

TOWN OF DEERFIELD

OPEN SPACE AND RECREATION PLAN 2006

**Prepared by the
DEERFIELD OPEN SPACE AND RECREATION
PLANNING COMMITTEE**
Carolyn Shores Ness, Chair

With the Assistance of the
FRANKLIN REGIONAL COUNCIL OF GOVERNMENTS
PLANNING DEPARTMENT



*This project was funded by the
Massachusetts Executive Office of Environmental Affairs*

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SECTION 1

PLAN SUMMARY

Deerfield residents have a history of working together to solve problems, methodically re-creating their town based on a collective vision. This Open Space and Recreation Plan continues that tradition, as many of its actions are dependent on careful assessments of resources and needs by a cross-section of interests and levels of expertise at town-wide and neighborhood scales. There is a growing understanding among the citizenry of the interconnectedness between land use decisions, the state of the environment, and the quality of life as experienced by all.

The purpose of the Deerfield Open Space and Recreation Plan (OSRP) is to provide a framework for decisions dealing with land use, natural systems like the water cycle, and the lands that contain unique forest, agricultural, historical, recreational and scenic values. It is also a work plan for people who want to engage in the stewardship of the environment in their town.

The 2006 Deerfield Open Space and Recreation Plan is based on community members' collective understanding of the interdependence of rivers, wetlands and aquifers, ridgelines and contiguous forests, recreational trails and access, agricultural fields, scenic views, and significant historical structures and landscapes with each other and with the town's rural character as a whole. The Open Space and Recreation Plan also illustrates the role that all undeveloped lands have in providing wildlife habitat, in ensuring the integrity of drinking water supplies, and at least in part, in providing for residents' livelihoods.

The Plan highlights the town's natural, historical, and recreational resources, including:

- Prime farmland and working agricultural businesses;
- Critically important ground and surface waters;
- Large blocks of contiguous forest;
- The Connecticut and Deerfield Rivers;
- Trail systems on private and public lands;
- Rare wildlife habitats; and,
- Significant historical sites and buildings throughout Deerfield.

The Five-Year Action Plan provides direction to a myriad of local boards, commissions, and committees about how to implement the goals and objectives that were developed in part from the results of the 2006 Open Space and Recreation Planning Survey and from

community members' understanding of their town's significant yet vulnerable natural and cultural resource base.

SECTION 2

INTRODUCTION

A. STATEMENT OF PURPOSE

The purpose of this plan is to provide a basis for decision-making based upon the short-term and long-term needs of Deerfield residents regarding the protection and/or enhancement of priority natural, cultural and recreational resources. Specifically, it is designed to help residents and town officials decide which conservation opportunities they should act upon. In addition, this plan represents the collective will of many citizens who are committed to understanding and solving complex environmental challenges e.g., high water tables, flooding, water demands, and environmental pollution. This OSRP represents consensus on the most important recreational, scenic, and natural resource-related needs in town and on the best solutions for addressing these needs. The Five-Year Action plan, when carried out by town boards, commissions and committees, will implement the Town's open space and recreation goals and objectives (*see Section 8*) as well as provide citizens with meaningful experiences in the stewardship of their whole community.

B. PLANNING PROCESS AND PUBLIC PARTICIPATION

A. DESCRIPTION OF PROCESS

The Town of Deerfield's open space and recreation goal statement was developed through a survey and a series of meetings between January and June 2006. In March of 2006, an open space and recreation survey was developed by the Town of Deerfield. The random sample survey was mailed to approximately 200 households in Deerfield (*see Appendix A for a copy of the survey*). Of these, seventy-nine were returned, which represents a 40 percent rate of return. The survey responses were used to help the Open Space and Recreation Planning Committee focus on the development of the Preliminary Draft Section 8-Goals and Objectives.

On March 29, 2006, approximately twenty-six (26) individuals participated in a kick-off meeting for the Deerfield Open Space and Recreation Plan. During the meeting, residents' opinions were recorded regarding the most important natural, recreational and historical resources in Deerfield and the best actions for the town to take to protect or enhance them. A mapping exercise encouraged citizens to identify areas in town that were the most important to protect, and the locations of environmental problems like

dumping and unauthorized recreational use. The results of this exercise were used to develop a draft set of goals and objectives.

During the months of March, April, May and June 2006, the Deerfield OSRP Committee held a series of public meetings--two each month. During these meetings, Committee members discussed open space and recreation goals and objectives and their opinions on the most critical environmental problems in Deerfield. In addition, they reviewed and discussed draft sections of the Deerfield OSRP.

On June 21, 2006, the OSRP Committee held a public forum to present the town's five-year open space and recreation action plan and receive feedback on all of the plan's products, including the geographic information systems (GIS) maps.

SECTION

3

COMMUNITY SETTING

The Town of Deerfield contains rural landscapes that have been established, developed, and formed by its human inhabitants over thousands of years. Planning for open space in Deerfield must consider the complex relationships between people and the open spaces and natural resources upon which they depend. If development occurs without consideration for natural resources, such as drinking water supplies, the quality of life for current and future generations of Deerfield residents could be diminished over time.

A. REGIONAL CONTEXT

The Town of Deerfield, an historic agricultural and residential community, is located in the center of Franklin County in western Massachusetts. It is approximately eight miles south of Greenfield, ninety-nine miles west of Boston and 162 miles northeast of New York City. The town encompasses a geographic area of thirty-three miles and lies within the heart of the Pioneer Valley. Deerfield is bordered by the Connecticut River and the Town of Montague to the east, Whately to the south, Conway to the west, and Shelburne and Greenfield to the north. The Deerfield River forms part of the northern and western boundaries of the town, and winds through the town's northern half.

