

**SECTION
3****COMMUNITY SETTING**

The Town of Orange contains both rural and urban landscapes that have been established, developed, and affected by its human inhabitants over the past several hundred years. Planning for open space in Orange must account for the complex relationships between people and the open spaces and natural resources upon which they depend. Continued growth without consideration of the natural systems that need to be protected, such as drinking water supplies, will reduce the quality of life for future generations.

The information provided in this section, *Community Setting*, inventories and assesses the human and land use components of the landscape, moving from the present, to the past, and then to the potential future based on current development trends. The *Regional Context* gives a snapshot of Orange today, and identifies the ways in which the location of the Town within the region has affected its growth and quality of open space and recreational resources. *History of the Community* looks back at the manner in which human inhabitants settled and developed the landscape. Next, using statistical information and analysis, *Population Characteristics* shows the reader who the people of Orange are today and how population and economic trends may affect the Town in the future. Finally, *Growth and Development Patterns* describes specifically how the Town of Orange has developed over time and potential impacts that the current zoning could have on open space, drinking water supplies, and municipal services.

A. REGIONAL CONTEXT

Regional Context concentrates on the location of the Town of Orange relative to natural and socio-economic resources in the region and State and demonstrates the significant influence a physical location can have on community characteristics including the quality and quantity of open space and recreational resources. It also considers the impact that different land uses, located within the Town of Orange and surrounding communities, have on regional open space and recreational resources. Finally, it offers possible regional strategies for environmental and open space protection.

The Town of Orange, Massachusetts is located in the north central region of the State, at the eastern extreme of Franklin County less than three and a half miles from the New Hampshire State line. Orange borders the towns of Warwick, Wendell, Erving, and New Salem in Franklin County and the towns of Athol and Royalston in Worcester County. While Franklin County is the most rural county in the State, Orange, which is less than five miles west of Athol, has the third highest population in the County. It is a regional employment center for surrounding communities.

A.1 Natural Resources Context

In order to plan for open space and natural resource protection, the Town of Orange should consider valuable regional natural resources like the Quabbin Reservoir and the Millers River Watershed. These are two major natural resources that present both opportunities and challenges to open space planning. There are also natural resources that are located within the Town of Orange that contribute greatly to the region, including Lake Mattawa, Tully and Packard Ponds, and the large, mainly contiguous, forested areas in Chestnut Hill, West and North Orange. These resources are inventoried in Section 4, *Environmental Inventory and Analysis*.

The Quabbin Reservoir is a major regional recreation and wilderness area located directly south of Orange. The thirty-seven (37) square mile Quabbin watershed, covering portions of three counties, supplies water to the Boston Metropolitan Area and communities in Hamden County, and is protected from commercial and industrial development. The value of the Quabbin as wildlife habitat and as a recreational resource can be enhanced through strengthening its physical link to an existing network of permanently protected open space, with Orange as the central gateway to the region. The presence of large, mostly contiguous, forested areas in West Orange, on Chestnut Hill, and in North Orange, contributes to the habitat, recreation, and scenic values of the region.

Orange is located in the western portion of the Millers River watershed, which includes portions of sixteen Massachusetts communities and four towns in New Hampshire. The Millers River watershed is located in north central Massachusetts and southwestern New Hampshire. It borders the Nashua River watershed on its east, the Chicopee River watershed on its south, and is one of 38 major tributaries to the Connecticut River. From its headwater tributaries in New Hampshire, the Millers River flows south, then gradually west flowing into the Connecticut River. The Millers River drains a regional landscape that is three hundred and ninety-two (392) square miles in size, three hundred and twenty (320) of which are in Massachusetts (DEP; 1995). The total river length is fifty-one (51) miles, forty-four (44) of which are in Massachusetts.

The sub-basins of two tributaries represent large portions of the Millers River Basin: Tully River (74.0 square miles) and the Otter River (60.4 square miles). The West Branch of the Tully River begins in northern Orange at the confluence of Tully and Fish Brooks. The Otter River runs northwest out of Gardner, through Baldwinville to the confluence with the Millers River in Winchendon. Although the Millers River fluctuates between sluggish and rapid flows there is an average drop of twenty-two feet per mile. This feature has made the Millers River and its main tributaries a magnet for manufacturing and hydroelectric power generation, which spawned industrial development in Orange in the late 1700s and early 1800s.

All the town centers between Erving and Winchendon are located along the Millers River, or on one of its main tributaries. The presence of growing industries, dense residential development, and the use of the river as a means of waste water disposal all helped to produce serious pollution problems in the past. Many of the point sources of pollution have been regulated and as a result, the Millers River is much cleaner today. However, the continued presence of dangerous levels of mercury and poly-chlorinated biphenyls (PCB's), which are buried in the stream sediments of the Millers River, means that the river's classification as swimmable/fishable has still not been

achieved. Fish flesh has been found to contain these chemicals at levels that have motivated the Massachusetts Department of Public Health to initiate public health warnings against consuming fish caught in the Millers River. The full extent of the PCB contamination of the sediments is under continued study by the Massachusetts Department of Environmental Protection. The effects of PCB contamination of sediments in the Millers River will undoubtedly have a negative long-term impact on the recreational potential of that resource for the Town of Orange and surrounding communities.

The Millers River, along with many of its tributaries in Franklin County including the Tully River, and water bodies, including Lake Rohunta, are listed by the Massachusetts Department of Environmental Protection (DEP) as impaired (Category 5) on its Section 303(d) List of Waters. Both biennial reports issued by the DEP – Final Massachusetts Year 2004 Integrated List of Waters, Section 303(d) and the Proposed Massachusetts Year 2006 Integrated List of Waters, Section 303(d) – state that “those water bodies are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such, require the development of total maximum daily loads (TMDL).” A TMDL is the greatest amount of a pollutant that a water body can accept and still meet water quality standards for protecting public health and maintaining the designated beneficial uses of those waters for drinking, swimming, recreation, and fishing. Also, the TMDL report prepared for each impaired water body describes the steps and technologies needed to reduce the pollutant or source of impairment to meet water quality standards.

Ultimately the Town of Orange should expect the development of TMDLs for each of its water bodies on the 303(d) list. The TMDL reports reflect DEP’s strategy for cleanup of all of the water bodies in Massachusetts.

Many more rivers in the eastern part of the Commonwealth have completed TMDL reports. Only one TMDL report exists for water bodies in the Millers River watershed, the Total Maximum Daily Loads of Phosphorous for Selected Lakes in the Millers Basin Lakes, which was published in 2003. This report only focuses on lakes in communities in the watershed that are east of Orange.

To get a TMDL completed for the Millers River watershed, the Town of Orange along with the other communities in the Millers River Watershed will need to come together to request a report’s completion. Ideally, the towns could work with the Millers River Watershed Council, and perhaps the Connecticut River Watershed Council, to make this request and to encourage the State and EPA to improve their research and reporting as a whole for the tributaries to the Connecticut River in Massachusetts.

A.2 Socio-Economic Context

The Town of Orange is a stable regional employment center for surrounding towns. Waterpower, manufacturing, the railroad, and Route 2, all have influenced the development and growth of the Town of Orange and the region. Like many communities along the major waterways in the region, Orange has experienced a significant economic decline since its

manufacturing heyday. As will be described in the next section, Orange's manufacturing center developed due to the harnessing of the hydroelectric power of the Millers River and the presence of a vast forest resource base. Then later in the 1840's, the railroad linked Boston with Mechanicsville, New York through Orange Center. This spurred further industrial and dense residential development in Orange Center. However, manufacturing declined across the region during the latter half of the 20th Century. After the Interstate highways (I-90 and I-91) were developed, Orange and other communities in the eastern portion of Franklin County failed to see the levels of population growth that were exhibited in the 1970's and 1980's in other areas of Massachusetts.

