programs. The College also offers Career Development Certificate programs, Distance Learning courses online and Software Technical Writing programs.

  Middlesex Community College employs nearly 900 people and plays an active role in the economic development and cultural activities in the region. The College plays a valuable role in developing training programs that address the current training needs of local employers in a cost-effective and efficient manner. The College also addresses the needs of students who can't go to higher-priced schools, but wish to access courses of higher learning to improve their skill levels for the marketplace. A photograph of Middlesex Community College's downtown Lowell campus is provided on the next page.

Middlesex Community College Campus in Downtown Lowell

- **The Greater Lowell Workforce Investment Board (GLWIB)**, which is a private non-profit organization, plays a critical role in matching the needs of employers with the available workforce in the region. The GLWIB provides policy guidance for workforce development issues in the Northern Middlesex Service Delivery area, which is the same as the NMCOG region, except for the Town of Pepperell. The service area of the GLWIB is the same as the NMCOG region, except for the Town of Pepperell. The GLWIB was established to meet the requirements of the Workforce Investment Act of 1998 (Public Law 105-220) and provides the following services:
    - Evaluation of the local One-Stop system, youth activities and other employment and training activities as described under WIA in partnership with the Chief Elected Official including determination of resource allocations, priorities for service and eligibility for Individual Training Account vendors;
    - Development and/or modification with the WIA partners, the Five-Year WIA plan for the region;
    - Provision of information regarding workforce development initiatives and resources to employers within the region;
    - Convene and manage grant-writing activities as appropriate;
    - Negotiation of Memoranda of Understanding with One-Stop partners;
    - Liaison with local, state and federal agencies regarding workforce development policy;
    - Select eligible service providers for youth and adults in the region;

- Negotiation of performance standards with the State and other local performance indicators as appropriate;
- Generate Labor Market Information and reports as needed and or requested by the City of Lowell; and
- Other Workforce Development activities deemed appropriate.

The GLWIB contracts with the One-Stop Center and its partners to provide comprehensive workforce development training. The One-Stop Center utilizes Individual Training Account (ITA) contractors, Private Career Schools, Community Colleges and Universities and social service providers to address the training needs of their clientele. The Lowell Adult Education Program is the largest of two hundred similar programs across the State. Adult Basic Education (ABE), General Education Development (GED) and English for Speakers of Other Languages (ESOL) programs are offered at more than ten different locations, including the Cambodian Mutual Assistance Association, Community Teamwork, Inc., the Middlesex County House of Correction in Billerica and various homeless shelters. The ethnic and racial populations taught include Southeast Asian, Brazilian, African and Hispanic immigrants.

At the regional and local levels, there are three regional vocational schools: the Greater Lowell Technical School, which serves residents from Lowell, Dracut, Dunstable and Tyngsborough, the Nashoba Valley Technical School, which serves residents of Chelmsford, Pepperell, and Westford and the Shawsheen Valley Technical School, which serves Billerica and Tewksbury residents. Each community has their own public school system and library designed to educate their residents. The City of Lowell has the second largest high school in the Commonwealth.

4. Brownfields

While there is no formal definition of the term "brownfields" in Massachusetts, such properties are frequently abandoned or for sale or lease; they typically have been used for commercial or industrial purposes; they may have been reported to MassDEP because contamination has been found; or they may not have been assessed due to fear of unknown contamination conditions.

The redevelopment of brownfield sites can provide the following benefits:

- Revitalization of blighted areas;
- Reduced demand to build on undeveloped land;
- Creation of new jobs;
- Reduced exposure to contamination and associated health risks; and
- Expansion of the local tax base.

Redevelopment of a brownfield site can be a significant undertaking for a municipality, but it can have an even more significant pay-off. Such projects often benefit from pre-planning on the part of the municipality, which may include a brownfield site inventory, a review of existing bylaws or ordinances, and some advance visioning for the area. It may require a public-private partnership to bring the project to fruition. It is important to include corporate properties in the brownfields inventory. Many corporate properties are in Economic Opportunity Areas (EOAs) designated within Economic Target Areas (ETAs). This would allow owners to receive benefits including Tax Increment Financing (TIFs), under the Economic Development Incentive Program (EDIP). Redevelopment of brownfield sites is becoming more attractive to corporations, by allowing them to manage their long-term environmental liabilities and realize financial gain from sale or lease of the reclaimed property.

In some instances, the municipality may consider taking tax title of a brownfield property in which the owner is severely delinquent in paying taxes. This may help to move the redevelopment forward and allow the municipality to advance and facilitate the necessary planning process. This can be a lengthy and sometimes difficult approach due to absentee owners, but legal counsel can advise when and if this is a reasonable option.

Marketing a brownfield site for redevelopment requires the municipality to have a clear understanding of the conditions and limitations of the site, a plan for how the site can best be used to benefit the community as well as a developer, and a clear representation of the site conditions and opportunities. A developer, whether private, public, or non-profit, will want to have minimal uncertainty about the site conditions, the community's goals, and the options available for redevelopment. They also want limited liability associated with the contamination at the site.

Engaging a landowner or developer in a brownfield redevelopment may require incentives on the part of the municipality, the state, and the federal government. These incentives may be in the form of tax credits, liability relief, financial assistance, and innovative zoning and planning techniques at the local level. State program incentives are available to buyers, and sometimes sellers, of contaminated property provided there is a commitment to cleanup and redevelopment. State incentives can help identify risk, limit liability, and fund the cleanup of brownfield sites, enabling their reuse for industry, housing, parks, and other purposes. Federal Brownfields funding programs are also available to both landowners and communities for assessment and cleanup.

In 1996, the City of Lowell was designated by EPA as a “Brownfields Showcase Community” and over time has received $3.2 million dollars in funding. Several of these awards have been used to remediate contamination discovered within the Jackson-Appleton-Middlesex (JAM) Plan area and within the Hamilton Canal District. In 2005, the City received $255,040 in clean-up funds to remediate a Middlesex Street site that was redeveloped into the Early Parking Facility

within the Hamilton Canal District. Two years later, the City received an additional $200,000 to assess and clean up two sites within the Hamilton Canal District. The City also received $400,000 per year in 2008 and 2009 to complete Phase I or Phase II site investigations on nearly thirty sites across the city.

More recently, the Architectural Heritage Foundation (AHF) received a $70,000 site assessment grant from MassDevelopment to utilize for the Hamilton Crossing Project. MassDevelopment also makes Brownfield Redevelopment Funds available to communities with Economic Target Areas (ETAs), such as Lowell, Billerica, Chelmsford and Dracut. In 2005, MassDevelopment awarded a $400,000 loan to Dracut developer for the redevelopment of a former wool mill complex into the mixed-use Beaver Brook Village in Dracut.

Silresim Superfund site at 86 Tanner Street in Lowell

In June 2009, the Silresim Superfund site (center property covered in grass) was chosen to receive up to $25 million in ARRA Funds to further environmental remediation efforts. The City of Lowell is in the process of developing a master plan for the site.

Image Source: Pictometry International 2008

In June 2009, the Silresim Superfund site located at 86 Tanner Street in Lowell was selected for up to $25 million in additional remediation funds through the American Recovery and Reinvestment Act (ARRA). Pictured above is an aerial image of 86 Tanner Street. Presently, EPA is conducting groundwater remediation and monitoring at the site, and the City is in the process of developing a Master Plan for the property.

The redevelopment of the former Silicon Transistor Corporation site at 25 Katrina Road in Chelmsford was advanced through the Chapter 43D designation of the site by the Interagency Permitting Board in December 2008. Additionally, the site has received up to $ 2 million in low cost loans under the Brownfields Priority Project Program from MassDevelopment, as well as an $85,000 EPA targeted brownfield assessment grant. Upon completion of the environmental assessment, the Town plans to issue a Request For Proposal (RFP) for the disposition and redevelopment of the site.

5. Economic Development Incentive Program

The Economic Development Incentive Program (EDIP) is a tax incentive program designed to stimulate business growth and foster job creation. Through this incentive program, a three-way partnership is formed between the State, a growing company and a municipality. Participating companies may receive a 5% investment tax credit (known as the Economic Opportunity Area Credit) and local tax incentives (either a Special Tax Assessment or Tax Increment Financing) in exchange for job creation and private investment commitments.

Communities in the Greater Lowell region have taken advantage of this program. The City of Lowell led the way and has supported an extensive number of private firms through this program. The Town of Billerica has also been quite aggressive in reaching out to private firms and encouraging them to locate in Billerica, particularly along Middlesex Turnpike, Concord Road and the Route 3 interchanges. The Town of Chelmsford initially participated in the program through an extension of the Lowell ETA and, within the last six months, has established its own ETA to cover the entire community in response to a recommendation in their Master Plan. The Town of Dracut has an established ETA and has supported some mill conversion projects at Beaver Brook and the Navy Yard as part of its program. The Town of Pepperell became part of the Devens-Ayer-Groton ETA and established an EOA at Lomar Park. The Town will be looking toward other opportunities associated with the former Pepperell Paper Mill site. Tewksbury teamed up with Andover to establish an ETA focused principally on the Lowell Junction project, but is already to move ahead on an EOA for Thermo Fischer Scientific. Tyngsborough is considering submitting an ETA application that would assist the developer in revitalizing the former Sycamore Networks site on Middlesex Road. The Town of Westford recently submitted an Exceptional Opportunity application to MOBD for the Red Hat expansion project.

6. Streamlined Permitting

Inefficient permitting and approval processes can discourage economic development. Developers who face a long, costly and uncertain permitting process are likely to seek a site elsewhere. Developing a streamlined permitting process does not require that a community lower its standards, or that it approve an unacceptable proposal. The Massachusetts Association of Regional Planning Agencies (MARPA) developed “A Best Practices Model for Streamlined Local Permitting” which communities can consult to better under the concept of streamlined permitting and how to apply the best practices to their communities. The best practices are divided into four categories: fostering better communication; standardizing forms and procedures; providing sufficient resources; and encouraging proactive planning.

NMCOG worked with a number of its communities to develop a streamlined permitting process. In Billerica, Pepperell, and Tewksbury, NMCOG provided an overall assessment of the

permitting process and provided recommendations consistent with the MARPA Best Practices Model on how to improve the permitting process. In addition, the Towns of Dracut and Tyngsborough requested our assistance in completing the assessment of their permitting process through the use of District Local Technical Assistance (DLTA) funds.

Under the Chapter 43D contract with the Town of Billerica, NMCOG developed a Permitting Guide, in conjunction with town staff, which is available on the Billerica town web site and at the various permitting offices. The benefits to the Town of Billerica by having such a document in place, as well as having predevelopment meetings with prospective developers, have been reflected in the private investment the town has attracted over the past five years.

7. Chapter 43D Priority Development Site Process

The Commonwealth has sought to encourage more efficient permitting through the Chapter 43D Priority Development Site process. In order to qualify for this program, municipalities must adopt certain permitting best practices and must commit to issuing local permitting decisions within 180 days. In the case of the Greater Lowell region, five communities have actively participated in this program – Billerica, Chelmsford, Lowell, Pepperell, and Tewksbury – while the Town of Tyngsborough has also expressed interest in the program.

The City of Lowell began the Chapter 43D Priority Development Site process with the Hamilton Canal site and then added 38 Prince Street. The Town of Billerica focused upon the expansion efforts of EMD Serono on Middlesex Turnpike and was quite successful in moving this project forward. The Town of Chelmsford selected the former Silicon Transistor Corporation plant on Katrina Road and has utilized its PDS status to secure several environmental grants to address the brownfield issues related to the property. The Town of Pepperell designated the former Pepperell Paper Mill site as a PDS and has been working closely with the property owner to attract prospective developers to the site. The Town of Tewksbury, in conjunction with Andover and Wilmington, designated property in the Lowell Junction area as a PDS. The Town continues to work with the other communities, property owners and other stakeholders to review the draft Formed-Based Code that was developed and to complete the marketing study in conjunction with EOHED.