The Town of Deerfield contains within its boundaries several different landscapes: the eastern facing slopes of the foothills of the Berkshires, the floodplains of the Connecticut and Deerfield Rivers, and the north-south running Pocumtuck Range. Prominent peaks include North and South Sugarloaf, the Pocumtuck Range and Arthur's Seat with elevations that range between 400 and 900 feet above sea level. Deerfield is located in two main watersheds, surrounding the Connecticut River and the Deerfield River. Historically these rivers played important roles in the transport of goods to markets in Boston, Connecticut and New York. The Mill River, located in the southwestern section of town, is a subwatershed of the Connecticut River Basin. In the future, if adequately protected and enhanced, the rivers may once again unite the region through the establishment of continuous greenway networks.

Routes 5/10 and 116 constitute important transportation corridors that link Deerfield to the surrounding municipalities. Route 5/10 is the main thoroughfare which connects Deerfield to Whately and Northampton in the south, and Greenfield and the Mohawk Trail in the north. Route 116 cuts diagonally through Deerfield, linking the small town to Sunderland and Amherst to the southeast, and to Conway, Ashfield and the Berkshires to the northwest. Interstate 91 bisects the town, bringing tourists and providing a convenient connection to important employment centers such as Springfield and

Hartford, Connecticut. The East Deerfield rail yard links the east coast to the Midwest and points north and south for the movement of freight. Interstate 91 also provides access to the Massachusetts Turnpike, which extends from Boston to Albany, New York. Local roads usher people to and from towns that are not linked to Deerfield via a federal or state highway.

Deerfield's location on two major rivers and several key transportation routes has resulted in its settlement first as an agricultural center in the 17th century, then its development as a manufacturing center in the 19th century, and ultimately its emergence as a tourist destination in the 20th century. Throughout the centuries, however, the Town has maintained its historic ties to farming, with more than 4,800 acres, or nearly 23 percent of the Town's total area, continuing to be devoted to agricultural uses.

In order to plan for the protection of open space and natural resources in the Town of Deerfield, residents should consider the role natural resources play across the region. The character of the landscape in Deerfield is dominated by three watersheds; large blocks of dense, contiguous forestland; and farms located on prime soils in the floodplains. Each of these characteristic landscapes is discussed in detail in Chapter 4, Environmental Inventory and Analysis. The presence and relatedness of these significant resources present both opportunities and challenges to open space and recreation planning for Deerfield. In addition, these landscapes have shaped the historical development of Deerfield and the surrounding region.

B. HISTORY OF THE COMMUNITY

Deerfield's history is a fascinating drama punctuated by periods of intense violence. Incorporated in 1673, the town was the first to be settled in Franklin County. Native Americans lived in the area for at least 8,000 years prior to that time. Pocumtuck Indians, named after the area where they fished, hunted and cultivated the land, inhabited and controlled Deerfield Valley until the arrival of European settlers in the latter part of the seventeenth century. They lived relatively peacefully and prosperously until the mid-seventeenth century when, after being weakened by several years of disease, much of the remaining Pocumtuck tribe was annihilated during a war with the Mohawks of the Hudson River Valley. In 1667, John Pynchon purchased 8,000 acres from the few surviving Pocumtucks. The first settlers, Samuel Hinsdale and Samson Frary, arrived with their families two years later (McGowan, et al; 1996). Shortly thereafter, lots were formally laid out and apportioned among the forty-three proprietors who came to reside in the settlement they called Deerfield.

Unfortunately, Deerfield's strategic location and isolation from other settlements made it susceptible to repeated raids from French and Indian forces until well into the 18th century. In fact, the fighting became so intense during King Philip's War that the town was abandoned in 1675 after an ambush at Bloody Brook. Massachusetts' oldest historic landmark commemorates the site of that dreadful massacre that left seventy-seven colonists dead. Deerfield was recolonized shortly thereafter and, to protect the

inhabitants during times of attack, a stockade was built around the central portion of the village that included a town common, a meeting house, several houses and storehouses. But peace was not forthcoming. Violent attacks were commonplace throughout the 1680s and 1690s. The hardest blow was dealt on a cold winter night in February 1704 when much of the village was burned to the ground and forty-seven of the 250 residents were massacred during a joint French and Indian assault. More than 100 others were captured and marched to a settlement near Montreal. The town became a military outpost for a time after the massacre but Deerfield did ultimately rebuild and new settlements to the north buffered future raids (Rettig; 1976).

Eventually Deerfield grew in population and prosperity, developing into a thriving center for agricultural products, specifically wheat, onions, and cucumbers. By the late 1700s the stall-fed oxen industry dominated Deerfield's economy. Later, broom corn and tobacco emerged as popular cash crops. Residents used the Deerfield and Connecticut Rivers as natural highways to transport these products to markets in Hartford, New York and Boston. During the French and Indian War and the American Revolution, Deerfield also became a trading post where craftsmen and shopkeepers supplied local farmers, soldiers and westward-moving settlers (Ball, et al; 1990). The economy was further diversified in 1797 with the establishment of Deerfield Academy, the town's first boarding school.

With their new-found wealth, residents began to beautify the town by constructing new houses, refurbishing old dwellings and planting elm trees along The Street (McGowan, et al; 1996). Twenty-four well-preserved houses remain from that period, many of which are still occupied, while fourteen others are open to the public for exhibition.

Yet the era of agricultural dominance in Massachusetts did not prevail. Construction of the Erie Canal in 1825 and expansion of the railway system opened up the fertile Midwest to development which led to heightened competition (DeGraaf, et al; 1996). New England's stony soils and small field sizes were not conducive to the new agricultural practices that accompanied mechanization. Western settlements, on the other hand, were able to use the new techniques to produce an abundance of grain, beef and other agricultural goods more cheaply than their New England counterparts. Also, the excitement, jobs and economic benefits of living in the cities and larger manufacturing towns beckoned young farmers (Foster; 1998). Therefore, the 1820s and 1830s began a time of economic decline in Deerfield as farmers pulled in less money and larger towns took trade and workers away from the rural community. For several years thereafter, Old Deerfield reverted to a sleepy village that experienced little growth.