The Town of Orange currently has moderate population growth but poor traditional economic indicators including high unemployment rates as compared to other communities in the region. However, Orange's rural and urban nature, the improvements being implemented for Route 2, the development of a second industrial park, and the presence of the municipal airport could create job opportunities and as a result, population growth in the future.

Like many of the communities in the western and eastern portions of Franklin County, there has not been the same level of pressure to develop the open spaces of Orange for residential development in comparison to communities along the Interstate 91 corridor. Thus the community has an opportunity to protect natural, open space, and recreation resources in advance of the next surge in development. Currently, due to the local economy and lower property values relative to other areas in the region, development rights may be purchased at much lower rates than would be possible if the Town or local land trusts were to wait for the need for land protection to become more apparent.

A.3 Regional Open Space and Recreation Opportunities and Issues

Along the northern, western, and southern boundaries of the Town of Orange, parcels of land have been permanently protected from development. A parcel of land that is permanently protected from development can create real value for a community by being a potential site for recreational activities, conserving habitat for wildlife and fisheries, and protecting the integrity of first and second order streams, which are the most extensive and vulnerable water resources within the Millers River Watershed. If the parcel of land is located within the recharge areas of the public water supplies it can also contribute to protecting the wells and reservoirs from contamination by point and non-point source pollution. When abutting parcels of land are permanently protected over time, based on a plan, the result can be a network of open spaces that can cover thousands of acres. When land is protected to link the open spaces of each community, together this can create a regional greenway.

Currently, Orange is part of just such a regional greenway. There is a circular belt of permanently protected open space that stretches northwest from the 60,000-acre Quabbin Reservation through New Salem, Wendell, and western Orange into Warwick. According to the Mount Grace Land Conservation Trust, these lands together are the single largest continuous tract of protected land in southern New England. The eastern half of the circular belt continues up to the state line through Royalston, then extends south to Tully Mountain in North Orange,

Tully Lake, Birch Hill and Harvard Forest in Petersham. Another network connects the western part of the belt in Erving and western Orange through Wendell, Montague, and Sunderland to the Connecticut River. Within these networks of open spaces there are eleven (11) state forests or reservations that are popular for camping, fishing, hiking, and swimming. Specifically, the Orange State Forest, the Erving and Wendell State Forests are within a few miles west of Town.

Other protected open space and natural resources in the region, which Orange residents can take advantage of, include the Metacomet-Monadnock (M&M) Hiking Trail, which crosses some of the region's most interesting scenery, including the summit of Mt. Grace and the Millers River. Lake Mattawa and Tully Mountain located within Orange are considered to be valuable sites for recreational fishing and hiking by outdoor enthusiasts throughout the region and the State. Laurel Lake, Tully Lake, and the Northfield Mountain Recreation Area are other nearby regional attractions. Some natural and recreational resources can only be conserved through permanent protection of land encompassing resource networks that cross town boundaries. In addition, the presence of this potential greenway provides more opportunities for the Town of Orange to protect key parcels that add to this regional resource.

Historically, regional and local transportation and manufacturing were located in sensitive natural resource areas that are most vulnerable to contamination. Regional transportation corridors including Routes 2, 2A, and 202, and the railroad can negatively affect the natural, recreational, and open space resources in Orange and surrounding communities directly and by their associated land uses. For example, Route 2 travels across both of Orange's Department of Environmental Protection Approved Zone II recharge areas for their drinking water supplies. Runoff and spills of hazardous materials transported via Routes 2, 2A, and 202 have the potential for contaminating these aquifers.

In addition, the layout of regional and local transportation resources encourages sprawl development. The municipal airport, the industrial park at the junction of Routes 2 and 202, and the new Randall's Pond Industrial Park at the junction of Routes 2 and 122 – although close spatially – are reached from different roads. This contributes to industrial development pressures along each of these routes. In addition, there has been much commercial development along Route 2A and residential development along these and the community's other main roads.

A land use map of Orange shows intensive urban uses within the riparian corridor of the Millers River. Here, where the river is slow running, Orange has much of its current industrial and waste disposal uses within a half-mile of the Millers River. Future cleanup efforts for the Millers River will largely focus on non-point sources of pollution. Permitted point sources of pollution are represented by the many municipal and industrial wastewater treatment plants, which use the Millers River to dispose of their effluent. Non-point sources include storm water runoff that can carry pollutants from roads, roofs, and heavily fertilized lawns into streams and rivers and are much more difficult to address. Where continued use of developed areas near the Millers River is necessary, shifting the types of uses and decreasing the percentage of impervious surfaces could be accomplished over time through the adoption of appropriate changes to the local zoning bylaws.

A.4 Regional Strategies for the Protection of Open Space, Natural, and Recreational Resources

Actions at different political levels need to take place to affect the quality of open space, natural, and recreational resources in Orange and surrounding communities. At stake is the future of the region's wildlife, fisheries, drinking water, recreational, and scenic resources and all the values associated with them. Regional efforts are needed because regional planning agencies, land trusts, and watershed/landscape planning groups together can attract political and funding resources that individual towns may not be able to. Towns on the other hand have the power to implement changes in land use patterns directly through zoning and open space protection.

The main regional issues developed in this first part of Section 3, Regional Context include: 1) the need for continued clean-up of the Millers River; 2) the land protection opportunities presented by a sluggish local economy; 3) the presence of large corridors of protected open space; and, 4) the need for addressing the potential negative impacts of local and regional transportation and land use patterns on the open space, natural, and recreational resources in Orange and surrounding communities.

In 2003, the Commonwealth discontinued its Watershed Initiative. This model state and local partnership program had the Department of Environmental Protection and the Millers River Watershed Team (volunteers from communities and environmental groups in the region) working together to clean up the Millers River and its tributaries. Funding and technical assistance from the State provided the wherewithal for the Watershed Team to monitor the River's water quality, develop a Millers River Watershed Plan, study the issue of dams and fish passage, and begin to prioritize and address pollution problems that confront the watershed.

Today, in a more modest way, the Millers River Watershed Council, a nonprofit organization dedicated to the protection and clean-up of the River, carries on the Massachusetts Watershed Initiative. It serves to facilitate communication among towns, organizations and agencies working to clean up the River and to coordinate water quality improvement efforts throughout the watershed. The Town of Orange should consider assisting the Council with its work by becoming a member of MRWC and supporting zoning and community-based planning that helps to protect the quality of the water in the Millers River and its tributaries. Ideally, surrounding communities in the watershed would also make similar commitments to protect water quality and fisheries habitat.

Significant land protection opportunities exist within the Town of Orange and the region as a whole because of two factors: low property values and the presence of large blocks and corridors of protected open space in close proximity to the Quabbin Reservoir. Regional groups like the North Quabbin Regional Landscape Partnership (NQRLP) have the attention of state conservation agencies like the Department of Conservation and Recreation, because NQRLP represents many local constituencies, and the region currently is one of the last areas in the State with large contiguous forested blocks with significant biodiversity. According to the Mount Grace Land Conservation Trust, the Nature Conservancy has identified the North Quabbin as one of two areas in Massachusetts most suitable for designation as a large-scale priority region within which land protection at the landscape scale could be accomplished. Land protection on Tully

Mountain and the trail networking projects that have taken place are in part due to the efforts of the NQRLP. The Town of Orange should continue to work with the Partnership and others to identify and sponsor land protection efforts that conserve open space and recreation resources in Orange and the region as a whole.

The Tully Valley Private Forest Lands Initiative is one example of a land protection effort that the Town of Orange has participated in. In December of 2000, the Mount Grace Land Conservation Trust notified the Orange Planning Board of a regional land protection project, which would build upon the existing circular belt of protected land mentioned above. The Tully Valley Private Forest Lands Initiative was a pilot conservation project sponsored by the Massachusetts Executive Office of Environmental Affairs (EOEA) (now called the Executive Office of Energy and Environmental Affairs (EOEEA)). The purpose of the project was to protect a mosaic of forest and farmland under various ownerships thereby safeguarding important ecological processes and values, which occur at the landscape scale as well as access to the Tully Trail. The Department of Conservation and Recreation and the Department of Fish and Game purchased conservation restrictions from willing landowners, helping to keep the land in private ownership. Their focus areas for protection were in North Orange near Tully Mountain and surrounding areas. Several other state agencies and land trusts were involved including the Massachusetts Division of Fisheries and Wildlife, the Department of Conservation and Recreation, the Department of Food and Agriculture (now Department of Agricultural Resources) and the New England Forestry Foundation (NEFF). All together the Initiative protected an additional 3,954.7 acres of land.