8. Other State Initiatives for Economic Development

The Commonwealth of Massachusetts has a number of initiatives for economic development depending upon the specific needs of each municipality or region. Previously, this document summarized the activities related to the Economic Development Incentive Program (EDIP) and the Chapter 43D program, which have supported private development throughout the region. However, there are other programs outlined as part of this section. Although these initiatives do not reflect the exhaustive list of economic development programs available at the state, federal,

non-profit and private levels, this section provides a brief summary of some key economic development initiatives available at the state level:

- **Business Improvement Districts (BID)** – A business improvement district (BID) is a defined area where local businesses pay an additional tax or fee to fund improvements within that district. Originally established in Toronto, Canada in 1970, there are more than 1,200 BIDs across the United States today. Administered by the Department of Housing and Community Development (DHCD) in Massachusetts, BIDs may be established in local communities through a fee structure on property within the BID. The services provided through a BID are considered to be over and above what is normally provided by the municipality.

- **District Improvement Financing (DIF)** – District Improvement Financing (DIF) is authorized by M.G.L. c 40Q and provides an economic development tool for public/private partnerships to finance public works and infrastructure projects through the allocation of future incremental tax revenues in a specific district. A DIF plan from the local community is required and must be approved by the Economic Assistance Coordinating Council (EACC). DIF addresses the state's sustainable development principles by concentrating development and mixing uses, advancing equity, expanding housing opportunities, increasing job and business opportunities and planning regionally.

- **District Local Technical Assistance (DLTA) Program** – The District Local Technical Assistance (DLTA) program provides funds to the thirteen Regional Planning Agencies (RPAs) to assist their member communities in addressing the state's sustainable development principles, encouraging municipal partnerships and supporting local projects. Funded since 2007 and administered by DHCD and the Executive Office of Administration and Finance, DLTA funds in the Northern Middlesex region have been utilized to address permit streamlining, develop zoning recommendations resulting from corridor studies, draft bylaws and ordinances that address energy initiatives and biotechnology issues, and support new municipal partnerships. DLTA funding is critical to addressing the state's sustainable development principles and encouraging a greater number of municipal partnerships in the future.

- **Growth Districts Initiative (GDI)** – The Growth Districts Initiative (GDI) was created as a means for EOHED to partner with regional planning agencies and local communities to identify areas that show signs of significant new growth and that can be made "development ready" with respect to local and state permitting, site preparation (including brownfields remediation), infrastructure improvements and marketing. Locations targeted for EOHED assistance as "growth districts" must have the following fundamental characteristics: pre-planned zoning and streamlined permitting, market-

based planning, fairness to neighbors, focused and environmentally sensitive land use, transportation access and adequate utilities. These "growth districts" must also have one or more of the following characteristics: job opportunities, housing opportunities, community enhancement, land re-use, transit availability, "smart" energy, green building/low-impact development and good design. Currently, the Hamilton Crossings area in Lowell is the only approved Growth District in the region. The Town of Westford has applied with the Towns of Littleton and Boxborough for a shared Growth District, which would include three sections of Route 110 in Westford.

- **Infrastructure Investment Incentive Program (I-Cubed)** – I-Cubed is administered by the Executive Office of Administration and Finance to support large-scale ($10 million to $50 million) public infrastructure investments for certified economic development projects that will result in new jobs, increased property values and enhanced tax revenue at the state and municipal levels. Certified projects must be consistent with the state's sustainable development principles. More than $ 250 million has been authorized to support this economic development initiative.

- **Investment Tax Credit (ITC) –** The Investment Tax Credit (ITC) in Massachusetts provides for a three-percent credit for qualifying businesses against their state corporate excise tax. The credit is to be used for the purchase and lease of qualified tangible property used in the course of doing business. ITC includes a carry-forward provision and is considered a permanent incentive. Manufacturers, certain Research and Development Corporations and corporations engaged primarily in agriculture or commercial fishing are eligible to apply to the Massachusetts Office of Business Development (MOBD).

- **MassWorks Infrastructure –** The MassWorks Infrastructure program provides public infrastructure financing to support economic development in local communities. With the consolidation of six former programs – Public Works Economic Development (PWED) Grants, Community Development Action Grants (CDAG), Growth District Initiative (GDI) Grants, Massachusetts Opportunity Relocation and Expansion (MORE) Program, Small Town Rural Assistance Program (STRAP) and the Transit Oriented Development (TOD) Grant Program , EOHED has streamlined these grant programs to support job creation and economic development. The first round of funding for this program will be announced on October 28, 2011 and it is hoped that the NMCOG Region communities that submitted applications – Billerica, Chelmsford, and Lowell – will receive funding under this first round.

- **Tax Increment Financing (TIF)** - Tax Increment Financing (TIF) is similar to DIF in that it promotes redevelopment through public/private partnerships. TIF is authorized by

M.G.L. c 40 and allows municipalities to grant property tax exemptions to property owners under the EDIP program. TIF Agreements must be approved by the municipality's legislative and executive bodies, as well as the Economic Assistance Coordinating Council (EACC) at the state level. A TIF Zone must be in an area approved by the EACC as an Economic Opportunity Area (EOA) or found to be an area "presenting exceptional opportunities for economic development" by the Director of Development. TIFs may also be approved for housing in urban centers. TIF addresses the state's sustainable development principles by concentrating development and mixing uses, advancing equity, expanding housing opportunities, increasing job and business opportunities and planning regionally.

F. Identification of Priority Economic Development Areas

NMCOG staff worked with the planners and community development personnel at the municipal level to develop the list of Priority Economic Development Areas for the Northern Middlesex Region which are depicted on Map 10 on page 167. Input was also solicited through the public outreach process which included two public visioning sessions. While we have worked with each of our communities on many of these projects, we wanted to ensure that as many priority economic development areas as possible were identified. As the economy improves, we believe that there will be additional sites of interest to the private sector and we may need to amend the list of sites in the future.

These Priority Economic Development Areas include the approved Economic Opportunity Areas (EOAs) under the Economic Development Incentive Program (EDIP) already approved by the Economic Assistance Coordinating Council (EACC), and the Priority Development Sites (PDS) established under the Chapter 43D program by the Interagency Permitting Board (IPB). In addition, the planners and community development personnel identified additional future Priority Economic Development Areas. The specific areas by community are as follows:

- **Billerica**
  - **EOAs and Certified projects**
    - Non-residentially zoned tracts of land in the Billerica Avenue Corridor; includes EOA Site at 495 Billerica Avenue
    - Non-residentially zoned tracts of land in the Concord Road Corridor; includes EOA Sites at 157 and 129 Concord Road and 2 Federal Street
    - 29 Dunham Road
    - Non-residentially zoned tracts of land in the Middlesex Turnpike corridor
    - Rangeway, Sterling and Esquire Road area
    - Treble Cove Road west of Route 3

- **Priority Development Site under Chapter 43D**
  - 45 Middlesex Turnpike – EMD Serono

- **Additional Priority Economic Development Areas**
  - Billerica Mall
  - Route 3A Corridor from Floyd/Pollard Streets to Treble Cove Road
  - Route 3 at Route 129 interchange
  - Talbot & Faulkner Mills in North Billerica

- **Chelmsford**
  - **EOAs and Certified projects**
    - Billerica Road Corridor (Route 129) from Billerica town line to Turnpike Road, which includes 20 Alpha Road, 30 Apollo Way, 1 Executive Drive, and 6 Omni Way.

  - **Priority Development Site under Chapter 43D**
    - 25 Katrina Road

  - **Additional Priority Economic Development Areas**
    - 16-20 Boston Road
    - 123 Brick Kiln Road
    - 3 Chelmsford Street
    - 122 Chelmsford Street
    - 299 Chelmsford Street
    - Littleton Road Corridor (includes 361 and 215 Littleton Road)
    - 152 Stedman Street
    - UMass Lowell West Campus, Princeton St.
    - Vinal Square

- **Dracut**
  - **EOAs and Certified projects**
    - Beaver Brook Mill
    - Navy Yard Mill 96-100 Pleasant Street

  - **Additional Priority Economic Development Areas**
    - 970 Broadway
    - Brox Industries land frontage
    - Industrially zoned areas on Routes 110 & 113

- Route 38 from New Hampshire to Chuck Drive
- Town Center at Bridge and Arlington

- **Dunstable**
  - **Priority Economic Development Area**
    - Pleasant Street from Groton Street to Cross Street (MUD District)

- **Lowell**
  - **EOAs and Certified projects**
    - Bridge Street Gateway, 18-36 First Street
    - 900 Chelmsford Street (Cross Point, formerly Wang Towers)
    - 121 Hale Street
    - 70 Industrial Avenue East
    - 663 Lawrence Street
    - Lowell south CDB
    - 59 Lowes Way (Connector Park)
    - Meadow Croft/Bolt Street
    - 92-98 Middle Street
    - 585 Middlesex Street (Western Canal)
    - 81 Old Ferry Road
    - 1001 Pawtucket Boulevard (Cobham)
    - 2 Prince Avenue
    - 120 Stedman Street (Stedman Street Industrial Corridor)
    - 229 Stedman Street
    - Thorndike/Plain/Powell/Smith/Shaw/Chelmsford (Thorndike-Plain)
    - 1 Tremont Place (Tremont Mills)
    - 150 Western Avenue

  - **Priority Development Sites under Chapter 43D**
    - Hamilton Canal
    - 38 Prince Street

  - **Growth District**
    - Hamilton Crossing

  - **Additional Priority Economic Development Areas**
    - Acre Urban Renewal Plan (Pawtucket Canal)
    - Jackson Street
    - Lawrence Mills

- Meadowcroft Street
- Land between the Merrimack River and Middlesex Street and east and west of Wood Street
- Phoenix Avenue
- Tanner Street
- Technology Drive

- **Pepperell**
  - **EOA and Certified Project**
    - Lomar Industrial Park

  - **Priority Development Site under Chapter 43D**
    - 128 Main Street (former Pepperell Paper Mill)

  - **Additional Priority Economic Development Areas**
    - Chappell Street
    - Hollis Street from Main to Groton
    - Intersection of Hollis/River/Main Street
    - Nashua Road from Hollis to Merrimac
    - Main Street corridor from Railroad Square to River Street
    - Route 119 from the Groton Town Line to River Street

- **Tewksbury**
  - **Priority Development Site under Chapter 43D**
    - Lowell Junction area (43D)

  - **Additional Priority Economic Development Areas**
    - East Street
    - Five (5) overlay districts on Route 38, including the Town Center, Village Residential, South Village, Village Mixed-use and Community Village zoning areas.
    - Route 133 (as delineated on the map prepared for the Town targeted economic development project)
    - Woburn Street corridor

- **Tyngsborough**
  - **Priority Economic Development Areas**
    - Middlesex Road corridor
    - Town Center area

- 50 Westford Road (former Sycamore Networks parcel)

- **Westford**
  - **Priority Economic Development Areas**
    - Cornerstone Square
    - Route 110 from Tadmuck Road to Littleton town line, as is consistent with the 495 development compact
    - Tech Park East &West on Littleton Road (Route 110)

G. Issues and Opportunities

Economic growth is critical to the region's well being and it must be encouraged. There are a number of state, regional and local planning, permitting, infrastructure development, and marketing initiatives that are focused on promoting economic development and fostering job growth. While the Commonwealth of Massachusetts has led the way in recovering from the national recession, these additional economic development initiatives will enable the Northern Middlesex region to reduce its unemployment rates even further.

Municipalities will need assistance developing zoning and land use tools to redevelop existing vacant or underutilized commercial and industrial properties. NMCOG has found that many of our communities are looking more at redevelopment opportunities than new development. The focus upon corridor studies to examine the tie-in between land use, transportation and economic development has potential benefits for our communities to re-zone properties to match the current needs in the private sector.

Providing prompt and predictable permitting regulations at both the local and state levels is key to fostering economic development in a fashion that makes the region competitive with other areas of the country. The adoption of the Permitting Guide by the Town of Billerica and its placement on the town web site has sent a message to the private sector that the town is open for private investment throughout the community, not just at its Priority Development Site.