The introduction of the railroad in the mid-1800s ushered in a new period of prosperity by providing regional and interregional movement for people and goods. In 1835, efforts to provide cheap railroad connections spawned the construction of the Boston-Worcester Railroad and, soon thereafter, the Boston-Albany line (Foster; 1998). Since it was no longer necessary to be near a waterway, the rapid development of South Deerfield took place where agricultural trade thrived, including the sale, shipping and processing of farm produce. South Deerfield soon developed as a local industrial center that specialized in

pocketbook, wallet and pickle manufacturing. These factories attracted immigrants who settled in South Deerfield, Cheapside (later annexed by Greenfield), and East Deerfield (Ball, et al; 1990). In the 1920s, two private educational facilities were established: the Eaglebrook School and Bement School. These schools helped boost Deerfield's economy further by providing jobs.

With the advent of the railroad, streetcar and ultimately the automobile, Deerfield became a popular tourist destination. Beginning at the turn of the last century, visitors from throughout the region frequented Deerfield's Memorial Hall Museum (opened in 1880), enjoyed the beautiful scenery and purchased arts and crafts from local artisans. Tourism continued to be an important industry throughout the 20th century. Today, South Deerfield's Yankee Candle Company is Massachusetts' second most visited attraction. Each year nearly two million visitors explore its Bavarian Christmas Village and spend money in area restaurants, motels and shops.

Deerfield's second most popular attraction is Old Deerfield, which was designated a National Historic Landmark in 1968. Historic Deerfield, Inc. is a not-for-profit corporation that oversees the Landmark's fifty-two historic buildings and ninety-three acres of land. Open year round, Historic Deerfield offers guided tours of several 18th and 19th century buildings, a variety of educational programs, romantic carriage rides along the meandering Deerfield River, and an interpretive trail through meadows, wetlands and working farms. The village has grown only slightly since its settlement more than three hundred years ago. Therefore, in keeping with its agricultural heritage, the mile-long street continues to be surrounded by pastures and woodlands. But because listing on the National Register in no way restricts landowners from altering, managing, or selling their property when using private funds, some fear that the character of this historic village will be destroyed by insensitive development. Fortunately, many acres of farmland south and north of the village have been protected through the acquisition of agricultural preservation restrictions.

Today Deerfield is a special place for several reasons. South Deerfield continues to maintain a strong industrial and commercial base with a variety of manufacturers, shops, restaurants, toolmakers and a printing plant. Meanwhile farming, arts and crafts, tourism and education remain a vital part of Deerfield's identity. With more than 4,800 acres still in active cultivation, the town has remained faithful to its agricultural heritage. Over 100 Deerfield residents are employed as farmers (Commonwealth of Massachusetts Division of Employment & Training; 2001). This blending of old and new is what makes Deerfield a unique place and is largely responsible for its popularity among residents and success as a tourist attraction.

C. POPULATION CHARACTERISTICS

In order to identify the open space and recreation needs of the community, it is essential to know about the people who call Deerfield their home. Therefore the size, age, density, income, and occupations of the population are discussed so that informed decisions may be made regarding the type, quantity, location and level of future investments in open space and recreation areas and facilities.

C.1 Demographic Information

According to the 2000 U.S. Census, Deerfield has 4,750 residents. As indicated below in Table 3-1, the population in Deerfield grew between 1970 and 1990, but then had declined by 2000. This contrasts with trends in Franklin County and the state of Massachusetts as a whole, where population growth has been steady over the years between 1970 and 2000.

Table 3-1: Total Population from 1970, 1980, 1990 and 2000

Geography	1970 Population	1980 Population	1990 Population	2000 Population
Deerfield	3,873	4,517	5,018	4,750
Franklin County	59,223	64,317	70,092	71,535
Massachusetts	5,689,377	5,737,037	6,016,425	6,349,097

Source: U.S. Census Bureau – 1970 Census, 1980 Census, 1990 Census STF3A, and 2000 Census SF3.

From 1970 to 1980, the population in the Town of Deerfield grew over 16 percent (*see Table 3-2*), and continued to grow from 1980 to 1990 by another 11 percent. For Franklin County, the rate of population growth was fairly consistent from 1970 to 1980 and from 1980 to 1990, with approximately a 9 percent growth rate for each of those time periods. However, the growth rate from 1990 to 2000 in Franklin County diminished to 2 percent. The Town of Deerfield’s population actually declined by 5.3 percent during the same period. In contrast, the state’s population did not grow as much as the county’s since 1970; however, the rate of growth continued to rise each decade. In spite of the variable rates of population growth and decline in Deerfield, the town experienced an overall increase in population between 1970 and 2000 of nearly 23 percent. This rate of growth exceeded the rates in both Franklin County and the state of Massachusetts over this extended period.

Table 3-2: Population Change from 1970 to 2000

Geography	1970-1980 Change	1980-1990 Change	1990-2000 Change	1970-2000 Change
Deerfield	16.6%	11.1%	-5.3%	22.6%
Franklin County	8.6%	9.0%	2.1%	20.8%
Massachusetts	0.8%	4.9%	5.5%	11.6%

Source: U.S. Census Bureau – 1970 Census, 1980 Census, 1990 Census STF3A, and 2000 Census SF3.