In December of 2001, the NEFF, which is a regional forest land conservation organization, agreed to act as the facilitator of the Chestnut Hill Project, which was organized by local landowners of contiguous acreage who are interested in the long-term protection of the portions of Chestnut Hill not already protected by the Orange State Forest. Massachusetts EOEA provided Orange with a \$275,000 Self Help Grant to administer the project and protect land. Thirteen landowners in Orange and New Salem participated in the project with the NEFF, Department of Conservation and Recreation, and Department of Fish and Game. Approximately 1,000 acres were protected.

Finally, planning for the protection of critical natural resource systems including underground public drinking water supplies, called aquifers, which are vulnerable to above ground land uses requires both regional and local planning. Through the FRCOG, Orange has access to regional transportation planning and MassHighway personnel. Town Officials should seek to strengthen emergency management planning for State highways in and around the community public water supplies that DEP has approved as Zone II recharge areas. Local planning and conservation committees should continue to champion changes to zoning and target open space protection that ensures the long-term protection of vulnerable natural, open space, and recreational resources in the Town.

B. HISTORY OF THE COMMUNITY

B.1 Contact Period (1500-1620)

Although there are no reported native Contact period sites, occupation probably occurred primarily on the lowlands adjacent to the Millers River, particularly in the vicinity of the villages of West Orange and Orange along the river's southern bank. Additional sites were likely on the lowlands adjacent to Tully River, and on the current sites of Tully and Packard Ponds. Upland sites may have been located on the relatively level summit of Temple Hill. Due to the terrain of the area, which is generally hilly surrounded by marshy lowlands, any native horticultural tracts would have been limited to the Millers River floodplain. This would have also been the probable location of the areas main hunting and fishing grounds as well. By the early 17th Century, this area may have been the rough dividing point between the territories of the Pocumtuck-related settlements of the Connecticut River Valley and the Nipmucs of central and central western Massachusetts.

B.2 Plantation Period (1620-1675)

The primary east-west trail was along the Millers River with the north-south route traversing the lands between Lake Mattawa and Tully Pond via an Orange Center fordway. During this time, Orange probably still had a moderate sized native population since colonial settlement wouldn't occur until the mid-18th Century. The lack of early colonial settlement in Orange is thought to be due to both the large supply of higher quality farmland in the Connecticut River Valley and the area's vulnerability to native attacks.

B.3 Colonial Period (1675-1775)

Orange and neighboring towns were first settled as small villages separated by acres of farmland and woods. The oldest recorded colonial settlement in Orange was on West Pequoiaog Hill in what is now North Orange.

Settlers practiced subsistence farming, as well as the grazing and hay production that were more appropriate for the shallow, stony soils and steep slopes. The average farmstead was one hundred acres and included a house, barn, small garden, and orchard. Overall eighty percent (80%) of the forested land was cleared for pastures and fields (Franklin County Commission, 1992). Homes tended to be dispersed across the hilly terrain and along its waterways, following the natural lay of the land, forming village centers like North Orange, Tully, and West Orange (Franklin County Commission, 1992).

The early economic base in Orange was clearly farm-based. Cloth and woolens were generally made in the home. Soap, cheese, honey and sausages were produced seasonally. Maple sugar production had been introduced by the Native Americans and was continued by the colonists, who planted sugar maples along the edges of roads that were widened to accommodate wagons and coaches traveling to surrounding towns. Applesauce and cider production became important

products because the climate, slope orientation, and soils proved to be ideal for apple orchards. The only documented industrial facilities at the time were a sawmill and a tannery that were established by Nathan Goddard in c.1760. The Colonial Period settlement in Orange was an outgrowth of the primary settlement established in Athol. Local settlers relied heavily on Athol for supplies because of Orange's limited economic base.

B.4 Federal Period (1775-1830)

By 1783 a district had formed from portions of the surrounding towns of Athol, Royalston, Warwick, and Ervingshire. The Town's first meetinghouse was established in North Orange in 1783 and this area served as the civic center. A mill village was also located at Tully Pond. Lowland farming centered around North Pond (Lake Mattawa) while upland agriculture extended to the limits of cultivation along Tully Meadow. In 1790, the first dam was built on the Millers River and attracted new settlement and industries to the riverside area of Orange Center. A sawmill and a gristmill were the first of several prosperous industries to make use of waterpower there, even while agriculture was still the predominant land use. Soon, the change from agriculture and grazing to commercial and industrial employment would radically transform the social, economic, and physical shape of the Town.

While agricultural land was abandoned in the outlying areas of Town, new housing was built in dense clusters along the Millers River. A gridiron street system was adopted for the downtown and neighborhoods developed in dense clusters. Civic and institutional buildings were erected to accommodate the growing industrial population. Stagecoach lines carried mail and passengers to different points around Town and tollhouses dotted the landscape. New roads and turnpikes linked the Town to the region for trade opportunities.

Early manufacturing in Orange included a scythe shop (1803) and forest products from nearby cleared land. These included pails, bedsteads, and boxes. Other products of Orange's early manufacturing base were cloth, woolens, hides, bricks, earthenware, caned chairs, and iron works such as fireplace fixtures and candlesticks. Factories requiring raw materials were built directly on the river's edge and the need for new transportation systems increased (Franklin County Commission, 1992). Roadways now extended throughout the growing Town to provide access for new settlers. The landscape now consisted of clusters of settlement with industrial and residential buildings surrounded by outlying areas of meadows and recovering woodlands.

B.5 Early Industrial Period (1830-1870)

With the introduction of the railroad in the 1840's, infrastructure developed along the edge of the Millers River and came to symbolize the inventiveness and prosperity of the industrial era. Portions of New Salem and Erving were annexed in 1837 to make South Orange (now Orange Center) the geographic and commercial center. Several rail lines connected Orange to other regions. The major east-west rail link from Boston to Mechanicsville, New York passed through Orange Center. A trolley line between Athol and Orange led to the Town of Fitchburg where passengers connected to the "Rabbit Railroad" for Springfield and points south. Finally, the

Vermont and Massachusetts Railroad at Millers Falls traveled to Brattleboro. With its proximity to Greenfield, the transportation center at that time, Orange became a major hub for the distribution and trade of raw materials and locally manufactured goods.

New technology also improved farming techniques and made domestic chores easier. With the promise of new jobs, and the comforts of town life, immigrants from England and Sweden arrived, eager to work. These new settlers and the others that followed contributed to the richness and success of the Town. Soon clusters of new worker housing began to radiate out from the Town, north of Millers River, interspersed with areas of open land.

Many new industries located by the Millers River for its waterpower in this period. These included a strong woodworking and furniture industry as well as important machine shops that also needed access to the improved railroad system. In the 1840's, palm-leaf hats were manufactured in Orange. In 1845, a third of all the boots and shoes produced in Franklin County were made in Orange. In 1865, chair manufacturing employed one hundred (100) men and women and represented the dominant manufacturing industry. Some smaller mills were absorbed into larger industries, like the "New Home" sewing machine company, which moved into an abandoned wooden pail mill in 1867. Company founder John Wheeler was regarded as the Towns' most prominent industrialist once these new machines became a home necessity.