There is recognition that the continued success of academic institutions is in the best interest of both the private and public sector. Economic development partnerships between UMass Lowell and Middlesex Community College have demonstrated the benefits of leveraging the unique capabilities that each has to offer in the areas of workforce development and job creation. UMass Lowell is a leader in the engineering and emerging technologies, nanotechnology, biotechnology, and information technology sectors. The University continues to implement its strategic plan which includes the construction of a new emerging technology research facility. There are proven benefits to building strong research and development capacity within a public university in an urban location. Public/private research and development ventures serve to align education with industry needs and economic development goals, thereby supporting the

Placeholder for Map 10

innovation economy. Product development from public/private R&D provides the seeds for start-up companies, including future manufacturing opportunities. In the Northern Middlesex region, there is a strong network of motivated partners, such as the UMass Lowell, Middlesex Community College, business organizations, private companies, and municipal leaders, who can work together to cultivate future opportunities related to research and development in the innovation economy and downstream production, service and support jobs.

The region's creative economy will play an important role in growing the economy over the next decade. The Creative Economy project initiated by MVEDC illustrated that there was sufficient economic activity throughout the Merrimack Valley to focus on the contributions of this sector to the overall economy. The investment in residential units for artists on Middle Street and at Hamilton Canal in Lowell reflects the special economic contributions offered by this segment of the workforce.

Additional resources are needed to address environmental contamination issues and NMCOG will be applying for Brownfield Assessment funds once again to assist our suburban communities and to work cooperatively with the City of Lowell to address problems on city-owned properties. Our focus in this year's Annual Comprehensive Economic Development Strategy (CEDS) Update will include a Public Forum on Brownfields, as well as working with the City of Lowell on implementing their EPA grant for Tanner Street.

Another major opportunity will be in the area of "green jobs" to replace the lost manufacturing jobs in the region. NMCOG will focus on the energy renewal area as part of the Annual CEDS Update, as well as through a joint application with the Montachusett Regional Planning Commission to the Economic Development Administration (EDA). If NMCOG and MRPC are awarded funding, we will initiate an examination of the Siting of Renewable Energy Facilities, which will address wind energy conversion systems, geothermal energy, photovoltaics, hydropower, biomass, and LEED certification. As part of this Siting Plan, we will be examining the zoning, permitting and regulations and public incentives for private energy firms that wish to invest in the region. Through the development of this Siting Plan, NMCOG will be able to make specific recommendations to our member communities on what they need to change to make their communities more welcoming to private energy firms.

In essence, the major issues and opportunities related to economic development revolve around the need to attract private investment and to create high-paying, high-skilled jobs. Through our continued work with our member communities and the federal, state, regional, non-profit and private economic development stakeholders we normally work with, there is great potential for increased private investment, jobs and revenues for our communities. NMCOG will be applying for Economic Development District (EDD) designation, which will enable it to access additional funds from EDA, and for the Sustainable Communities Grant from HUD that will enable us to further develop our capacity to address the state's sustainable development guidelines.

VII. HOUSING ELEMENT

The Housing Element of the Regional Strategic Plan is largely driven by the Master Plans and Housing Production Plans developed by the local communities and the housing components within the *Greater Lowell Comprehensive Economic Development Strategy (CEDS) for 2009-2013*. Due to the different dates by which these documents have been completed, there is a different level of data for each community, and, therefore, for the region as a whole. The availability of 2010 U.S. Census data this summer offers an opportunity to update our regional housing data through the development of a Regional Housing Plan beginning in January 2012 financed through the District Local Technical Assistance (DLTA) V program. For the purposes of this Housing Element, we utilized the data that was available at the time that the RSP was developed. This Housing Element will be updated once the Regional Housing Plan is completed.

A. Overview of Housing Trends and Challenges

The cost and availability of housing in the Greater Lowell region remains a major barrier to economic growth in the region. Although housing prices have declined recently, homes are still too costly for many families and households who wish to live in the region. Without the availability of affordable housing for its workforce, private firms have difficulty expanding their businesses or locating in the region. The housing sector has been the most impacted sector within the region's economy. The number of housing units built and sold has been reduced and the cost of housing has begun to show the impacts of this slowdown. While the number of housing units built for low- and moderate-income families under Chapter 40B have increased in the region, the sale of market-rate housing units have slowed due to the poor state of the overall economy and declining and aging populations. These collective issues make the state of housing in the region the most challenging area for the expansion of the regional economy.

B. Homeownership Data

In analyzing the region's home ownership patterns, it is important to review housing values, the amount of monthly mortgage payments and the percentage of household income spent on housing. The following sections compare this important information for the NMCOG region between 2000 and 2008.

1. Home Values

Table 31 on the next page compares median home values across the region between 2000 and 2008. This table reveals that home values among owner-occupied units substantially increased between 2000 and 2008. Both the Town of Dracut and the City of Lowell saw values increase by at least 100% during this time period. The remaining seven communities experienced rates of increase ranging from 63.8% in Westford to 88.9% in Tewksbury. Across the NMCOG region, home values among owner-occupied units increased by 85.3%. Although this rate is lower than

the state-wide increase of 96% during the same time period, median home values themselves are higher than the state figures in seven of the nine communities, pointing to the region's relatively strong housing market. However, median home values for owner-occupied units in the Northern Middlesex Region and the state will decline in 2009 as a result of the housing problems affecting the nation.

Table 31: Median Home Values for Owner-Occupied Units in 2000 and 2008

Community	2000	2008	Percentage Change 2000-2008
Billerica	$201,400	$374,800	86.1
Chelmsford	$205,500	$371,000	80.5
Dracut	$158,400	$317,600	100.5
Dunstable	$271,500	$508,655*	87.4
Lowell	$130,500	$266,600	104.3
Pepperell	$189,300	$354,748*	87.4
Tewksbury	$197,600	$373,200	88.9
Tyngsborough	$204,900	$383,983*	87.4
Westford	$276,200	$452,300	63.8
NMCOG Region	**$201,400**	**$373,200**	**85.3**
Massachusetts	$185,700	$363,900	96

Sources: 2000 US Census; 2006-2008 American Community Survey.

*Note: Estimates were developed for Dunstable, Pepperell, and Tyngsborough by applying the average rate of increase for the other six communities to the median home value in 2000.

2. Owner Costs

Table 32 on the next page provides selected monthly housing costs for homeowners living in the Northern Middlesex region in 2000 and 2007. In 2000, 7,733 owner-occupied households (12.2%) paid less than $500 per month on housing-related expenses, while 24.7% of households spent between $500 and $999 per month. However, more than half (52.2%) of the owner-occupied households in the region spent between $1,000 and $1,999 per month. The remaining 10.9% of homeowners spent $2,000 or more per month on their housing costs, which represented a significant amount for these homeowners.

Table 32: Selected Monthly Owners Costs for Owner-Occupied Units: 2000 and 2007

Cost Range	2000		2007*	
	Number	Percent	Number	Percent
Less than $ 300	1,762	2.8	340	.52
$ 300 – 499	5,971	9.4	4,223	6.5
$ 500 – 699	6,257	9.8	6,553	10.1
$ 700 – 999	9,479	14.9	7,436	11.4
$ 1,000 – 1,499	20,268	31.8	10,205	15.7
$ 1,500 – 1,999	12,996	20.4	12,815	19.7
$ 2,000 or more	6,908	10.9	23,450	36.1

Source: US Census 2000; 2005-2007 American Community Survey
**Note: 2007 Counts do not include households in Dunstable, Pepperell, or Tyngsborough*

In general, the rule-of-thumb in the housing industry is that homeowners should not spend more than 30% of their household income on housing costs. Table 33 below reflects the Owner Costs as a Percentage of Household Income in the NMCOG region for 2000 and 2008.

Table 33: Owner Costs as a Percentage of Household Income: 2000 and 2008

Owner Costs as a Percent of Household Income	2000		2008*	
	Number	Percent	Number	Percent
Less than 10%	8,260	14.3	7,187	10.8
10% - 19.99%	20,991	36.3	16,864	25.4
20% - 29.99%	15,744	27.2	18,380	27.7
30% – 49.99%	8,550	14.8	14,749	22.2
50% or more	4,021	7	8,739	13.2
Not Computed	248	.43	375	.6
Total	57,814	100	66,294	100

Source: US Census 2000; 2006-2008 American Community Survey

**Note: 2008 Counts do not include households in Dunstable, Pepperell, or Tyngsborough*

In 2000 more than three-quarters (77.8%) of homeowners had "affordable" housing relative to their incomes, meaning that their total housing and housing-related costs did not exceed 30% of

their household income. Another 14.8% of homeowner households were "moderately" burdened, spending between 30% and 50% of their incomes on housing-related costs. However, 7% of households were "severely" burdened, spending more than half of their incomes on housing.

Eight years later, the percentage of homeowner households whose housing was affordable respective to their incomes had decreased to 63.9%. As a result, the percentage of "moderately" and "severely" burdened households increased to 22.2% and 13.8% respectively.

C. Rental Housing Data

The rental housing market plays a major role in providing affordable housing opportunities for residents at all income levels. As outlined below in Table 34, the median gross rent in the Northern Middlesex region increased by $322 per month, or 44.4%, between 2000 and 2008. The percentage change within individual communities ranged from $111, or 11.9%, in Tewksbury, to $359, or 49.5%, in Dracut.

Table 34: Median Gross Rent: 2000 and 2008

Gross Rent	2000	2008*	Percent Change 1999-2008
Billerica	$897	$1,197	33.4
Chelmsford	$777	$1,154	45.8
Dracut	$725	$1,084	49.5
Dunstable	$908	$1,265*	39.3
Lowell	$627	$917	46.3
Pepperell	$697	$971*	39.3
Tewksbury	$936	$1,047	11.9
Tyngsborough	$701	$976 *	39.3
Westford	$690	$995	44.2
NMCOG Region	**$725**	**$1,047**	**44.4**
Massachusetts	$684	$987	44.3

Source: US Census 2000 and 2005-2007 American Community Survey

**Note: 2008 estimates were developed for Dunstable, Pepperell, and Tyngsborough by applying the average rate of increase for the other six communities to their median gross rent in 1999.*

Table 35 below examines the Gross Rent as a Percentage of Household Income in the Northern Middlesex region for 2000 and 2008. Similar to the affordability of housing for homeowners, the majority (60.8%) of renting households spent less than 30% of their incomes on housing-related costs in 2000. However, housing burdens were greater among renters than homeowners: 17.9% of rental households were "moderately" burdened, while 16.4% were "severely" burdened.

Table 35: Gross Rent as a Percentage of Household Income in the NMCOG Region: 2000 and 2008

Gross Rent as a Percent of Household Income	2000		2008	
	Number	Percent	Number	Percent
Less than 10%	1,920	6.2	729	3
10% - 19.99%	8,906	28.8	5,278	21.4
20% - 29.99%	7,914	25.6	6,413	26
30% – 49.99%	5,546	17.9	5,393	21.9
50% or more	5,084	16.4	5,796	23.5
Not Computed	1,546	5	1,023	4.2
Total	30,916	100	24,632	100

Source: US Census 2000; 2006-2008 America Community Survey
**2008 Counts do not include households in Dunstable, Pepperell, Tyngsborough, or Westford*

In 2008 slightly more than half (50.4%) of rental households lived in housing that was affordable relative to their incomes. "Moderately" burdened renters accounted for 21% of all rental households, and "severely" burdened renters increased to 23.5%. These figures give us a sense of the housing burden among renters across the region. However, these estimates understate the total household costs since the Census Bureau does not collect data about additional housing-related costs for renters, such as utilities and rental insurance.