According to the Franklin Regional Council of Governments’ 2000-2025 Population Projections developed as part of the 2003 Regional Transportation Plan, the Town of Deerfield will experience an increase in population during the twenty-five year period

from 2000 to 2025. FRCOG projects the town will gain 1,810 residents, which would be an increase of 38 percent over the current population. The county’s population is expected to increase by 21 percent during the same time period.

If we assume Deerfield could experience a 38 percent increase in population by the year 2025, how would this translate into demand for open space and recreational resources? Would these additional residents be young, middle-aged, or elderly and, what would be the age distribution of the population in 2025? How could these changes in population impact demand for open space and recreational resources?

According to the 2000 U.S. Census General Demographic Characteristics shown in Table 3-3 below, the Town of Deerfield experienced a decrease from 1990 to 2000 in the proportion of the population under 9 years of age, while the proportion of young adults from 10 to 19 years of age increased. For the age group from 20 to 24 years old, there have been consistent decreases in the proportion of these individuals in relation to the total population. A considerable decrease in the distribution of people in the 25 to 44 year age group was noted; however, there was a dramatic increase of 8.5 percent in the distribution of 45 to 64 year olds over the ten-year period 1990-2000. This increase in the older age cohort represents the aging of the “Baby Boom” generation. The number of people between the ages of 65 and 74 decreased over this period. The 75 + age group represents a relatively small portion of the total population and has seen a slight increase.

Table 3-3: Age Distribution in 1990 and 2000

Geography	Total Population	% 9 Years & Under	% 10-19 Years	% 20-24 Years	% 25-44 Years	% 45-64 Years	% 65-74 Years	% 75 Years & Over
Deerfield								
1990	5,018	11.9%	11.9%	6.3%	35.0%	20.8%	8.3%	5.6%
2000	4,750	10.9%	13.4%	3.9%	28.7%	29.3%	6.9%	6.9%
Franklin County								
1990	70,092	14.5%	12.6%	6.4%	34.2%	17.7%	8.2%	6.3%
2000	71,535	11.5%	14.3%	5.4%	28.5%	25.9%	6.7%	7.5%
Massachusetts								
1990	6,016,425	13.1%	12.6%	8.4%	33.6%	18.6%	7.7%	5.9%
2000	6,349,097	13.0%	13.3%	6.4%	31.3%	22.4%	6.7%	6.8%

Source: U.S. Census Bureau – 1990 Census STF3A and 2000 Census SF3.

If the relatively large cohort of older (45-64) working-aged residents were to continue to reside in Deerfield, it could result in a significant population of individuals in the older age cohorts in ten to twenty years. How will the Town of Deerfield provide recreational facilities and services for all of its residents, especially the elderly, which may require accessible walking paths and arts and leisure programs? Residents of all ages may need facilities and programs that provide safe spaces for recreating as well as access to open space.

A large amount of Deerfield’s land is devoted to agriculture and open space, resulting in a relatively low population density of 147 persons per square mile. This figure has

fluctuated along with the population trends reported above, representing an overall increase of 21.5 percent since 1970 when it was 121 persons per square mile.

Identifying the best location for the development of new open space and recreation resources should consider where the concentration of population will occur and which parts of the local citizenry require specific needs. As will be seen below in Section D, Growth and Development Patterns, future growth depends in large part on zoning, slopes, soil and groundwater related constraints, and on which lands are protected from development. Town officials could identify key parcels that might be future parks and walking trails that are close to the current distinct neighborhoods and/or areas that could be later developed for residential uses. Officials could be looking for opportunities to conserve land in Deerfield that protects valuable scenic and natural resources and provides public access to trail networks and open spaces.

Whatever the generational make up of the future community, recreation and open space needs may change over time. What would Deerfield’s response be to these potential increasing and changing needs? How can these services and facilities be created in an inexpensive manner for both the town and the residents? The answers to these questions may depend in part on the current and potential economic well being of the Town of Deerfield and its residents.

C.2 Economic Wealth of Residents and Community

Measures of the income levels of Deerfield’s residents as compared to the county and state are helpful in assessing the ability of the citizenry to pay for recreational resources and programs, and for access to open space.

Table 3-4: Per Capita Income, Median Household Income, and Percentage Below Poverty Level in 1999 for Deerfield compared to Franklin County and the State

Geography	Per Capita Income in 1999	Median Household Income in 1999	Individuals Below Poverty Level*
Deerfield	\$24,555	\$49,764	4.5%
Franklin County	\$20,672	\$40,768	9.4%
Massachusetts	\$25,952	\$50,502	9.3%

* For whom poverty status was determined.
 Source: U.S. Census Bureau – 2000 Census SF3

Table 3-4 describes the earning power of residents in Deerfield as compared to the county and the state. The Deerfield per capita income reported for 1999 was \$24,555, which was higher than the county figure of \$20,672, and lower than the state figure of \$25,952. The Deerfield per capita income was the ninth highest of the twenty-six towns of Franklin County. The median household income for Deerfield was \$49,764 in 1999, which was much higher than the county (\$40,768) and just under the state figure (\$50,502). The Deerfield median household income in 1999 was the ninth highest of the twenty-six towns in Franklin County. Another way to describe a community’s income and economy is the poverty rate. In Deerfield, 4.5 percent of residents for whom poverty status was determined (for Deerfield, this was the entire population), were living below the poverty

level in 1999. Deerfield's poverty rate was significantly less than in the county (9.4 percent) and state (9.3 percent).

Although Deerfield's resources today consist of both its people and its natural landscapes, the status of its finances could be affected by an interdependent relationship that exists between the two. The costs of the community services provided to residents are paid for with the tax revenues generated by different kinds of property, both developed and undeveloped. Some developed uses, such as housing, often require more services including education and road maintenance. The costs associated with one household are rarely paid for by the revenues generated by that same property. One reason that towns encourage economic development is to have another type of property in town, other than residential, to share the tax burden. Protected open space on the other hand can cost towns very little in community services, provide a modest amount of tax revenues, and reduce the amount of housing that can ultimately occur in town. This relationship is explored in more detail below in subsection D, Growth and Development Patterns.