The civic focus of North Orange began to relocate to Orange Center's economic center on Millers River around 1848. Rapid expansion of industrial development followed the opening of regional railroad connections in 1848 and later the development of Civil War sewing machine factories in 1863. During this period an affluent suburban district developed along Prospect Street with a commercial district along East Main Street. Dairy farming maintained settlement along Tully Meadows and around North Pond

B.6 Late Industrial Period (1870-1915)

Between 1870 and 1915, Orange grew by 157% to a total of 5,379 people. This was due to the expansion of local industries, namely New Home Sewing Machine, Rodney Hunt, and Chase Turbine.

Orange Center continued to expand as the center of economic and civic activity with a primary industrial corridor along the Millers River Railroad line. The commercial district remained along East Main Street with multiple story blocks along North-South Main Streets. The civic focus centered on Prospect Street hill. Later in the period there was considerable expansion of industrial development along River Street with secondary residential development along South Main Street and Walnut Hill Street. To the north of the river, a more modest residential district developed with multiple-family housing along Mechanic Street and West Main that extends to a secondary village at West Orange.

For most of this period, Orange's manufacturing economy was dominated by (in order of value of product sold) the New Home Sewing Machine Company, Rodney Hunt Machine Company, (founded in 1873 to manufacture machinery and turbine parts), Chase (turbine parts) and a

cluster of furniture manufacturing firms. Beginning in the late 1880's the Town began to attract a large group of new industries. These included a modern box factory, a shoe factory in 1887 (employed 250 people by 1892), the Leavitt Machine Company in 1890, the Whitman Grocery Company in 1894 (which made Tapioca), and two tool plants, in 1903 and 1908. Another new company was the Grout Automobile plant, which was established in 1899, and produced one car a day. This early steam-powered machine was road tested on inclines like Walnut Hill and upper Mechanic Street, and reached speeds of thirty (30) miles per hour. It received a gold medal award for steam engine design at the Philadelphia Automobile show.

The town's major institutional buildings were all built during the Late Industrial Period, including Town Hall (c. 1900), Center School (c. 1890), Center Congregational Church (c. 1900), Putnam Opera House (c. 1877), Orange Savings Bank (c. 1874), Mann Block (c. 1892–1954) and Memorial Hall (c. 1892- 996). Other surviving buildings from this period include three or more churches, Wheeler Memorial Library (c. 1912), Wheeler Mansion (c. 1910), and most of the commercial buildings on East Main Street. The finest complex of three and four-story brick buildings in Orange Center are at 50 and 58 South Main Street, formerly a portion of the New Home Sewing Machine complex (c.1885).

B.7 Early Modern Period (1915-1940)

By the early 20th century, the Town's period of major growth had passed even though there were growth spurts in the late 1920's and 1930's. By this period, thousands of acres of abandoned farmland throughout the Town had reforested naturally. The Orange State Forest was set aside for hunting and recreation on three tracts of land at the Town's western edge. Public parks like Butterfield Park were integrated into residential neighborhoods to alleviate the density of worker housing. Interest in the rural landscape was growing along with industrialization, and people were attracted to places like Orange for recreation. The railroads and newly established scenic auto routes showed off the natural beauty of the Town, and seasonal cabins were built at Lake Mattawa, Packard Pond, and in surrounding forest areas.

B.8 Late Modern Period (1940-present)

By the mid-20th century, agriculture was no longer a primary industry. The Town's growth and economic stability continued to depend on manufacturing industries like the Rodney Hunt. Later in the 1920's and '30's, the Minute Tapioca Company was a leading employer manufacturing this mass-produced dessert food for worldwide distribution. Another important firm was NRG Industries (formerly the Orange foundry), which produced rough iron castings, wood burning stoves, and accessories.

However, the manufacturing base in towns like Orange had declined from their highpoint earlier in the century. As roadways and auto travel competed with the rail system, small, regional industries gave way to larger, centrally located plants in other parts of the country. Trucking moved goods efficiently over long distances. People retreated to their private automobiles for commuting to new job centers, and for vacationing and recreation. Regional highways were

expanded and improved. Passenger rail service in Orange ended in the late 1950’s. Downtown Orange continued to expand for a time, but soon housing began to spread to subdivisions on former agricultural land across the landscape.

C. POPULATION CHARACTERISTICS

In this section, Orange's needs for open space and recreational resources are assessed based on an analysis of demographic and employment statistics. The demographic information includes changes in total population, changes in the relative importance of different age groups in Orange and changes in the density of development across Town. Employment statistics describe one of the most important factors in the growth of a community, the status of its economic base and labor force. In particular it is important to understand who the major employers are in Orange, whether the Town is likely to attract new businesses or will be able to aid the expansion of existing businesses, and where the best locations for economic development will be in the future.

The Town is projected to grow at a slower rate than both the State and County, but at a similar pace to Montague which comparable in size to Orange. Also, the percentage of its elderly population is projected to grow, while the percentages of those younger than 65 is projected to decrease. Per capita and median household income in Orange continues to lag behind County and State incomes.

C.1 Demographic Information

According to the Orange Town Clerk, the population as of the January 2007 street census was 7,475. The historic trends show that despite the economic downturn over the past fifty-years in Orange, the community's population has grown steadily by nearly 7 percent (6.8%) from 1980 to 1990 and by just over 4 percent (4.1%) from 1990 to 2000 (U.S. Census of Population). (see Table 3-1).

Table 3-1: Population Change, 1980 to 2000

Geography	1980-1990 Change	1990-2000 Change	1980-2000 Change
Orange	6.8%	4.1%	10.9%
Franklin County	9.0%	2.1%	11.1%
Massachusetts	4.9%	6.2%	10.4%

Source: U.S. Census Bureau, Census of Population and Housing, 1980, 1990, 2000.

According to the FRCOG and Massachusetts Executive Office of Transportation (EOT), the Town of Orange will have an estimated 9,270 residents by 2030. EOT estimates that Orange will grow by 11 percent (11.1%) between 2000 and 2015 and 11 percent (11.0%) between 2015 and 2030. This local growth rate is on par with Franklin County's growth rate of 11 percent (11.8%) and 12 percent (12.3%) during the same periods (see Table 3-2 below).

**Table 3-2: Percentage of Population Change, 2000 to 2030
For the Town of Orange and Franklin County**

Location	2000 – 2015	2015 - 2030
Orange	11.1%	11.0%
Franklin County	11.8%	12.3%

Source: Franklin Regional Council of Governments and Massachusetts Executive Office of Transportation; 2007.

If we assume that the Town of Orange will experience a 22 percent rate of growth in its population (an additional 1,752 residents) between 2000 and 2030, how will this translate into demand for open space and recreational resources? Will these additional residents be young, middle aged, or elderly? Will they live in apartments in the village centers or in houses in rural outlying areas?

According to the U.S. Census, Orange had a relatively youthful population in 2000, compared to the State and County. This was determined by comparing the numbers of Orange residents that were in each of the ten-year cohorts in 2000 with those of the County and the State. A cohort in this case is a group of people organized by age in ten-year increments (0-9, 10-19, 20-29, etc.). In 2000, almost 24 percent of Orange’s population was 24 years old or younger, almost 52 percent is of working age (20 to 64 years old), and only 14 percent were elderly (65 and older).

The main differences between the population statistics for the period 1990 -2000 for Orange, Franklin County, and Massachusetts include:

- The 24 years and under cohorts for Orange and Franklin County decreased (-3.3% for Orange and -2.2% for the County), at a faster rate than the State cohorts.
- Cohorts in which adults work and/or raise children increased at a slightly faster rate in Orange and Franklin County than the State.
- Finally, Orange’s share of elderly people (over 75 years) grew by 2 percent, which is double that of the State and County.

Comparing this data with the growth projections through 2030, it appears that the population of Orange is aging and the Town should think about providing open space and recreation programming for an older population.

That said, however, recreation and exercise are becoming more and more important to peoples’ lives. The Town should seriously consider upgrading and expanding fields and playgrounds for the under twenty crowd; increasing the number of hiking and biking trails for the twenty to sixty year olds; and building other parks that are convenient and accessible for less mobile elderly and disabled individuals. Adding open space and recreational amenities will make Orange more “livable” for its residents and add to its appeal to attract visitors and new business. For example, the areas surrounding East and North Main Streets in Orange Center have no open play areas today. Many youngsters live in apartments that have little or no yard space, and Butterfield Park is too far away for the younger children. In Section 7, Analysis of Needs, recommendations are presented to address this problem.