D. Affordable Housing in the Northern Middlesex Region

The Northern Middlesex region has shown some progress in addressing the affordable housing goals established by former Governor Michael Dukakis through Executive Order 418. As of December 2010, the Greater Lowell region had 9,584 subsidized housing units, or 9.4% of the year-round housing units documented in the 2000 U.S. Census. Approximately 54.4% of these subsidized units were located in the City of Lowell. Between June 2009 and December 2010, the subsidized housing inventory for the region grew by 183 units, or 1.9%. Lowell's subsidized housing inventory, however, dropped from a 55.7% share of the region to approximately 54.4% during this time, which reflected the increase in the subsidized units being developed in the suburban communities. Outlined in Table 36 below are the subsidized housing unit comparisons

for each community in the Northern Middlesex region. The locations of these units are shown on Map 11 on page 175.

Table 36: Subsidized Housing Units in the NMCOG Region: December 2010

Community	Year Round Housing Units 2000 Census	Subsidized Housing Units	
		June 2009	Percent of Total
Billerica	13,055	1,186	9.1%
Chelmsford	12,981	966	7.4%
Dracut	10,597	590	5.6%
Dunstable	933	0	0.0%
Lowell	39,381	5,212	13.2%
Pepperell	3,905	122	3.1%
Tewksbury	10,125	967	9.6%
Tyngsborough	3,784	194	5.1%
Westford	6,877	347	5.0%
Northern Middlesex Region	**101,638**	**9,584**	**9.4%**

Source: Department of Housing and Community Development, December 22, 2010.

E. Trends in the Regional Housing Market

The Massachusetts housing market changed significantly between 2004 and 2008. Sales in single-family homes in Massachusetts declined by 29.8% between 2004 and 2007, and dropped even more, according to the Warren Report, when the "credit crisis" hit in July 2007. This contributed to a total sales decline statewide of more than 20% in the first part of 2008 and a decline in sales in the Merrimack Valley of 19.1% during the same period of time. Over the course of the year, the total number of sales across the state declined by 5,216, or 11.5%. Condominium sales were also severely impacted. The Warren Group reported that in February 2009, there were 866 condo sales across the state, marking a 30% drop from the 1,236 condos that were sold in February 2008.

Median prices of single-family homes had been declining for thirty-five (35) months in Massachusetts, while the Merrimack Valley lost 10% in median prices during the first four months of 2008. The Warren Group reported that the median selling price for a single family home in Massachusetts dropped 18.3% from February 2008 to February 2009. Furthermore,

Placeholder for Map 11

February 2009 marked the sixth consecutive month that the median sales price was below $300,000 and that prices had declined by double digit percentages. These numbers surpass estimates calculated by Professor Ross Gittell of the University of New Hampshire, who projected a 14% decline in housing prices for Massachusetts between 2005 and mid-May 2008, which represented the largest decline in New England. Professor Gittell predicted that housing prices wouldn't return to their peak until 2010. Another study conducted by Professor Adam Clayton-Matthews of the University of Massachusetts argued that these price declines were good for the Massachusetts economy. Professor Matthews predicted that Massachusetts would not recover its lost jobs from the early 2000's until 2011. Given the sharp declines in home sales and values and sharp rise in unemployment that have occurred in recent months, these projections may ultimately prove to have been too optimistic.

1. Number of Sales

Table 37 below shows the number of single family home and condominium sales by community between July 2008 and June 2009. This data reveals that over the course of the year, 900 single family homes and 464 condos were sold in the Northern Middlesex region. Sales in Lowell accounted for the greatest percentage of both single-family (26.2%) and condo (35.3%) sales during this time. Billerica had the second-highest percentage of single-family home sales (18.9%), while Chelmsford and Westford tied for the second-highest percentage of condos sold, with 61 units sold in each community during the course of the year.

Table 37: Single-Family and Condominium Sales: July 1, 2008 – June 30, 2009

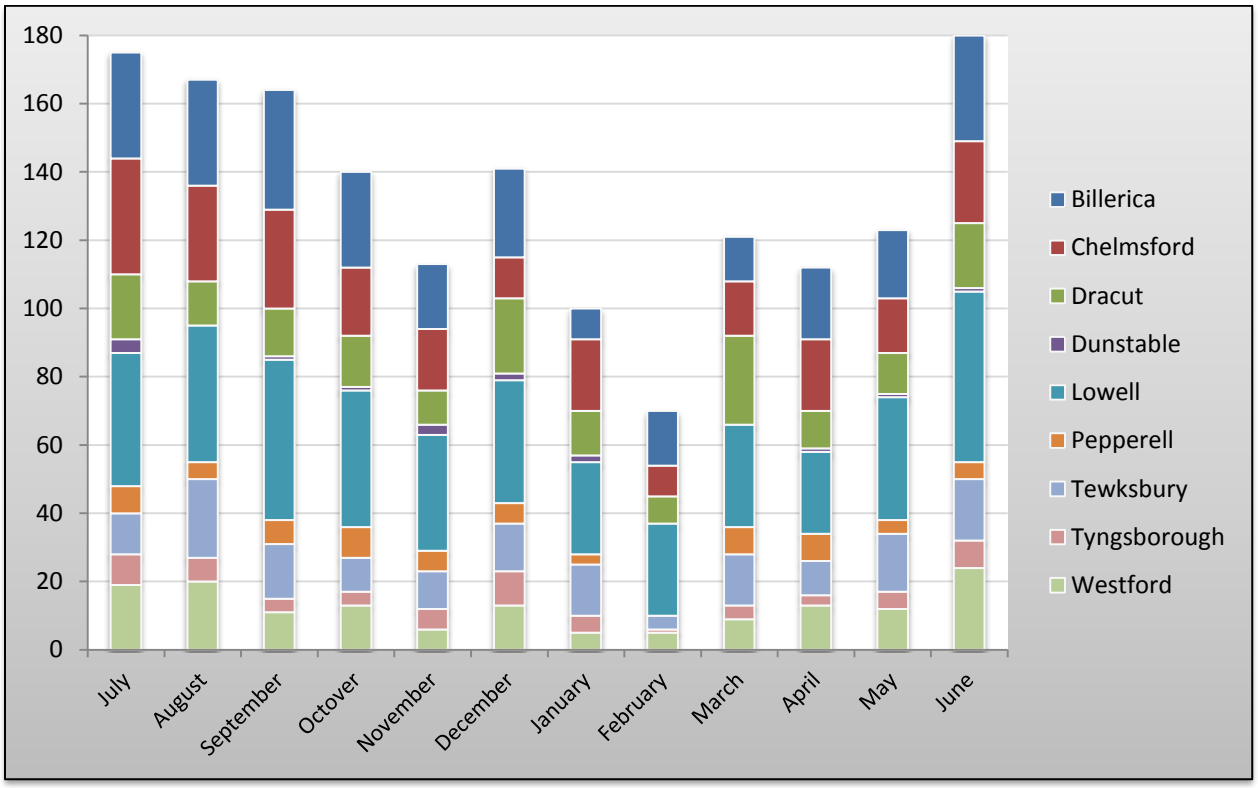
Community	Single Family		Condos	
	Number	Percent of Region	Number	Percent of Region
Billerica	170	18.9	39	8.4
Chelmsford	141	15.7	61	13.1
Dracut	93	10.3	52	11.2
Dunstable	11	1.2	0	0
Lowell	236	26.2	164	35.3
Pepperell	41	4.6	8	1.7
Tewksbury	86	9.6	56	12.1
Tyngsborough	40	4.4	23	5
Westford	82	9.1	61	13.1
Northern Middlesex Region	**900**	**100**	**464**	**100**

Source: The Warren Group

Figure 2 below breaks down total single-family home sales by month and community. This figure reveals that total sales decreased monthly from 175 sales in July 2008 to 113 sales in November 2008. Between November 2008 and December 2008, however, total sales increased by nearly a quarter (24.8%) to 141 single-family home sales.

Between December 2008 and January 2009, single-family home sales across the region dropped by 29.1% and then decreased an additional 30% between January 2009 and February 2009. In March 2009, single-family home sales increased by 72.9% from the previous month. Although the total number of sales across the region decreased slightly in April 2009, single-family home sales increased over May and June so that there were 180 single-family home sales in the region in June 2009, the highest number of monthly sales in the past year.

Figure 2: Single-Family Home Sales: July 1, 2008 through June 30, 2009

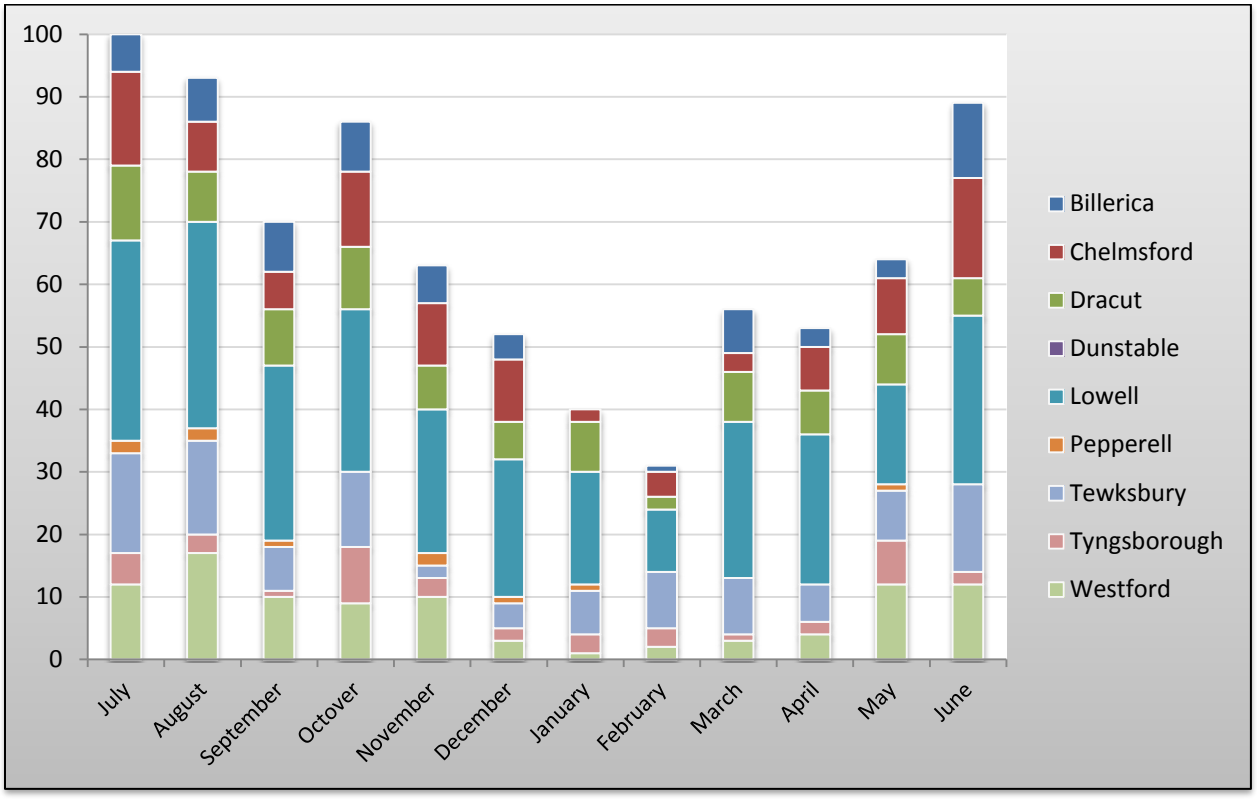


Source: The Warren Group

Condominium sales were more severely impacted across the Northern Middlesex region, as reflected in Figure 3 on the following page. According to the Warren Group, there were 464 condo sales between July 1, 2008 and June 30, 2009. Approximately 21.6% of those sales occurred in July 2008 when 100 units were sold. Over the next two months, sales declined rapidly. In September 2008, only 70 units were sold, which represented a decrease of 30% from the July 2008 sales. Although condominium sales recovered somewhat in October 2008, beginning in November 2008 the number of sales declined steadily until it reached a low of only 31 condo sales across the region in February 2009.