C.3 Employment Statistics

Employment statistics like labor force, unemployment rates, numbers of employees, and place of employment are used to describe the local economy. Labor force figures can reflect the ability of a community to provide workers that could be employed by incoming or existing businesses. Unemployment rates can show how well residents are fairing in the larger economy while employment figures describe the number of employees in different types of businesses. Employment can be used as a measure of productivity. The number of people employed in each business can be used to determine the types of industries that should be encouraged in town. The town may decide to encourage business development to create more jobs and as a way of increasing taxable property values, which can help pay for municipal services and facilities, including recreational parks and programming as well as protected open space.

C.3.1 Labor Force: Deerfield residents that are able to work

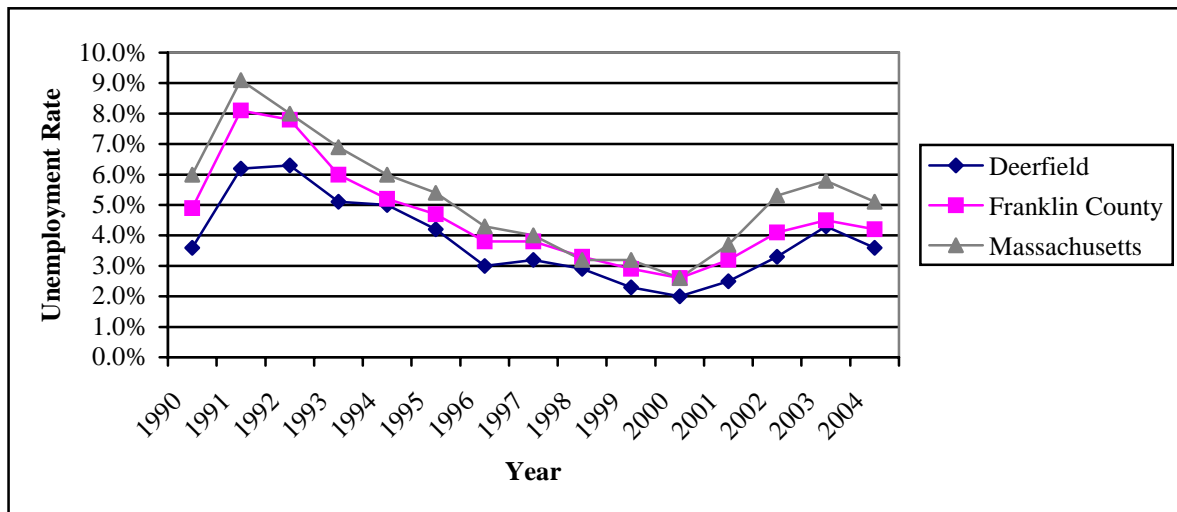
In 2004, the Town of Deerfield had a labor force of 2,810 with 2,709 residents employed and 101 unemployed (*see Table 3-5 below*). Deerfield experienced a 3.6 percent rate of unemployment, lower than both Franklin County's overall rate of 4.2 percent and the Commonwealth of Massachusetts' rate of 5.1 percent. For the period 1990-2004, Deerfield had a generally lower rate of unemployment than the county and state. (*See Figure 3-1 on the following page.*) This lower rate indicates that Deerfield has been in the unique position of not having been as severely impacted by the economic recessions and recoveries experienced over the past ten years as other areas have in terms of unemployment rates, in part because of the diversity of industrial sectors represented in the local economy (*see Table 3-6 below*). However, it is also evident that Deerfield's labor force figures and the number of employed in town are influenced by the greater economy, as demonstrated by the highs and lows in Figure 3-1.

Table 3-5: Labor Force and Unemployment Data 2004

Geography	Labor Force	Employed Persons	Unemployed Persons	Unemployment Rate
Deerfield	2,810	2,709	101	3.6%
Franklin County	39,771	38,095	1,676	4.2%
Massachusetts	3,393,100	3,219,500	173,600	5.1%

Source: Massachusetts Division of Employment & Training, ES-202 data.

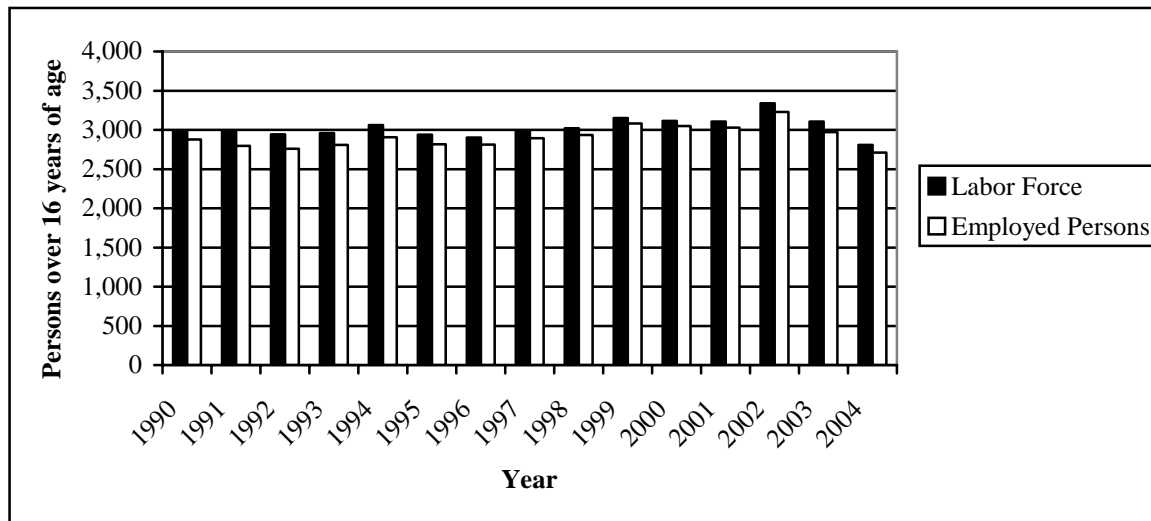
Figure 3-1: Unemployment Rates from 1990 to 2004



Source: Massachusetts Division of Employment & Training, ES-202 data.