As Town officials consider where to facilitate the development of new open space and recreation resources, they would do well to consider where population growth will occur and which parts of the local citizenry require specific needs. As will be seen in the build-out study in the fourth part of Section 3, *Growth and Development Patterns*, future growth will depend in large part on zoning and development trends.

There is room for additional residential development in Orange Center. Town officials should identify key parcels that might be future parks and portions of pedestrian walkways that are close to current housing and/or areas that would be developed later for residential uses. Officials should be looking for opportunities to conserve lands in Orange that protect valuable scenic and natural resources as well as provide public access to the trail networks and open spaces that Orange residents appreciate so much. Finally, sports fields should be located close to village centers where the density of future growth will be highest.

The ability of the citizenry to pay for recreation resources and programs and access to open spaces is an important consideration. By two measurements, per capita and median household income,¹ Orange households appear to have less earnings to spend on recreation and land protection than those across the County and State as a whole. And, Franklin County has among the lowest per capita income of all the counties in the State. As such, Town Officials should seek to provide low cost or free, convenient, and easily accessible, recreational programs, parks, and conservation lands for the benefit of Orange residents.

Table: 3-3: 2000 Per Capita and Median Household Income Statistics for Orange, Franklin County, Massachusetts, and the U.S.

Geography	1999 Per Capita Income	1999 Median Household Income
Orange	\$17,361	\$36,849
Franklin County	\$20,672	\$40,768
Massachusetts	\$25,952	\$50,502

Source: 2000 U.S. Census of Population.

C.2 Major Employer and Employment Statistics

Understanding the characteristics of Orange’s major employers and employment trends is important for two reasons. First, the economic health of the major employers and their associated industry sectors including service, retail, and manufacturing will impact the numbers of people employed in Orange. As employment expands an unintended result may be increases in the rates of residential development as people move to Orange to be closer to their jobs. The second reason to analyze economic trends, specifically major employers and employment, is to determine their need for additional infrastructure and land for future economic development.

Knowing the health of Orange's major employers is very important for residents. If employment were to increase in Orange, the benefits the community would receive would vary depending on whether the jobs were full-time or part time. Although a diversity of employment opportunities is important, part-time jobs are rarely secure or long-term and they may not include benefits.

¹ Income data are from the 2000 Census (SF3), and are reported for the previous year, 1999, when the Census survey was taken.

The manufacturing industry usually has a higher percentage of full-time employment while service and retail often provide part-time employment. Second, manufacturing jobs are unique in that they often produce expansion in service and retail industries as well, which could produce additional demand for housing. The major employers (companies with at least fifty (50) employees) in Orange in terms of number of employees are listed in Table 3-4.

Table 3-4: Major Employers in Orange

Employer	Industry Sector	Full-time Employees	Part-time Employees	Total Employees
Town of Orange	Government/Education	<i>Not Available</i>	<i>Not Available</i>	272
Wal-Mart Stores Inc	Retail	152	76	228
Rodney Hunt Co	Manufacturing (Metal)	210	0	210
Ralph C. Mahar School District	Education	123	3	126
Seaman Paper Co. Inc	Manufacturing (Paper)	<i>Not Available</i>	<i>Not Available</i>	98
Hannaford Super Market	Retail	<i>Not Available</i>	<i>Not Available</i>	62
Total		-	-	996

Source: Franklin Regional Council of Governments, Interviews with Employers, 2002 & 2003.

Orange has six employers with at least fifty employees each. In 2000, according to the U.S Census Bureau, there were 2,079 people employed in Orange by 192 employers.² Roughly, fifty percent of the total employment in Orange is currently provided by the six major employers. Two of the six employers are manufacturing firms, which are more likely to provide full-time jobs. In addition, this group represents a large share of the industrial property that provides tax revenues. These major employers should receive support from the Town of Orange so that they remain in Town and expand locally.

In July of 2007, the Orange branch of Thomas & Betts, which manufactures electrical, electronic, mechanical, and utility products, closed. Overall, 150 jobs were lost. Although it was not possible to ascertain the share of total jobs lost by Orange residents, any position lost impacts local businesses that sell good and services to these employees.

By the same token, 185 small businesses provide 50 percent of the employment in town. These businesses provide basic services and commerce for the community and visitors to the area. Their vitality is representative of the economic health of Orange as a whole, so the Town needs to support them. For example, increasing the number of parks in Orange center as part of a main street revitalization effort would improve the appearance and livability of the downtown and add amenities that local small business could utilize for their employees and to attract qualified employees to the area.

The construction of sixty-seven (67) acre the Randall Pond industrial park west of the municipal airport has provided needed infrastructure for expansion of existing transportation, communications, public utilities and manufacturing industries as well as the sites for up-and-coming small businesses. It would be important to encourage businesses that provide value without direct and indirect negative impacts. These would include the minimizing of hazardous materials use and storage, minimizing sewage production, minimizing drinking water use, minimizing traffic generation, and maximizing the ratio of property value and jobs created to

² Employment and Wages (ES-202), MA Department of Workforce Development.

space required. These requirements are all included in the Industrial Standards identified in the Orange Economic Development and Industrial Corporation's report on the Randall Pond Industrial Park.

The quality of natural resources and open spaces should be important considerations when siting new commercial and industrial development and when redirecting localized expansions of existing development. The industrial park was located near the airport to take advantage of a regional transportation resource. According to an analysis of the area's geology, there are glacial tills and clays, which in effect produce a barrier between the Randall Pond Industrial Park and the aquifer. However, most of the parcels of land currently used for industrial purposes in Orange Center are located within close proximity to the Millers River. This is mostly due to the historical use of the river for hydroelectric power, and the railroad line being located alongside the river. All future industrial development and current businesses within existing industrial sites should adopt best management practices. These new developments should also be required to refrain from using any materials that could jeopardize the quality of the river or of the groundwater. Town Officials should consider zoning measures that exclude those uses from the 100-year floodplain.

D. GROWTH AND DEVELOPMENT PATTERNS

D.1 Patterns and Trends

The Town of Orange developed from a sparsely populated agricultural community with its civic center in the northern highlands to a red brick downtown based on manufacturing powered by the river with transportation access provided by the railroad. This resulted in small lot housing to the north of the Main Streets, suburban neighborhoods to the south, and large lot single family residential uses along all the main roads. Like many communities across New England, Orange's pattern of development over the past one hundred and fifty-years has been one of attraction to and exodus from the Town Center. People were attracted away from farming in the highlands to manufacturing in the village center. Much later this was followed by an exodus of residents from the failing manufacturing centers to the ample open spaces of rural residential districts by way of suburban subdivisions and approval-not-required developments.

Between 1971 and 2006 the predominant land use change in the Town of Orange has been the construction of residential development on frontage lots and in subdivisions. Most of the residential development is in the form of approval-not-required lots that have occurred in the village districts as well as the more rural districts. From 1990 to 2003, there had not been a single subdivision approved. However, in recent years (since 2004), the Town has approved three subdivisions – Evergreen Acres (thirty-one building lots off Tully Road in the northern part of Town), Doubleday Fields (nineteen lots on South Main Street), and Pioneer Place (thirty-two duplexes) on New Athol Road (Route 2A). Approval of a fourth subdivision is pending – Millers Landing with fifty-one building lots is being proposed along the Millers River on East River Street.

According to the data provided by the Orange Building Inspector between 2000 and 2006 there were 232 new residential housing units in Orange. It represented a 7 percent increase in all the housing units in Orange. As pressures to develop rise, remaining farmland and other open spaces will become increasingly rare (based on building permit data files provided by the Orange Building Inspector, March 2007, to the FRCOG.)