Since February 2009, however, condo sales began to rebound with a nearly twofold increase in sales by March 2009. Although the sales of condos decreased between March 2009 and April 2009, similar to single-family home sales, sales of condominium units increased by 20.8% between April 2009 and May 2009 and an additional 39.1% between May 2009 and June 2009 to the third highest monthly sales figure during this eighteen month period.

Figure 3: Condo Sales by Month and Community: July 1, 2008 through June 30, 2009



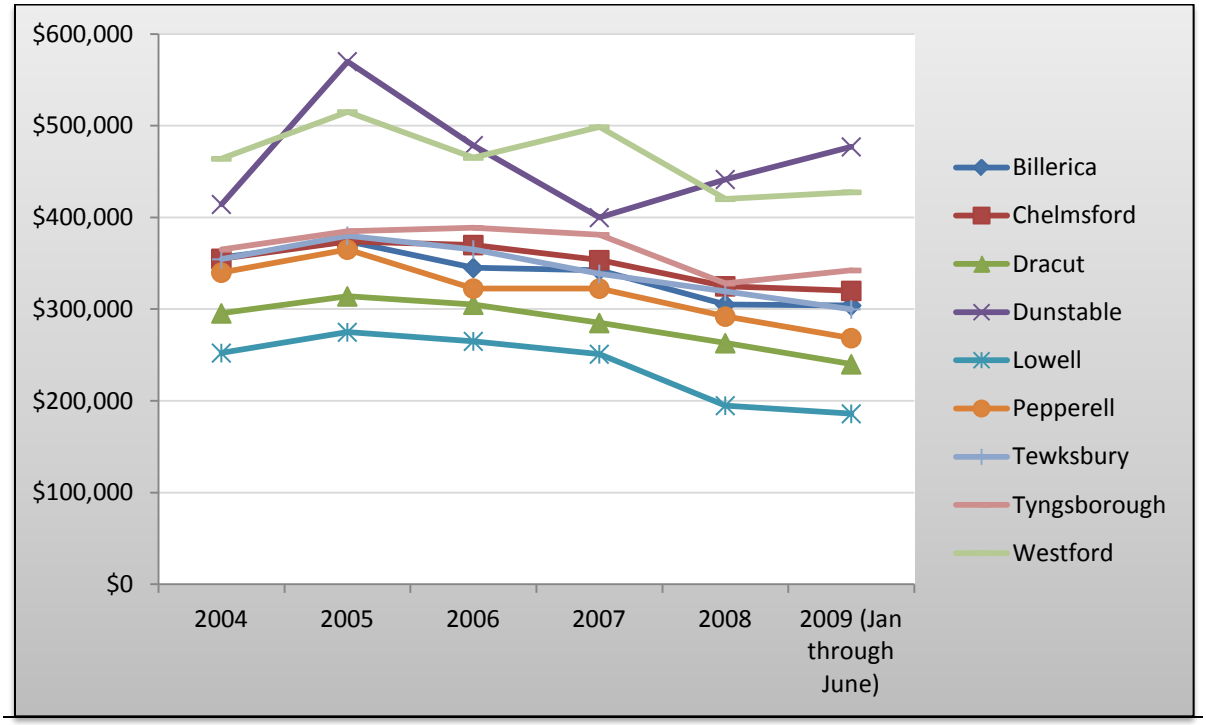
Source: The Warren Group

2. Median Selling Prices

Another important indicator of the health of a housing market is the median selling price for homes. Figure 4 on the next page illustrates the median selling price for single-family homes in the Northern Middlesex region between January 2004 and June 2009. According to this data, median sales prices for single-family homes for every community in the region peaked in 2005, the same year that housing sales peaked. This data reflected a robust real estate market in the Northern Middlesex region during the middle of the decade, where people wanted to move here and were willing to pay more to do so. The Town of Dunstable saw the most significant increase in median selling price between 2004 and 2005, up $155,700, or 37.6%. Other communities experienced more modest gains during this period, ranging from a 4.9% increase in Billerica to an 11% increase in Westford between 2004 and 2005.

With the exception of Dunstable, which experienced a 10.4% increase in median selling prices between 2007 and 2008, every community in the Northern Middlesex region has seen the median selling price for single family homes in their community consistently decline between 2005 and 2008. Data for the first half of 2009 has revealed mixed trends among the nine communities in the region. Chelmsford, Dunstable, and Tyngsborough have seen increases in the median selling price for single-family homes during this time period, while Billerica, Dracut, Lowell, Pepperell, and Tewksbury have seen their prices drop further. The median selling price for a single-family home in Westford was $ 420,000 in both 2008 and the first six months of 2009.

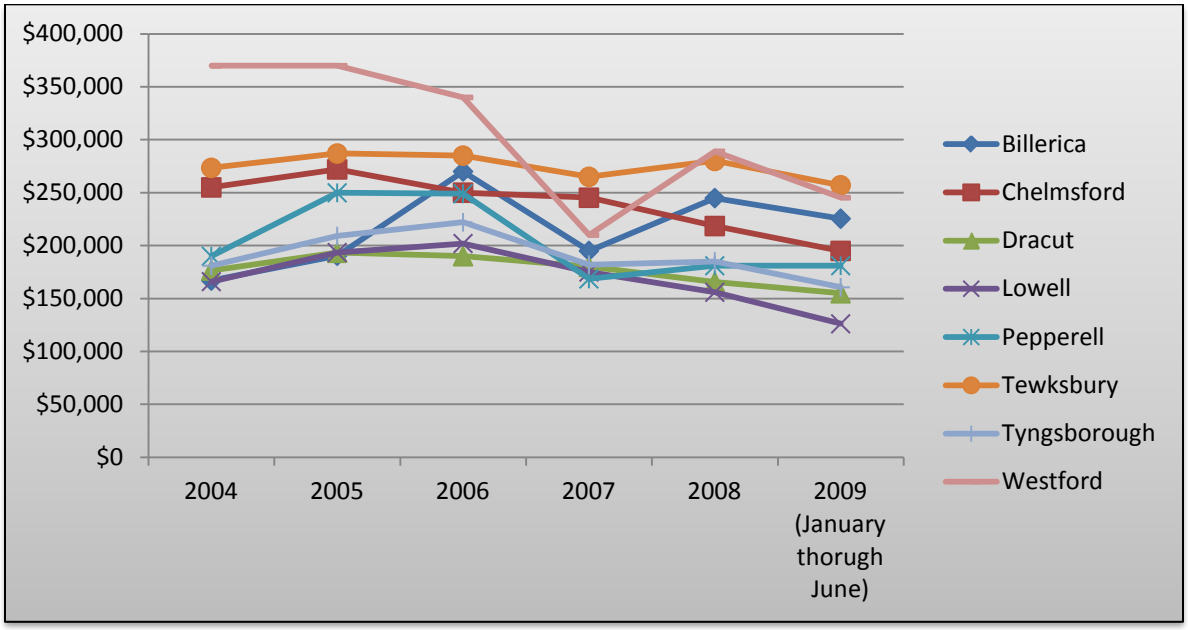
Figure 4: Median Selling Price for Single-Family Homes: January 2004-June 2009



Source: The Warren Group

Figure 5 on the next page shows median selling price for condominiums across the region between 2004 and the first half of 2009. These trends are different from the median selling prices for single-family homes and show wide variations, such as in the case of Westford and Billerica.

Figure 5: Median Selling Price for Condominiums: January 2004-June 2009



Source: The Warren Group

The median selling price for condominiums increased in every community between 2000 and 2004. In 2005 Chelmsford, Dracut, and Tewksbury experienced their highest median selling price for condominiums, while Westford matched their 2004 median selling price. In 2006 Billerica, Lowell and Tyngsborough had their highest median selling price for condominiums, while Pepperell matched their highest median selling price set in 2005. Between 2006 and 2007, the median selling price for condos declined sharply in all nine communities from 2% in Chelmsford to 38.2% in Westford. The median selling price for condominiums increased between 2007 and 2008 in every community, except for Chelmsford and Dracut. Over the next year, prices climbed again in every community except for Chelmsford, Dracut and Lowell. Through the first six months of 2009, the median selling prices declined, which is reflective of the overall decline in sales and increased number of foreclosures. As of the first six months of 2009, the median selling price for condominiums had not yet returned to the 2004 levels in any community in the region.

F. Foreclosures in the Region

Beginning in early 2007, a combination of market and regulatory forces activated a nationwide "foreclosure crisis" not witnessed in the United States since the Great Depression of the 1930s. Although the factors contributing to this crisis are complex and multifaceted, economists and policy analysts generally point to several root causes. In its March 2009 *Interim Report to Congress on the Root Causes of the Foreclosure Crisis*, the U.S. Department of Housing and Urban Development summarized these factors as follows:

- "In pursuit of higher profits, lenders and investors poured resources into ever riskier loans, particularly after 2003. These "risk-based pricing" investments, which include subprime and Alt-A mortgages, were enabled by a series of legislative changes, including removed interest rate ceilings, which allowed lenders to offer loans with variable interest rates, balloon terms, and negative amortization;

- The emergence of an international asset-backed securities market shifted the primary source of mortgage finance from federally-regulated institutions to mortgage banking institutions that acquired funds through broader capital markets. These lenders are subject to far less regulatory oversight than institutions such as Fannie Mae and Freddie Mac;

- A lack of federal oversight of the lending rating agencies led to "excessive optimism" with respect to the risk inherent to the subprime mortgage market, resulting in an explosion of the financially risky loans described above;

- A substantial increase in home values across the United States through 2006 created a false sense of financial security within the housing market and encouraged lenders to approve ever increasing numbers of loans, including refinances. These efforts to keep loan origination volumes high despite increasing "unaffordability" led to loosened underwriting standards;

- Following the onset of the more general economic recession, housing prices slowed down, stagnated, and in many cases, declined. This led to many homeowners falling "under water"—a term used to describe a phenomenon where the borrower owes more money on the mortgage than the home is worth; and,

- Since 2008, other "trigger" impacts of the economic recession, such as job losses and rising health care costs, have exacerbated the foreclosure crisis and forced borrowers to default on the home mortgages that they could previously afford."

The Greater Lowell region has experienced the foreclosure crisis first hand, with the number of petitions filed increasing substantially since the housing crisis began in 2007. Table 38 on the next page shows the total number of foreclosure petitions filed across the region between January 2007 and June 2009, as well as year-to-date petitions filed for the first half (January- June) in 2007, 2008, and 2009.

In 2007 there were 319 foreclosure notices filed in the NMCOG region. At that time, the majority of notices occurred in the City of Lowell (38.9%), followed by Billerica, (15.4%),

Tewksbury (13.5%), Dracut (12.5%), Chelmsford (9.1%), Pepperell (3.8%), Westford (3.4%), Tyngsborough (3.1%), and Dunstable (.3%).

One year later, the total number of foreclosure notices across the region had increased by roughly a third (33.2%) to 425 notices. Notices filed in the City of Lowell still made up the majority of those filed in the region. However, notices in seven of the eight suburban communities had increased significantly during this twelve month period. The rates of change during this time period, by community, were: Billerica (24.5%), Chelmsford (17.2%), Dracut (25%), Dunstable (500%), Lowell (51.6%), Pepperell (25%), Tewksbury (-2.3%), Tyngsborough (40%), and Westford (36.4%).