As Figure 3-2 demonstrates, from 1990 to 2001, Deerfield experienced growth in the size of its labor force as well as in the number of people employed within that labor force. In 2002, the size of the labor force and the number of people employed increased greatly. Increases in the labor force may be from increases in the resident population's participation in the labor force and/or overall population growth in a community. However, these figures declined again in 2003 and continued to decline in 2004 to the lowest levels over this 15-year period.

Figure 3-2: Labor Force and Employed Persons in Deerfield from 1990 to 2004



Source: Massachusetts Division of Employment & Training, ES-202 data.

C.3.2 Employment in Deerfield: People who work in town, whether residents or not

The Town of Deerfield has benefited from a diverse local economy that provides employment in a number of industrial sectors. The largest sectors of employment for the Town of Deerfield are shown below in Table 3-6. The largest sectors for employment in Deerfield are Manufacturing and Education and Health Services. The percentage of people employed in the Manufacturing sector in Deerfield (28.4%) is significantly higher than in either Franklin County (at nearly 19%) or the state as a whole (at almost 10%). Jobs in this sector tend to be more stable and provide better benefits than in other sectors, which may be a contributing factor to the relative strength of the employment rates in Deerfield. The Education and Health Services sector employs over 27 percent of those working in Deerfield, the vast majority of them working in the various public and private educational institutions in Town. Though still a small percentage of the overall employment picture at just 2 percent, the agricultural sector in Deerfield represents a larger share of employment than in either the county or the state and embodies an important part of the Town’s historical development and current character. Employment in the Trade sector is smaller in Deerfield than in the county or state. In addition, the town has a smaller share of workers than the state and county in the Professional and Business Services sector and in the Financial, Insurance and Real Estate sector. This is not unexpected given that generally the percentage of employment in the professional services sector tends to be lower in small, rural towns.

Table 3.6: Employment by Sector for Deerfield, Franklin County and Massachusetts, 2004

Industry Sectors*	Deerfield	Franklin County	Massachusetts
Agriculture	1.9%	1.2%	0.2%
Construction	3.8%	4.2%	4.8%
Manufacturing	28.4%	18.8%	9.9%
Transportation & Public Utilities	5.4%	3.3%	3.7%
Trade	4.9%	13.5%	15.7%
Finance, Insurance & Real Estate	1.4%	2.7%	6.9%
Professional & Business Services	3.9%	6.0%	14.5%
Education & Health Services	27.2%	28.3%	23.9%
Other Services**	9.1%	13.1%	11.1%

Source: Massachusetts Division of Employment and Training, ES-202 data.

*These sectors do not add up to 100% because some data is suppressed for confidentiality purposes.

**This category includes the following services categories: accommodation and food services, and other services excluding public administration.

According to 2003 data compiled by the Franklin Regional Council of Governments, the largest employer located within the Town of Deerfield is Yankee Candle, with 3,643 workers. This is also by far the largest employer within Franklin County. The next largest employers in Deerfield are Hardigg Industries Inc. with 325 workers, Channing Bete Co. Inc. with 320 employees, Deerfield Academy with 300 employees, and Kenametal South Deerfield Plant also with 300. Other major employers in town include Historic Deerfield Inc., Eaglebrook School, N&B Express, Frontier Regional High School and the Springfield Terminal Railway. Oxford Foods LLC has also been a major employer in Town, but it announced in early 2006 that the facility is closing. This represents the loss of 130 jobs and of a connection to the town's history of pickle production that dates back to the mid-1800s.

Table 3-7: Worker* Commute Patterns in 1990 and 2000

Geography	Worked in Town of Residence	Worked out of Town but in County of Residence	Worked out of County but in State of Residence	Worked out of State of Residence
Deerfield				
1990	34.3%	32.6%	28.4%	4.7%
2000	23.8%	28.4%	44.2%	3.6%
Franklin County				
1990	35.8%	35.8%	24.9%	3.4%
2000	27.6%	34.9%	33.4%	4.1%
Massachusetts				
1990	36.5%	35.9%	24.5%	3.1%
2000	31.3%	35.4%	30.1%	3.3%

* Employed workers 16 years and over.

Source: U.S. Census Bureau – 1990 Census STF3A and 2000 Census SF3.

According to the 1990 and 2000 Census figures shown below in Table 3-7, the percentage of Deerfield residents who worked in town decreased from 34 percent to 24 percent over this ten-year period, as did those who commuted to jobs in other towns in the county, from 33 percent to 28 percent. The greatest increase during the decade occurred with commuters traveling to jobs in other counties in the state, rising from 28 percent to 44 percent.

D. GROWTH AND DEVELOPMENT PATTERNS

Growth and development in a community can often reflect its history and values. From the first years after Deerfield was permanently settled by Europeans, Old Deerfield's Main Street reflected the values of a close knit, security-conscious community. As mills took advantage of water power in the Mill River and later in Cheapside along the Green River, activities broadened to include industries like broom and pocketbook manufacturing. Different areas throughout Deerfield began developing with their own Post Offices and cemeteries. Trails that began as Native American travel ways between encampments and hunting grounds were adopted by colonists and later improved to their present paved state. South Deerfield became a center for industry and dense suburban living. Farms spread throughout the Town along floodplains of the Connecticut and Deerfield Rivers to take advantage of the prime soils there.