D.2 Infrastructure

Infrastructure plays a vital role in current and future development patterns. Changes in regional and local transportation infrastructure in the past provided for both the rise and decline of the economic base in Orange. Drinking water supplies may be the new constraint to future growth. According to Bruce Merriam, Superintendent of the Orange Water Department, a lack in pipe size (and thus fire protection) has already limited commercial development along the eastern portion of Route 2A in Orange. Orange residents should be seeking to conserve both the quantity and the quality of the drinking water within their groundwater and aquifers. The waste water treatment plant and sewer collection system also play an important role in determining the location of dense residential development and future industrial and commercial development. Extending sewer lines without careful planning can increase residential development, reduce farming and forest acreage, and increase hydraulic flows to the wastewater treatment facility due to both.

D.2.1 Transportation Systems

Orange is located along highways that connect different portions of the north central Massachusetts to other regions. Route 2 is the major east/west highway in Northern Massachusetts. The road is going through a significant upgrade both to improve safety and access for commercial and industrial users. When this project is completed, it could have major implications for land use in Orange.

Route 2A connects the Town centers of Orange and Athol, which are less than five miles apart. Orange and Athol are destination points for Routes 202 (via 122) and 32, two main north and south highways that bridge the gap in central Massachusetts. These highways run along the western and eastern highlands surrounding the Quabbin Reservoir.

The main rail line of the Boston and Maine Corporation connects New England to the Midwest, serving Orange-based companies like Rodney Hunt and the Leavitt Machine Company. There is no passenger rail service at this time and there is interest in adding this service. Existing commuter rail lines are predicted to extend as far west as Greenfield by the year 2010 and could link Orange with major economic centers like Worcester and Boston.

The Orange Regional Airport covers four hundred and eighty (480) acres in the southern portion of town in between the town's two industrial parks. The airport, originally named Orange-Athol Airport was created in 1929 on the site of an existing private landing site. During World War II the U.S. Civil Aeronautics Administration expanded the airport from what was originally only

the front field to its current 480 acres and constructed three 5,000 foot runways to upgrade the airport for military use as an alternate landing site to Westover Air Force Base.

The airport provides a transportation benefit to the local community in several ways. The airport provides the local community with access to the national air transportation system, and likewise, the airport provides communities and businesses throughout the United States with access to Orange. In fact, the location of an airport is one of the most important considerations in locating a major business. A recent survey conducted by the Dow Jones Company found that local air transportation access is the single most important attribute in selecting a location for corporate headquarters, and research and development facilities.

The airport enhances the well being of the community, maintains environmental resources, supports law enforcement, transports goods and supplies, provides emergency medical transportation, and is used extensively by area businesses. The airport is a valuable economic development resource for the area and is self sufficient.

The airport also provides many recreational opportunities to the community. The front field area is available to the public and is frequently used by local residents for various activities including youth sports, dog walking, kite flying, and picnic lunches. The newly constructed Jumptown skydiving facility provides thrill seekers with state of the art parachute instruction for the novice as well as the advanced jump enthusiast. Jumptown and the airport both sponsor several events throughout the year which are enjoyed by spectators from near and far.

Although the airport is still utilized largely for recreational purposes, recent trends have changed the airport's role much more toward corporate use. The airport currently has about 38,000 aircraft operations annually and about 60 percent of those operations are non-recreational in nature.

G-Link is a fixed-route bus service that runs weekdays along the Route 2-2A corridor between Greenfield and Gardner, linking Orange and Athol as well. G-Link also runs bus service between Gardner and Winchendon. The Franklin Regional Transit Authority (FRTA) provides the western part of the Link service between Greenfield and Athol, and the Montachusett Regional Transit Authority (MART) provides the eastern part between Gardner and Orange and Gardner and Winchendon. There is overlapping and connecting service to Athol and Orange.

Orange's transportation resources give the Town the characteristics of a hub that has yet to be fully utilized. Routes 2, 2A, and 202, the railroad, and the airport are resources that are available for the next surge of development. It is difficult to predict when the wave of new businesses and residents will come to Orange, but when it does, the highway and transportation corridors will continue to affect the development patterns. Marketing Orange as a hub in north central Massachusetts that is accessible to good transportation resources and great outdoor and recreational opportunities could be a way to attract new business and improve the economy of the Town.

D.2.2 Water Supply Systems

The Town water supply is currently adequate, with three municipal wells classified as active. These ground sources are supported by two, one million gallon storage tanks. Three of the wells had their Zone II and Zone III recharge areas delineated and mapped in 1994. That same year the safe yields were calculated for each well and the entire system's permitted withdrawal volume was established. The permit is for twenty years with reviews of the water withdrawal data occurring every five years by the Department of Environmental Protection. It is expected that the permitted withdrawal volume will increase over time as the community's population and demand for water increases.

Currently the average daily use is approximately 535,000 gallons per day or 0.535 million gallons per day (MGD). The current permitted withdrawal volume is nine hundred and thirty thousand gallons per day (0.93 MGD). The safe yield of the three wells combined is equal to 1,680,480 gallons per day (1.68 MGD). The safe yield is the amount of water that can be withdrawn on a continuous basis during an extended dry period without adverse hydrological or ecological impacts (Skiba, DEP, personal communication; 1999). It appears as if there is enough drinking water for current demand.

However, Orange Town Officials are considering the long-term protection of both the quantity and quality of the public drinking water supplies. The public water supply wells' Zone II and III recharge areas are now part of the Town's zoning bylaws and are considered as Water Resource Districts. Within these districts land uses that are commonly associated with the use, production and storage of materials that could contaminate the water within the aquifers are prohibited. In addition a new source of drinking water is being developed north of the Millers River to serve local residents and businesses located in that part of Orange.

Water supplies and the reach of their delivery systems could limit growth in the future. A watershed can only supply a certain volume of water before its plants and animals suffer. This is theoretically the basis for having registered withdrawal volumes and for the calculation of safe yield figures. Because drinking water is a finite natural resource that is heavily regulated in Massachusetts, Town Officials should consider use of the water mains as a boundary to new growth in the future. At some point in the future, demand for water could exceed both drinking water and fire protection supplies.

The Quabbin Reservoir, Boston's water supply, is a unique resource which is located southeast of Orange and which could have a significant impact on the availability of water. Quabbin is part of the Chicopee River watershed, some of which is located in Orange, and is a major tributary to the larger Connecticut River. The Millers River is also a major tributary of the Connecticut.³ As the number of cities and towns with access to the Quabbin Reservoir increase, so does the risk of shortages in supply when periodic droughts occur. The same is true of cities to the south in the Connecticut River watershed – Springfield, Massachusetts and Hartford, Connecticut – which would want to protect flows upstream from rivers like the Millers and Chicopee Rivers. This is an issue that communities such as Orange need to consider and to

³ The Millers and Chicopee Rivers are two of thirty-eight (38) major tributaries identified in the Connecticut River waters in the Environmental Impact Statement for the Silvio O. Conte Wildlife Refuge issued in 1998 by the US Fish and Wildlife Service.

present to the Commonwealth and the Massachusetts Water Resources Authority as they consider growth and change in the eastern portion of the State.

D.2.3 Wastewater Treatment and Sewer Systems

The Town's sewer system includes one wastewater treatment plant and a collection system that dates back to the 1890's. Orange upgraded the treatment facility in the late 1990's. These improvements included increasing the capacity of the pumps, a new fine bubble aeration system, and upgrades to the return activated sludge controls. These improvements resulted in an increase in the design capacity of the plant for handling hydraulic flow, which is the water entering the plant, from 1.1 MGD to 1.35 MGD. The age of the sewer pipes has contributed to problems of infiltration and inflow (I & I). Infiltration is groundwater entering cracked pipes and inflow is storm water getting into the pipes from cracked manholes and other sources. Fixing I & I problems can be an expensive proposition. One main section of pipe was repaired and according to the Chief Operator, Ed Billiel, the wastewater treatment plant has seen a significant reduction in hydraulic flow.