Table 38: Foreclosure Records in the NMCOG Region: Jan. 1, 2007 through June 30, 2009

Community	2007		2008		2009	% Change Jan.-June 2007-2009
	Total Number	January-June	Total Number	January-June	January-June	
Billerica	49	23	61	41	48	108.7
Chelmsford	29	17	34	11	29	70.6
Dracut	40	17	50	31	47	176.5
Dunstable	1	0	6	3	1	100.0
Lowell	124	49	188	94	150	206.1
Pepperell	12	5	15	9	11	120.0
Tewksbury	43	12	42	23	31	158.3
Tyngsborough	10	4	14	9	18	350.0
Westford	11	6	15	12	10	66.7
NMCOG Total	**319**	**133**	**425**	**233**	**345**	**159.4**

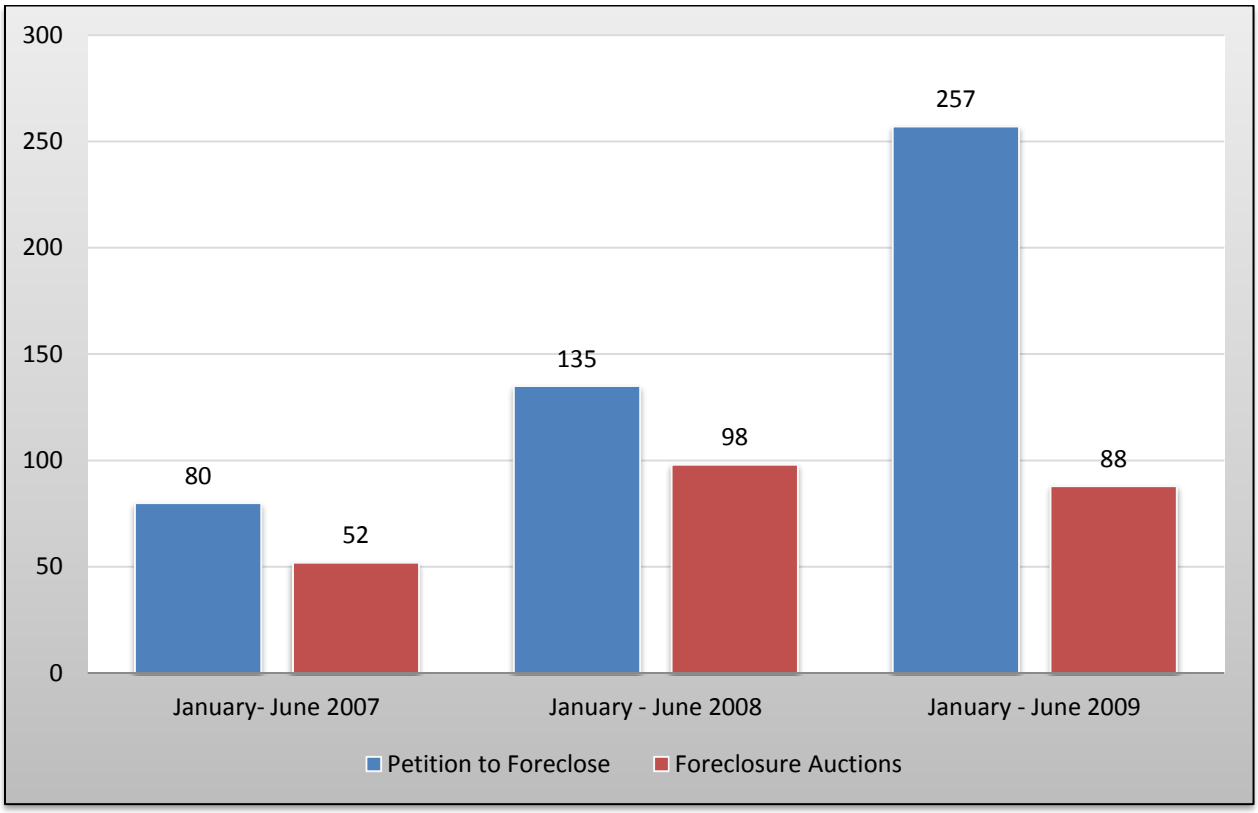
Source: The Warren Group
Note: Total numbers include foreclosure petitions, foreclosure auctions, list pendings, and sheriff sales.

During the first six months of 2009, the Northern Middlesex region experienced an even greater increase with the total number of petitions filed across the region (345) reaching 81.1% of the annual total in 2008. Another important indicator of distress within the housing market is the year-to-date foreclosure petitions filed in local communities and across the region. During the first six months of 2007, 133 petitions were filed across the region, accounting for 41.7% of the annual total. In 2008, 233 petitions had been filed by the end of June, marking a 75.2% increase in petitions from the previous year.

As of June 2009, year-to-date petitions across the region were up an additional 48.1% from the previous year. This marked a 159.4% increase across the region when compared to 2007. Seven of the nine communities in the Northern Middlesex region saw their June 2009 figures increase by more than 100% when compared to the first six months of 2007. Lowell and Tyngsborough saw their petitions increase by 206.1% and 350% respectively.

It is important to note that not every foreclosure petition filed ends in a foreclosure. Figure 6 below compares the year-to-date notices filed across the NMCOG region to number of foreclosure auctions completed during the same time.

Figure 6: Year-to-Date Number of Petitions to Foreclose and Foreclosure Auctions in the NMCOG Region: January 1, 2007 through June 30, 2009

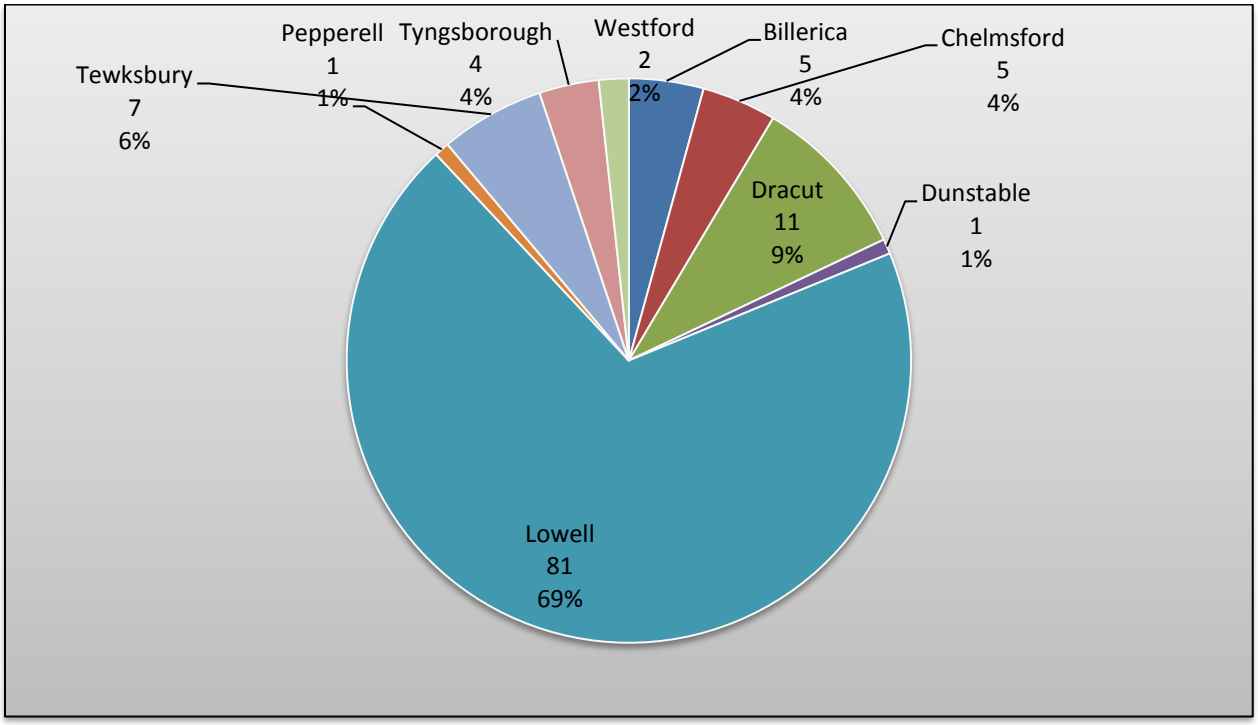


Source: The Warren Group

Obviously, the number of notices filed far exceeds the number of auctions completed. While the year-to-date auctions increased by 88.5% between 2007 and 2008, the number of decreased by 10.2% in 2009. While part of the difference in petition and auction rates is due to the lengthy timeframe of foreclosure proceedings, one can also assume that some of the households where initial petitions were filed were able to restructure their financing in a way that prevented their home from being seized by their lender.

A final foreclosure indicator worth analyzing is the number of bank-owned/REO properties across the region. Figure 7 illustrates the total number of properties, by community, that were seized by banks between January 2007 and June 2009. This graph reveals that more than two-thirds (69%) of all bank owned/REO properties were in the City of Lowell. Dracut (9%) had the second highest percentage of bank-owned/REO properties, followed by Tewksbury (6%), Billerica (4%), Chelmsford (4%), and Tyngsborough (4%), Westford (2%), Pepperell (1%) and Dunstable (1%).

Figure 7: Bank-Owned/Real Estate Owned (REO) Properties in the NMCOG Region: January 2007 through June 30, 2009



Source: The Warren Group

G. Housing Production Tools

Outlined in this section are the Housing Production Tools available to our member communities to increase their supply of affordable units in the next few years. These housing production tools include Affordable Housing Trusts, Chapters 40R and 40S, and Accessory Apartments. Additional housing production tools will be outlined in the Housing Production Plans developed for each of our member communities.

1. Affordable Housing Trusts

Municipalities may form and fund Municipal Affordable Housing Trust Funds through M.G.L Chapter 44, Section 55c. These locally-controlled entities administer local funds, sometimes

through “payments in lieu of housing” from zoning bylaws requiring affordable units, but most often through the Community Preservation Act. Working with a local board or a local housing partnership committee can help ensure that the housing funds are directed toward specific community needs.

The purpose of the Affordable Housing Trust Fund is to support the creation or preservation of housing that is affordable to people with incomes that do not exceed 110% of the area median income, as defined by HUD. AHTF funds are focused on those activities that create, preserve or acquire housing throughout the state for the benefit of those households. AHTF funds may also be used for permanent or transitional housing for homeless families and individuals, and for the modernization, rehabilitation and repair of public housing.

A housing development to be financed by the AHTF which receives subsidy, financing, tax credits or other assistance under a state or federal housing program, may contain market rate units insofar as permissible under those programs and/or to the extent that they are necessary to support the creation of and/or on-going sustainability for the affordable housing units in the development. However, AHTF funds may not be used to support market rate units.

2. Chapters 40R and 40S

Chapter 40R of the Massachusetts General Laws encourages cities and towns to establish new overlay zoning districts to promote housing production and, more generally, smart growth development. Chapters 40R and 40S both provide financial incentives to communities to adopt these new zoning districts. Under Chapter 40R communities that adopt special zoning districts allowing as-of-right higher density residential development are provided financial rewards. Eligible locations include the following:

1. Areas near transit stations, including commuter rail and bus terminals;
2. Areas of concentrated development, including town and city centers, other existing commercial districts in cities and towns, and existing rural village districts; or
3. Areas that by virtue of their infrastructure, transportation access, existing underutilized facilities, and/or location make highly suitable places for residential or mixed use smart growth zoning districts.

40R districts must be established as overlay districts and not through base zoning. Typically, districts cannot exceed 15% of local land area, although the Department of Housing and Community Development (DHCD) can be petitioned to approve up to 25%. While all residential and mixed use development must be as-of-right in a smart growth zoning district, communities can use design review to regulate the physical character of the development, as long as the requirements are not unduly burdensome. Twenty percent of the housing in the district must be affordable to those earning 80% or less of median income, and these units must be deed

restricted for at least thirty years. The district must provide a minimum allowable density of eight units per acre for single-family homes, 12 units per acre for two- and three-family buildings, and/or 20 units per acre for multi-family dwellings. Smart growth zoning districts must provide a range of housing opportunities for a diverse population, including households with children.

In order to address the circumstances of smaller and more rural municipalities, any community with a population of less than 10,000 people may request a reduction from the minimum allowable density requirements. The community will need to show that compliance with the density requirements would create a hardship and that any proposed reduced density would be consistent with the smart growth goals of Chapter 40R. The community must also demonstrate that development at the required densities would either be highly inconsistent with the existing physical environment of the community, would create significant risks to water pollution due to poor soils, or cannot be feasibly served by a piped water system.