The private schools of Deerfield played an important role in the town's growth, beginning with the Deerfield Academy in the late 18th century and continuing with Eaglebrook and the Bement School later in the 20th century. The private educational institutions were one of the most important employer groups in town for many years. In addition, the founding of Historic Deerfield, Inc. and the initiation of the private institutional ownership of much of the surrounding landscape was due in part to parents of students taking an interest in the future of the historic structures on Old Deerfield's Main Street.

As industries expanded and new companies came to Deerfield, the population grew and people built new homes along existing roads throughout Town. Roads that normally only saw farm machinery traffic were now being traversed by automobiles. During the 1980s, fourteen residential subdivisions were developed in the South Deerfield area. Since the 1990s, three subdivisions have been developed including Crestview and the Technology Park off of Routes 5/10. In 2004, the Deerfield Planning Board approved the Hawk Drive Subdivision, a cluster development which resulted in the protection of nearly twenty acres of a forty-acre parcel. Nonetheless, the primary form of development in the past decade has been individual houses scattered across Deerfield on lots with frontage on local roads.

The following sections inventory the current patterns and trends in land use in Deerfield. The effects of these patterns on Deerfield's natural and cultural resources are reviewed. This is followed by an assessment of the potential for future development based on

current land use patterns and zoning, known as a build-out analysis. A build-out analysis estimates the maximum amount of development, which could be realized in the future based on current zoning and available undeveloped land. It can also be used to estimate the number of new homes, miles of new roads needed, gallons of additional drinking water supply required, and the number of tons of municipal waste generated. Following this, the costs of community services for residential and industrial development and farmland in Deerfield are analyzed.

D.1 Patterns and Trends

Deerfield originated as a compact, linear village in Old Deerfield surrounded by rich agricultural lands. The forests that greeted European settlers upon arrival were gradually cleared to make way for cropland and grazing. In the 1790s, agriculture accounted for approximately 50 percent of the land in the Connecticut River Valley and during the period from 1800 to 1875, 60 percent to 80 percent of most towns in the area were devoted to open land (Foster; 1998). With 24 percent of its land area actively devoted to agricultural use today, Deerfield can still be considered an agricultural community despite significant losses of farmland to residential development in recent years.

The roads system originated in Old Deerfield, the historic center, where business and residential activity were situated. With the coming of the railroad, development expanded south along Routes 5/10 to form the larger village of South Deerfield. From there it gradually radiated out in all directions as residential development began to encroach on former agricultural lands.

Bounded by Mount Sugarloaf to the east and by Routes 116 and 5/10 to the south and west, South Deerfield is considered the business and industrial heart of Deerfield. The majority of commercial and industrial development is concentrated within two designated commercial/industrial zones and the planned industrial zone (*see the Zoning Map at the end of this section*). Routes 5/10 and Elm Street, which leads into the center of South Deerfield, is the site of one commercial/industrial zone. Unfortunately this area shows early signs of suburban sprawl and if future growth is not laid out and designed creatively, the area could lose its small village character. Recent development in this area, both residential and commercial/industrial, has occurred on land that was once farmland with prime agricultural soils. Continued development of this area without careful planning will result in further degradation of its historically rural nature. The second commercial zone is in East Deerfield, at the confluence of the Connecticut and Deerfield Rivers. It is dominated by a railroad yard and rock quarry operations. The Planned Industrial Zone runs along Route 116 and is occupied by several large industrial firms, such as Millitech and Greenfield Industries. The advantages of such a zone include orderly development and an open space provision, which usually results in development that is physically more appealing.

Deerfield's growth and the changes in specific land uses over time can be seen in Tables 3-8 and 3-9. These tables are based on the 1971, 1985, and 1997 MacConnell land use

data layers produced by the Department of Forestry and Wildlife at the University of Massachusetts at Amherst using aerial photographs taken in those years.

Table 3-8 below presents the area, in numbers of acres, of selected natural resources and agricultural land uses in Deerfield in 1997. Note the large extent of both farm and forestland. In 1997, forestland accounted for 58 percent of the total land area of the Town of Deerfield. Agricultural land (consisting of cropland, pasture, and orchards or nurseries) comprised 24 percent of the land area. According to the United States Fish and Wildlife Service's National Wetlands Inventory (NWI), Deerfield contained 1,586 acres of wetlands in 1997, or 7 percent of the total land area.

Table 3-8: Natural Resources and Agricultural Land Acreage in Deerfield in 1997

	Acres	Percentage of Total Area
Forest	12,340	58%
Cropland	4,463	21%
Non-Forested Wetlands*	1,012	5%
Surface Water	593	3%
Forested Wetlands*	574	3%
Pasture	345	2%
Orchard, Nursery, etc.	197	1%
Other (Developed Land Uses)	1,864	7%
Total Land Area in Deerfield	21,388	100%

Source: 1997 Massachusetts GIS Land Use Coverage except for wetlands data.

* These figures were determined from calculations using National Wetlands Inventory data.

Although the landscapes are mostly permanent, being based on glacial and geomorphic processes, their uses are not. For example, the floodplains of Deerfield have historically been prized for their prime soils and, thus, farming has been a dominant activity there. However, as residential development consumes more and more farmland, the use of those prime soils changes.

In Table 3-9 a comparison of the types of land uses and their acreages in Deerfield between 1971 and 1997 demonstrates which natural resources are most susceptible to development pressures. Cropland and forestland have been the primary resources converted to other uses, particularly to residential development. As residential development of one quarter acre or larger has increased, both cropland and forestland acreages have decreased.