The Town of Orange completed a Comprehensive Wastewater Treatment Master Plan in 2000. The plan evaluated the existing conditions of the wastewater treatment facility (WWTF) and wastewater collection system, make recommendations for cost-effective improvements for increasing the system's efficiency over the next twenty years, and look at the potential of expanding the sewer system. According to the Chief Operator, the most important issues for the future include a number of collection system improvements and a second phase of construction projects, including flow equalization, grit removal, an additional clarifier, and a new aeration and disinfection system.

The public sewer system can impact development in a number of ways. First, where new sewer lines go, so development will follow. Sewer infrastructure should be expanded to ensure that new industrial development occurs away from sensitive natural resources and that new dense residential development is built ideally within a Town-mandated boundary. Second,, due to Title 5 regulations, Towns may be inclined to rescue residents with problem sewer systems. Expanding sewer to areas with physical and hydrogeologic constraints may open up other areas to future development. Third, expanding sewer lines increases the cost of upkeep and repair to the Town of Orange, particularly with respect to infiltration and inflow problems. In addition, new demand for public sewer service may require further expansion of the wastewater treatment capacity, which can be very expensive.

The point is that public sewer systems can be a valuable tool for controlling and, in a sense, rewarding dense residential development that remains close to existing infrastructure. On the other hand, expanding sewer can create a major drain on the Town budget due to repair costs and the costs of future community services that will be the result of expanding sparse yet sewered residential development in rural outlying areas.

D.3 Long-term Development Patterns

Long term development patterns will be based on a combination of land use controls and population trends.

D.3.1 Land Use Controls

The Town of Orange has three local land use controls: zoning districts, water resources districts, and an open space development bylaw.

Zoning Districts: Orange separates the Town into five zoning districts: Village Residential (Ar), Village Residential/Commercial (Ac), Residential/Commercial (B), Residential (C), and Rural Residential (D). The Dimensional Schedule is described in the table below.

Table 3-5: Selected Features from Town of Orange Zoning Bylaws

DISTRICT	A (r) & A (c)	B	C	D
Max. Lot Coverage	70%	35%	25%	25%
Max. # of Stories	4	3	3	3
Min. Lot Area (sq. ft.)				
With sewer	10,000 sq. ft.	21,780 sq. ft.	43,560 sq. ft.	87,120 sq. ft.
Without Sewer	21,780 sq. ft.	43,560 sq. ft.	43,560 sq. ft.	87,120 sq. ft.
Min. Lot Frontage	50	100	100	200
Min. Front Yard	20	20	35	35
Min. Side Yard	10	10	15	20
Min. Rear Yard	15	15	25	35
Additional Lot Area Required for Each Attached Dwelling Unit over 2				
With sewer	10,000 sq. ft.	20,000 sq. ft.	20,000 sq. ft.	20,000 sq. ft.
Without Sewer	20,000 sq. ft.	40,000 sq. ft.	40,000 sq. ft.	40,000 sq. ft.

Source: Town of Orange Zoning By-Law; May 3, 1999.

Water Resource Districts: The following primary and accessory land uses are prohibited in Zones II and III of Orange’s three public water wells:

- Generate, treat, store, or dispose of hazardous waste;
- Provide for wastewater treatment;
- Store road salt or deicing chemicals;
- Junk yards, salvage yards, gasoline stations, or landfills; or,
- Residential units served by on-site sewage disposal systems with less than one acre in lot size, which could affect the quality of the water within the groundwater or aquifers.

Open Space Development Bylaw: This town bylaw provides for a type of residential development in which the houses are sited together into one or more groups within the development, and separated from adjacent properties and other groups by undeveloped land. The purpose of this zoning is primarily to preserve open space for conservation, recreation, or agriculture purposes utilizing the natural features of the land. A revision of the Open Space Development Bylaw was a part of a major overhaul of the Orange Zoning Bylaw in 2006. The minimum requirements for use of this bylaw are:

- Six acres in single ownership;
- The maximum number of dwelling units shall not exceed that which is allowed within a conventional subdivision;
- The use schedule is equal to that of the zoning district;
- Access on a public or approved private way;
- Fifty-foot side and rear yard buffer strips of natural vegetation;
- Thirty-five percent of the total parcel must be set aside as common open space or open land (to be owned by the Town or covered by a conservation easement), none of which can be wetlands, floodplains, existing permanently protected open space, land with slopes greater than 25% roadways or accessory uses.

A dimensional schedule which dictates that at least sixty percent (60%) of all units must be single family detached commonly on twenty thousand square feet (20,000 sq. ft.) but a maximum of twenty percent (20%) of these may be on lots less than that, to a minimum of ten thousand square feet (10,000 sq. ft.); up to forty percent (40%) of all units may be attached units, each unit having a minimum of ten thousand square feet (10,000 sq. ft.) per lot size; and in addition, the bylaw allows for fifty foot (50 ft.) frontages and zero side lines.

In essence, Orange's land use controls will create a pattern of development today that is similar to that which was developing in the Town center around 1900. It encourages dense residential development in and around Orange Center. Along the river, where the railroad is, industrial and commercial development is encouraged to occur nearby dense residential development. However, in the rural areas where farmsteads once stood surrounded by vast undeveloped areas of cropland, these pastures and woodlands have been, and will continue to be, encroached upon by larger lot residential development.

Developing industrial parks outside of the village center separates incompatible uses and reduces traffic congestion near dense residential areas. If allowed to spread throughout large areas of Town there may be unintended consequences to valuable natural resources. Commercial and industrial development could negatively impact aquifers and groundwater, because the Town has designated two whole districts for commercial and industrial development and all but the village districts which include uses allowed by special permit.

D.3.2 Build-out Analysis

To illustrate the long-term effects of current zoning, results of a build-out study are included here with modifications based on recent 2006 zoning by law changes, i.e. increased lot size in Zone D from one to two acres. This build-out study was part of a State-wide effort funded by the Executive Office of Environmental Affairs carried out in 2000-2001. The methodology and results of the build-out study and associated GIS mapping is explained below.

The purpose of the build-out analysis is to determine potentially developable land areas for residential, commercial, and industrial development. The process starts with identifying development that already exists based on 1997 MacConnell Land Use data and new subdivisions built since that time. Already developed areas are subtracted from the Town's total acreage and the remaining area is classified as undeveloped. Undeveloped areas are then screened for

environmental constraints such as steep slopes in excess of twenty-five percent (25%), wetland areas, Rivers Protection Act buffer areas, and Zone I Recharge areas to public water supplies. In addition, protected open space is removed from consideration, but only those areas that are permanently protected, such as farmland in the Agricultural Preservation Restriction Program.

Interestingly, some areas which you would expect to be screened, such as those held by water districts to protect public water supplies, may not be if a conservation restriction or some other legal mechanism is not placed on the deed to permanently protect the land as open space. Slopes between fifteen and twenty-five percent (15-25%) are considered a partial constraint, since certain types of land use typically do not occur on relatively steep slopes. For purposes of this build-out analysis, it was assumed that commercial and industrial development, and residential districts with small lot sizes would not occur on slopes of fifteen and twenty-five percent (15-25%). However, it was assumed that large lot residential zoning could occur on slopes of fifteen and twenty-five percent (15-25%) given greater flexibility to grade and site structures. The areas that remain after the screening process are considered potentially developable.

There is also an overlay district that affects the population density in portions of the Residential (C) and Rural Residential (D) Districts in the southern-most portion of Orange. The Massachusetts Metropolitan District Commission (MDC) regulates the use of land, which is within a 400 ft. buffer of any tributary in the Chicopee River Watershed. These tributaries drain the watershed that recharges the Quabbin Reservoir. The impact of this buffer on the density of development allowed depends on the parcel in question. Unfortunately, applying this regulation on a parcel-by-parcel basis is unreasonable. The FRCOG Planning Department, in cooperation with MDC Planning Staff, developed an application of this regulation that could be used in the build-out analysis through the creation of a 200 ft. and a 400 ft. buffer around the tributaries. Development within the 0-200 ft. buffer would be prohibited. Any residential uses built in the 200-400 ft. buffer would have a minimum lot size of two acres. This in effect decreases the density of residential development in areas containing tributaries that are most sensitive to contamination.