Before adopting a smart growth zoning district, communities must apply to DHCD for district approval. DHCD must determine if the proposed location is an eligible site and must also approve the proposed zoning regulations and design standards. Once an application has been approved by the DHCD, a community then adopts the zoning regulations for the overlay district.

A primary purpose of Chapters 40R and 40S is to provide a financial incentive to communities to build smart growth consistent housing. Upon approval of a district, a municipality receives a zoning incentive payment. The amount of the incentive payment is based on the potential number of new housing units that can be constructed in the district minus the number of units permissible under the previous zoning. The incentive payment is disbursed to the community after the issuance of the approval letter by the DHCD. The payments schedule is as follows:

- $10,000 for up to 20 units;
- $75,000 for 21-100 units;
- $200,000 for 101-200 units;
- $350,000 for 201-500 units; to
- $600,000 for 501 or more units of housing.

A community will also receive a bonus payment of $3,000 for each unit of new housing unit built in the district, which is payable once the building permit has been issued for the housing unit.

Under Chapter 40S, communities are reimbursed for any net cost of educating students living in new housing in a smart growth district. The reimbursement is equal to the cost of educating students living in new housing in a smart growth district minus the percentage of new revenues from the district that would be otherwise be devoted to educational costs and any increase in state educational aid resulting from students living in new housing in the district.

3. Accessory Apartments

Accessory dwelling units, also known as "in-law apartments", can be an important component of the region's housing supply in the future. Accessory apartments allow homeowners to create an additional unit within their single-family home, generally with minimal neighborhood impact. Accessory apartment units generally have lower rents than conventional units, and the rental income helps defray expenses for the homeowner. Such opportunities can prevent displacement of low- and moderate-income households, seniors, and entry-level workers.

H. Identification of Priority Housing Areas

NMCOG staff worked with the community development, housing and planning personnel in each community to identify priority housing areas for the Northern Middlesex region, which are shown on Map 12 on page 190. As mentioned previously, only one community in the region currently has an approved Housing Production Plan in place, but four communities (Chelmsford, Tewksbury, Tyngsborough and Westford) are in the process of preparing updated plans that comply with the revised DHCD regulations and guidelines developed in 2008. As these Housing Production Plans are completed over the next year, there will be additional information on the priority housing areas in the region. The Town of Westford has already identified their Priority Housing Areas in the draft document that is being reviewed by the Board of Selectmen and Planning Board and will be modified based upon the final vote of each of these committees. Based upon what was provided by each community to date, here are the priority housing areas:

Billerica

- Mill Overlay District in North Billerica

Chelmsford

- 16-20 Boston Road
- 11 Cushing Place
- Off Dunstable Road
- 233 Littleton Road
- 235 Littleton Road
- 241 Littleton Road
- 51-57 Middlesex Street
- 61-63 Middlesex Street
- 26 North Road
- 32 North Road
- 100 Wotten Street

Dracut

- 483 Riverside Street
- All vacant, unrestricted residential parcels.

Dunstable

- Pleasant Street in the Mixed-Use District

Lowell

- Julian Steele Reinvention project
- 24 scattered downtown sites for affordable housing
- Hamilton Canal District

Pepperell

- Area “behind VFW” on Route 113

Tewksbury

- Victor and Main - 50-60 units
- Woburn and Highland - 8 units

Tyngsborough

- 15 Descheneaux Lane
- 21 Descheneaux Lane
- Frost Road
- Longwood Road

Westford

- 29 Carlisle Road
- Cold Spring Road
- 14 Greenwood Road
- 478 Groton Road
- 130 Littleton Road
- 210 Littleton Road
- 250 Littleton Road
- 46 Lowell Road (2 parcels)
- Old Lowell Road
- 72 Old Lowell Road
- 73 Old Lowell Road
- 64 Main Street
- 146 Main Street
- Makepeace Road
- Sawmill Road
- Texas Road (2 parcels)
- 22 Texas Road
- Tyngsboro Road

(Westford continued)

- 18 Tyngsboro Road
- Vose Road
- 18 Vose Road
- 16 Wing Road

I. Issues and Opportunities

Local, state and regional housing policies must address diverse needs by promoting a range of housing types and affordability, by expanding programs that connect residents with housing opportunities, and by ensuring equitable access to those opportunities for all of the region's residents. Over the past twenty years, the predominant condition of the housing market has been based on high demand and limited supply, which has negatively impacted low-income families.

Currently, there is no housing plan in place for the Northern Middlesex region. A regional assessment would provide a framework for equitable access to housing by quantifying regional needs. A regional housing plan would also help inform the development of local Housing Production Plans. While there are a variety of advocacy organizations and agencies addressing housing issues across the region, no formal entity has established regional needs or made policy recommendations at the regional level.

Nonprofits play a critical role in developing affordable housing and preserving housing in communities where there are limited affordable housing opportunities. Community Development Corporations (CDCs), such as the Coalition for a Better Acre (CBA) and other nonprofit developers, such as Common Ground, produce affordable rental units, provide first-time homebuyer opportunities and permanent housing options for transitional and at-risk populations. Nonprofit organizations facilitate challenging real estate deals and invest in weak markets where the for-profit development community will not venture. In return, they receive low fees and very limited financial support, making it difficult to meet their mission. Equity and programmatic funding is often difficult to secure. Additional support is needed for these organizations, particularly in light of the need generated by the most recent recession.

Municipalities have played a role in housing rehabilitation programs for owner-occupied and investor-owned housing units. Historically, the HOME Investment Partnership Program (HOME), and Community Development Block Grant (CDBG) program funds have been used to preserve and stabilize units for low- and moderate-income families. As HOME and CDBG funds become more limited, Community Preservation Act (CPA) funding and Affordable Housing Trust funds are being tapped for this purpose. Mechanisms for addressing housing rehabilitation programs on a regional basis should be explored further.

Many homeowners currently find it difficult to create new accessory units, as they may be prohibited within the current zoning or by regulations that contain onerous requirements. For

Placeholder for map 12

example, homeowners may be required to create additional parking, or occupancy may be restricted to family members. Many municipalities have little incentive to accommodate accessory apartments, unless the unit is deed restricted and eligible for inclusion in the subsidized housing inventory.

The current foreclosure rate in the state and the region is the highest seen in decades. The causes are complex—many loans were made with historically high loan-to-value ratios, and subprime lenders sold adjustable-rate mortgages to borrowers with limited ability to repay. Falling real estate prices, lack of owner equity, and tight credit conditions may continue to impact the ability of already stretched borrowers to refinance or sell, leading to additional foreclosures. In addition, many area residents have been impacted by job losses during the recent recession, increasing the need for foreclosure prevention and assistance.

The Massachusetts Commission to End Homelessness has determined that the Commonwealth must shift resources away from shelters and crisis management to prevention and permanent housing solutions. The Commonwealth has now transitioned to a Housing First model which provides housing to homeless individuals and families, in conjunction with an array of support services. Prevention, intervention, re-housing and housing stabilization are all critical to ending homelessness. The City of Lowell has developed a Ten-Year Plan to End Homelessness, and organizations such as Community Teamwork, Inc. (CTI) and the Merrimack Valley Regional Network to End Homelessness are committed to addressing the needs of the region. However, funding for very-low income households is lacking and additional rental vouchers are needed to meet current demand.

Housing discrimination has severe impacts and quality of life repercussions. This issue must be addressed to advance regional equity and prosperity. Real estate professionals and landlords should be made aware of their responsibilities under fair housing laws. Residents should be encouraged to report instances of discrimination and valid complaint should be pursued. In addition, developers and municipalities should follow the accessibility mandates of the Massachusetts Architectural Access Board (MAAB) rules and regulations, and the design and construction requirements of the Federal Fair Housing Amendment Acts of 1988. When a development receives federal, state or local funding assistance, compliance with the accessibility standards of Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 is triggered. Compliance with these regulations should be enforced. Greater awareness and education are necessary to help builders, designers and municipalities coordinate and balance compliance with accessible and fair housing mandates.

VIII. RECOMMENDATIONS & STRATEGIES

The Regional Strategic Plan offers policy recommendations and strategies aimed at achieving sustainable future growth and development. The recommendations and strategies outlined below have taken into account the land use, economic development, housing and conservation goals identified through the public outreach process and articulated in Chapter I of this document.

Land Use

- Promote growth in appropriate areas where adequate infrastructure capacity and services are available.
- Communities should review their subdivision and zoning regulations on a regular basis and revisions should be consistent with sustainable development policies
- Communities should adopt zoning regulations that protect solar access.
- Update and improve Open Space Residential Design bylaws/ordinances.
- Preserve and enhance the aesthetic character and quality of life in town and village centers, through the adoption of town center/village center overlay zoning bylaws and corresponding design guidelines or design standards.
- Promote the use of incentives, such as density bonuses and relief from dimensional requirements, as a means of protecting open space and creating affordable housing.
- Promote coordinated planning initiatives by encouraging consistency between community Master Plans, Zoning Bylaws, Housing Production Plans, Open Space and Recreation Plans, the Greater Lowell Comprehensive Economic Development Strategy, the Regional Transportation Plan, Hazard Mitigation plans, and the Regional Strategic Plan.
- Create incentives in zoning and subdivision regulations to encourage traditional neighborhood development, and compact mixed-use development in downtowns, village centers and town centers.
- Provide zoning incentives for infill development, adaptive reuse and redevelopment of blighted, contaminated and underutilized properties.
- Revise parking standards to eliminate rigid minimum parking requirements, adopt shared parking options, and outline maximum parking allowances.
- Examine opportunities for TDR in rural communities and across municipal boundaries.

- Communities should examine the feasibility of utilizing form-based code and transit-oriented development districts in priority areas targeted for future development.
- Encourage planning initiatives that cross municipal boundaries to address corridor-wide and area-wide issues.
- Improve coordination between local, regional, state and federal levels of government.

Environment

- Regionally connect open spaces through greenways and blueways, and improve public access to water bodies.
- Update the Regional Open Space Plan.
- Encourage local communities to adopt stormwater management and low impact development bylaws/ordinances.
- Consider establishing a local or regional stormwater utility to fund the implementation of local stormwater management plans.
- As outlined in the regional and local hazard mitigation plans, communities should strengthen local flood plain zoning bylaws/ordinances.
- Encourage property owners and developers to establish conservation restrictions on portions of their properties located in environmentally sensitive areas.
- Protect and enhance critical upland water resource areas, wetlands and habitat areas to sustain biodiversity.
- Target water supply recharge areas as priority lands for acquisition and protection.
- Each community should have an active historical commission and an historic preservation plan, and development regulations should consider historic resources. Demolition delay bylaws should be implemented in every community that currently lack such a bylaw.
- Support the retention of existing agricultural and rural landscapes through the use of agricultural preservation techniques, programs and tools.
- Establish a regional brownfields assessment program and a revolving loan fund for clean-up activities.
- Adopt green performance standards for development review.

- Support agricultural businesses through zoning and permitting requirements.
- Establish community gardens.
- Prepare a regional sustainability plan.

Energy

- Develop a regional Clean Energy Plan to identify opportunities for clean energy production and capital investments, and to promote job creation in the clean energy sector.
- Work with the Northern Middlesex communities to establish a regional energy circuit rider program
- Municipalities should work with the development community to encourage design that meets LEED standards and embraces the principles of green building design.
- Communities should implement renewable energy bylaws and streamlined permitting to foster the generation of clean energy and create green jobs.
- Communities should adopt an expedited permitting process for green development.
- Implement a green restaurant program and green business program in each community.

Economic Development

- Municipalities should adopt streamlined permitting best practices based on the Best Practices Guide developed by MARPA.
- NMCOG should continue to provide technical assistance to communities regarding Chapter 43D and streamlined permitting.
- Work to grow the creative economy through a collaborative regional approach that includes training and education, and that markets the region as a center of creative activity.
- Promote neighborhood-oriented commercial development in village and town centers.
- Support expansion of infrastructure in those locations identified as Priority Economic Development areas and Priority Housing areas.
- Encourage regional service delivery and establish regional service agreements through NMCOG.

- Promote inter-municipal collaborations to attract businesses to vacant and underutilized properties and grow jobs for the region's workforce.
- Utilize the University Research Center at UMass Lowell to attract emerging industries to the region.
- Establish partnerships between UMass Lowell, Middlesex Community College and private industry to develop training programs for the area workforce.
- Provide educational and employment opportunities for the region's youth, and work to retain young workers to address future manpower needs.
- Assess the feasibility of expanding the LDFC to serve the suburban communities or utilize the non-profit arm of NMCOG to address these needs.
- Develop a plan for addressing sewer capacity deficiencies in the Greater Lowell region.
- Complete a Regional Renewable Energy Plan in partnership with the Montachusett Regional Planning Commission to address the future siting of renewable energy facilities and expand green job opportunities.
- Apply for Economic Development District status through EDA.

Housing

- Provide a variety of housing choices for all age groups, incomes and abilities.
- Implement inclusionary zoning as a means of creating additional affordable housing units across the region.
- Update and improve accessory apartment bylaws and ordinances.
- Update and maintain local Housing Production Plans.
- Prepare a Regional Housing Plan.
- Update local fair housing plans to ensure equitable access to housing opportunities for all residents of the region.
- Advocate for additional resources for nonprofit housing developers.
- Support and expand housing rehabilitation opportunities.

- Create additional 40R districts.
- Initiate programs to address homelessness across the region.

Information Dissemination and Public Outreach

- NMCOG should continue to provide technical assistance to its local communities in the area of smart growth and sustainable development.
- Educate area citizens on the sustainable development and livability principles through a Sustainable Development promotional campaign.
- Increase awareness and education to help builders, designers and municipalities coordinate and balance compliance with accessible and fair housing mandates.
- Implement a “buy local” initiative, and educate consumers on the benefits of buying locally produced goods and food.
- Educate residents on the need for and benefits of affordable housing.
- Educate local communities and the public relative to available incentives for renewable energy and energy efficiency improvements
- Work with local land trusts and other nonprofits to educate property owners on tax incentives available for conservation and land preservation
- Promote inclusive community planning through expanding the outreach process to include a broad constituency, including low income residents, minorities and other under-represented segments of the population.
- Encourage civic engagement across the region by providing increased opportunities for public involvement and volunteerism.
- Conduct regional focus groups on issues of common and regional interest.

IX. PLAN CONSISTENCY WITH THE COMMONWEALTH'S SUSTAINABLE DEVELOPMENT PRINCIPLES

In 2007, the Patrick-Murray administration updated the Commonwealth's Sustainable Development Principles, as discussed in Chapter I. This section of the Regional Strategic Plan provides an overview of the plan's consistency with the Sustainable Development Principles.

1. **Concentrate Development and Mix Uses**

   The RSP calls for the revitalization of city and town centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources, and integrates uses. The RSP encourages the remediation and reuse of existing sites, structures, and infrastructure rather than concentrating development in undeveloped areas and greenfields. The Regional Strategic Plan also recommends that communities enhance their town and village centers through the adoption of town center/village center zoning districts, thereby creating pedestrian-friendly neighborhoods with commercial, civic, cultural, educational, and recreational activities. The plan recommends that communities provide incentives within their regulations to encourage traditional neighborhood development and compact mixed-use development in downtowns, village centers and town centers.

2. **Advance Equity**

   The RSP promote equitable sharing of the benefits and burdens of development by educating residents on the use of sustainable development and livability principles. In addition, the plan calls for increased awareness and compliance with fair housing and accessibility mandates. The RSP also advocates for the establishment of a "buy local" initiative, remediation of brownfields, increased job training and educational opportunities for youth, low income and minority populations, and the creation of additional affordable housing opportunities for low- and moderate-income individuals and families. The plan also promotes civic engagement and inclusive community planning through expanded public outreach to a broad constituency, including low income residents, minorities and other under-represented segment of the population.

3. **Make Efficient Decisions**

   Several sections of the RSP discuss the importance of making regulatory and permitting processes for development clear, predictable, coordinated, and timely, in accordance with smart growth and environmental stewardship. The Plan recommends that communities review their regulations on a regular basis and that future revisions be consistent with sustainable development principles. The RSP states that communities should streamline

their permitting processes relative to economic development and renewable energy initiatives.

4. Protect Land and Ecosystems

The RSP advocated for the restoration and protection of environmentally sensitive lands, natural resources, agricultural lands, critical habitats, wetlands and water resources, and cultural and historic landscapes. It also calls for an increase in the quantity, quality and accessibility of open spaces and recreational opportunities, through the use of conservation tools such as agricultural preservation restrictions and conservation restrictions. The plan also recommends that open spaces be connected through greenways and blueways.

5. Use Natural Resources Wisely

The RSP promotes development projects, buildings, and infrastructure that conserve natural resources by reducing waste and pollution through the efficient use of land, energy, water, and materials. The Plan encourages local communities to adopt stormwater management and low impact development bylaws/ordinances, targets water supply recharge areas as priority lands for acquisition and protection, and supports the retention of existing agricultural lands and rural landscapes. The Plan recommends that each community adopt green performance standards for development review, and implement renewable energy bylaws and streamlined permitting processes for renewable energy projects.

6. Expand Housing Opportunities

The RSP support the construction and rehabilitation of homes to meet the needs of people of all abilities, income levels, and household types. The plan has identified future potential priority housing areas, and recommends that additional transit oriented development and 40R districts be identified. The plan recommends that communities update their Housing Production Plans and Fair Housing Plans, to ensure that all residents have access to decent and affordable housing.

7. Provide Transportation Choice

The RSP supports transportation options that maximize mobility, reduce congestion, conserve fuel and improve air quality. The updated 2012-2035 Regional Transportation (RTP) was recently endorsed by the MPO. The updated RTP addresses all modes of transportation and recommends transportation investments that support economic development and are consistent with smart growth objectives and livability principles.

8. Increase Job and Business Opportunities

The RSP focuses on attracting businesses and jobs to locations near housing, existing infrastructure, and transportation options. The RSP promotes economic development in industry clusters most suitable to the region, including high tech and clean energy. The Plan contains recommendations that expand access to education, training, and entrepreneurial opportunities. The RSP also supports the growth of local businesses, including agriculture, through more flexible zoning and permitting requirements. The plan recommends that communities adopt streamlined permitting best practices, market the area's creative economy, promote neighborhood-oriented commercial development in town and village centers, and develop a plan for addressing the need for additional sewer capacity in the region. The RSP also calls for utilizing the area's higher education facilities to attract research companies and emerging industries, and to provide workforce training.

9. Promote Clean Energy

The RSP provides recommendations that focus on maximizing energy efficiency and renewable energy opportunities. The plan recommends developing a regional Clean Energy Plan to examine renewable energy siting, and to promote job creation in the clean energy sector. It also recommends that municipalities work with the development community to encourage design that meets LEED standards and embraces green building principles. The RSP also recommends that communities implement renewable energy bylaws/ordinances and streamlined permitting for green development projects.

10. Plan Regionally

The RSP supports the development and implementation of local, regional, and state plans that support sustainable development principles. The plan encourages planning initiatives that cross municipal boundaries to address area-wide and corridor-wide issues. The plan advocates for improved coordination between local, regional, state and federal levels of government, calls for updating the regional Open Space Plan, and for developing a Regional Housing Plan, a Regional Sustainability Plan, and a Regional Clean Energy Plan. The Plan promotes development projects, land and water conservation, transportation and housing initiatives that have a regional benefit.

In summary, the RSP is consistent with the state's Sustainable Development Principles in that it promotes smart growth and compact development, which increases affordability by reducing the amount that households spend on both housing and transportation. It further reduces housing costs by increasing the variety of housing available and decreases the associated land and infrastructure costs. Such development patterns also enhance access to employment opportunities. The plan strives to identify strategies for growing the regional economy and

creating jobs for area residents. Toward this end, the Priority Economic Development, Priority Housing and Priority Preservation Areas have been identified in each Northern Middlesex community.

The RSP calls for locating housing and jobs near existing infrastructure and services, thereby promoting sustainability and reducing sprawl. Transit services can be more easily supported in compact development centers reducing reliance on the single-occupancy vehicle, which in turn conserves energy and reduces air pollution.

X. PLAN IMPLEMENTATION & PERFORMANCE MEASUREMENT

The Northern Middlesex Council of Governments (NMCOG) will strive to ensure that regional growth and development is well planned and consistent with the sustainable development principles that have been articulated throughout this plan. Through the RSP, the region and its communities have established development and preservation goals that will be implemented over the course of the next decade. Commitment by state, regional and local levels of government is essential to carrying out the recommendations that have been outlined. Given the breadth of recommendations and strategies outlined in the plan, there will be multiple entities responsible for implementing many recommendations.

In order to monitor progress in implementing the plan, performance criteria have been developed. The criteria will be reviewed annually and progress will be charted by NMCOG staff. The results of the performance assessment will be reported in the NMCOG newsletter and will be provided to EOHED and the local communities.

The following performance indicators will be tracked and quantified:

- Investment in infrastructure;
- State and regional job creation statistics;
- Unemployment rates for the communities and the labor market area;
- Acres of land preserved and protected;
- Renewable energy projects permitted;
- Installations of renewable energy;
- Implementation of green building initiatives;
- Number of new residential building permits issued;
- Number of units added to the SHI inventory;
- Foreclosure statistics;
- Number of EOAs, growth districts, 43D districts or 40R districts created; and
- Number of commercial and industrial building permits issued.

XI. PLAN ADOPTION & DOCUMENTATION

As outlined in Chapter I, the development of the RSP included a public involvement process comprised of two Visioning Sessions. The first session was held on November 4, 2010 at the UMass Lowell Inn and Conference Center. This session provided attendees with an overview of the planning project and with information regarding the proposed Land Use Reform Act (LUPA). In addition, a SWOT Analysis (Strengths, Weaknesses, Opportunities and Threats) was performed as a means of gathering input and ideas to be used in the formulation of the RSP goals. Participants were asked to address the following questions:

- What are the strengths of the Greater Lowell region?
- What are the weaknesses in the Greater Lowell region that need to be addressed?
- What opportunities are available to grow the Greater Lowell economy and to balance this growth with the quality of life?
- What future threats to the Greater Lowell region can you identify that will need to be addressed?
- What do you see as the future for the Greater Lowell region? Where will the regional growth centers be? Where should preservation areas be? Where should housing growth occur?

The second visioning session was held on November 18, 2010 in the Community Room at the Tewksbury Police Headquarters. Participants discussed LUPA and were presented with the results of the SWOT session conducted at the first visioning session. Draft goals were developed and discussed among those in attendance. In addition, attendees provided input relative to identifying priority development areas and priority preservation areas. Copies of the visioning session notices, agendas, and materials are included in Appendix A.

In addition to the public visioning sessions, numerous meetings with local officials and municipal staff were held to collect data, and receive input and feedback relative to the identification of the priority economic development, housing and preservation areas. The RSP was also discussed at several meetings of the NMCOG Council. These meetings were posted at the City/Town Clerk offices and were open to the public. In addition, the public was able to submit comments via the NMCOG website at www.nmcog.org. Copies of the RSP are being circulated to each municipal Planning Board, Conservation Commission, Zoning Board of Appeals, Chief elected official, community planning staff, and Chief Administrative officer

It is intended that the Regional Strategic Plan will be endorsed by the chief elected officials in each community. NMCOG staff will be presenting the plan to the Boards of Selectmen and the Lowell City Council by the end of the calendar year, and each municipality will be asked to formally vote to endorse the document, and to provide a “letter of endorsement” following the vote. Once the plan has been endorsed by all nine NMCOG communities, the NMCOG Council

will vote to adopt the RSP as the region's official policy plan. Following the endorsement process, the letters of endorsement from the communities will be provided to EOHED and incorporated into the final document. In addition, a resolution from the NMCOG Council to adopt the RSP will also be provided.

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