Zoning districts are then overlain on the potentially developable areas and a “build factor” is calculated. The build factor is calculated based upon the requirements of each zoning district in terms of minimum lot size, frontage, setbacks, parking required and maximum lot coverage permitted. Once calculated, the Build Factor is used to convert potentially developable acreage into either residential house lots, or commercial or industrial square footage depending on the zoning district. Once house lots are calculated this can be translated into estimated population growth, miles of new roads, and additional water consumption and solid waste generation. Commercial and industrial square footage is calculated and its associated demand for water is estimated.

Table 3-6: Summary Build-out Statistics of New Development and Associated Impacts

SUMMARY BUILDOUT STATISTICS (New Development & Associated Impacts)	
Potentially Developable Land (sq. ft.) [1]	546,767,298
Potentially Developable Land (acres)	12,552
Total Potential Additional Residential Lots	6,935
Total Potential Additional Residential Units	7,207
Potential Additional Comm./Ind. Buildable Floor Area (sq. ft.)	5,660,553
Potential Additional Residential Water Use (gallons per day) [2]	1,405,542
Potential Additional Comm./Ind. Water Use (gallons per day) [2]	424,542
Potential Additional Non-Recycled Solid Waste (tons/year) [3]	6,837
Total Population at Buildout	26,312
New Residents [4]	18,741
New Students [5]	3,870
New Residential Subdivision Roads (miles)	61
Notes:	
<ol style="list-style-type: none"> 1. All wetlands removed from potentially developable land No development on slopes in excess of 5% No development in Zone I Water Supply Protection Areas No development in permanently protected open space No development within 150-foot buffer of transmission lines 2. Estimate from the Department of Housing & Community Development's Growth Impact Handbook 3. Statewide Average 4. 1990 Census; Population/Housing Units 5. MISER; 1997 School Children/Population 	

The results of the build-out analysis are often quite startling. Table 3-6 describes the results of the build-out in numerical terms. While it might take many decades to reach “build-out,” it is quite clear that current zoning will not protect the community’s rural character or natural resource base. Two plans have been completed in recent years, a Master Plan in 2005 and a Community Development Plan in 2004 that identify the areas most suitable for development. The update of the Open Space and Recreation Plan in 2008 will identify and prioritize open space that should be protected. All of these plans should be translated into recreation and land protection programs in order to realize the balance desired by a community between natural resource protection and development.

Recent zoning and land protection efforts have helped reduce the total number of lots that could be developed in Orange from roughly 11,000 to 7,000 with subsequent reductions to development’s impacts. The Town of Orange has zoning that is designed to promote the kind of development pattern in the Town center districts that existed in 1900. Although sprawl is still

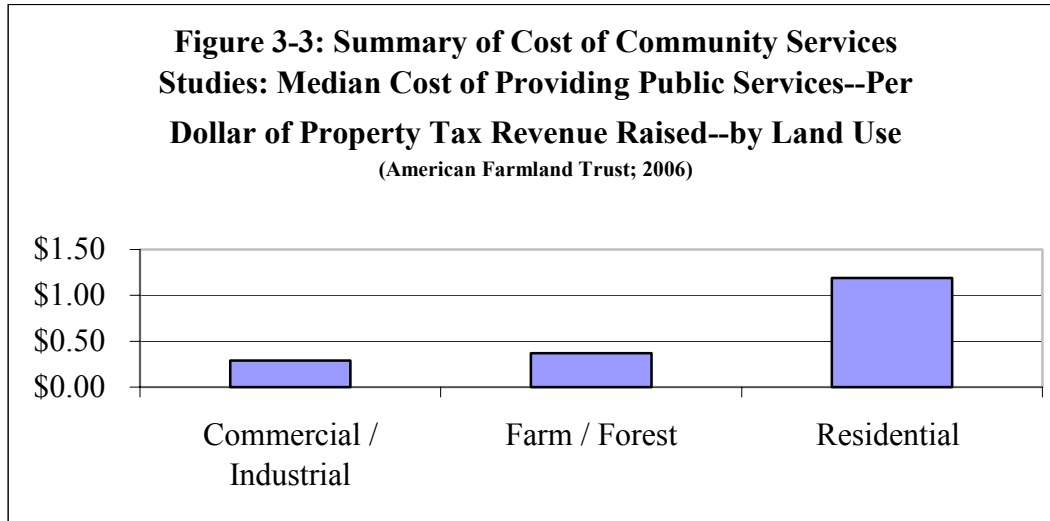
the development pattern that can continue to occur in outlying rural Orange, the recent increase in the minimum lot size and the adoption of revisions to the OSRD bylaw enables more compact development and the protection of privately-owned open space. Still, the largest district, Rural Residential, could result in over 7,200 new housing units.

Although it is not possible to determine exactly when build-out might occur, this may not even be necessary. Before the last acre was developed, Orange would probably have run out of water. In addition, with over 3,870 new school children at build-out (down from 6,800), Town officials would have to build many new elementary schools. New subdivisions could result in the need for over 61 new miles of roads that would have to be built and maintained (down from 190). Fire and police services would have to expand to protect the increased population. It is likely that at some point on the path towards complete build-out, the Town of Orange would seek to control this expensive development.

The challenge for Orange and many small rural towns is to identify a model for growth that protects vital natural resource systems like aquifers while also promoting a stable property tax rate. In designing the model it is important to understand the measurable fiscal impacts of different land uses. For instance, open space, residential, and commercial/industrial development each contribute differently in the amount of property tax revenues generated and they often require different levels and types of municipal services.

The American Farmland Trust (AFT) and other organizations have conducted Cost of Community Services (COCS) analyses for many towns and counties across the country. A COCS analysis is a process by which the relationship of tax revenues to municipal costs is explored for a particular point in time. These studies show that residential uses require more in services than they provide in tax revenues and that these communities, at the time of the study, were balancing their budgets with the tax revenues generated by other land uses like open space and commercial and industrial property.

Figure 3-3 demonstrates the summary findings of 122 COCS studies from around the country. For every dollar of property tax revenues received from open space, the amount of money expended by the town to support farm/forestland was under fifty cents while residential land use cost over a dollar. Taxes paid for by owners of undeveloped farm and forestland help to pay for the services required by residential land uses. When a town has few land uses other than residential, homeowners and renters pay the full cost of the services required to run a municipality, maintain public ways, and educate young people. In this way, local property real estate taxes tend to rise much faster in communities that have little protected land and higher rates of development.



Source: American Farmland Trust; 2006.

The second component of a balanced land use plan concerns the development of other tax-generating land uses beyond open space. The COCS studies showed that for every dollar of taxes generated by commercial and industrial uses, the cost to towns for these uses resulted in a positive net gain. Patterns of commercial and industrial uses vary considerably between towns but all communities need to consider the impact of commercial and industrial development on the overall quality of life for residents.

The best types of commercial and industrial development to encourage in Orange might have some of the following characteristics: locally owned and operated; in the manufacturing sector; being a “green industry” that does not use or generate hazardous materials; businesses that add value to the region’s agricultural and forest products; and businesses that employ local residents. It is also important to consider that successful commercial and industrial development often generates increased demand for housing, traffic congestion and some types of pollution. Therefore, the type, size, and location of industrial and commercial development require thorough research and planning.

For Orange, an approach that encompasses both appropriate business development and conservation of natural resources will best satisfy the desires of residents to maintain their community character while offsetting the tax burden. By continuing to pursue growth management strategies that include active land conservation that balance development with the protection of natural resources, Orange will be able to sustain and enhance the community’s agricultural and forested rural character and help to maintain a high quality of life for residents.