Table 3-9: Changes in the Land Area of Different Natural Resource, Agricultural, and Development Land Uses Between 1971 and 1997

	Land Use Acreages in 1971	Land Use Acreages in 1985	Land Use Acreages in 1997	Change in Acreage Between 1971 and 1997
Forestland	12,898	12,574	12,340	-558
Cropland	4,927	4,704	4,463	-464
Pasture	357	361	345	-12
Orchard, Nursery, etc.	146	171	197	51
Surface Water	593	593	593	0
Open Land	418	403	423	5
Non-Forested Wetland	114	114	113	-1
Residential > 1/2 acre	507	609	845	338
Residential 1/4 - 1/2 acre	519	723	765	246
Transportation	457	464	461	4
Mining (Gravel, etc.)	107	160	212	105
Open Land - Urban	122	158	185	63
Industrial	30	89	149	119
Participation Rec.	128	142	144	16
Commercial	45	86	106	61
Waste Disposal	14	18	33	19
Spectator Recreation	6	6	0	-6
Residential-Multi	0	14	14	14
Residential <1/4 acre	0	0	0	0
Total Area	21,388	21,388	21,388	

Source: MacConnell 1997 Massachusetts GIS Land Use Coverage data.

The land use tradeoffs between 1971 and 1997 were primarily a loss of forest and farmland and a gain in residential and industrial development. Larger lot residential growth has resulted in the loss of 983 acres of farmland or forestland. The loss in natural resources may go beyond simply the loss in acreage. As farm and forest land acres are converted to residential and commercial uses the landscape becomes fragmented.

Fragmentation of the landscape can negatively impact the quality of wildlife habitat, watershed protection, recreation opportunities, farm viability, forest management opportunities, and ultimately the municipal services budget. Many rural towns in western Massachusetts have much of their landscape covered in forest vegetation. Unlike more urbanized towns, this forestland is not intersected by roads or residential development. As development spreads across the landscape, wildlife habitat may become segmented so that animals that require large amounts of interior forest habitat are forced to search for it in still more remote areas. Fragmenting large blocks of contiguous forestland also jeopardizes the water quality and quantity in many first and second order streams, which are the most extensive and sensitive components of a watershed's stream network. The value of recreational opportunities associated with hiking, snowmobiling, and mountain biking often depends on whether there exists a network of fields and forests that are somewhat removed from residential areas. Deerfield residents need also to be aware of the indirect value of open farmland.

Development pressures threaten the continued viability of Deerfield farms. The more fragmented farmland becomes, the more expensive it becomes to farm, based on additional time and fuel costs. In the same way, fragmentation of the landscape affects the viability of forest management operations. When a large forest block is fragmented by a subdivision, the resulting parcels associated with single family homes are often too small to manage individually for forestry purposes. Finally, the most inefficient method of providing municipal services such as police, fire, sewer, water, waste disposal, and plowing is associated with a fragmented landscape where residential development is spread sparsely across the town.

The changes in land use in Deerfield between 1971 and 1997 can be described as exhibiting three main patterns: subdivision, commercial/industrial expansion, and approval-not-required development. The location of the residential subdivisions signifies one important trend. They are all located in the southern half of Deerfield. There are also three areas that have seen the most subdivisions and represent current and future sites that may be available for further concentrated residential development: the Mill Village area, Hillside, and the South Deerfield Village Center.

Prior to the 20th century, the people of Deerfield lived in a set of village centers and in farmhouses surrounded by large cultivated fields and logged-over forestland. Between the turn of the century and 1971, dense development in the South Deerfield village center took place. Since that time, sprawl has materialized in the form of approval-not-required (ANR) development along existing roads. The impacts of sprawl include reducing forests and active farmland, changing the character of the community from rural to suburban, and eroding the quality of the natural resources upon which the residents depend, especially the quality of the water in Deerfield's streams, rivers, and aquifers.

Clearly, the conversion of forest and agricultural land to building sites for single-family homes is the dominant land use change in Deerfield and in Western Massachusetts. Future development patterns in Deerfield may depend on national and regional employment and population trends but also on local conditions that impact development and land use, such as infrastructure and land use controls.

D.2 Infrastructure

D.2.1 Transportation Systems

Routes 5/10 and 116 constitute important transportation corridors that link Deerfield to the surrounding municipalities. Route 5/10 is the main north-south thoroughfare while Route 116 cuts diagonally from the southeast to the northwest. Interstate 91, with two exits located in Deerfield, bisects the town and also provides access to the Massachusetts Turnpike, which extends from Boston to Albany, New York.

Deerfield is also served by other modes of transportation. One route of the Franklin Regional Transit Authority (FRTA) links Deerfield and Greenfield by bus when Deerfield Academy is in session. The Pioneer Valley Transit Authority (PVTA) provides

free bus service from South Deerfield to Amherst. Paratransit services for the elderly and disabled are available through the Greenfield-Montague Transit Authority (GMTA) and Peter Pan Bus Lines provide service to Boston via Amherst, Springfield and Worcester. The Springfield Terminal Railway (the former Boston and Maine Railroad) lies parallel to Interstate 91 and Route 5/10 and offers freight rail service. The closest airport to Deerfield is the Turners Falls Municipal Airport, a general aviation facility located in Montague. Commercial flights can be obtained at Bradley International Airport, an approximately forty-five minute ride south to Windsor Locks, Connecticut.

D.2.2 Water Supply Systems

The water that Deerfield residents drink may come from private wells or public water district supplies. Water district supplies have both groundwater and surface water sources. Groundwater sources are springs and wells while surface water sources include reservoirs and rivers. A well pumps water from underground. The underground water collects in layers of sand and gravel called aquifers. Rain permeating through layers of soil can reach groundwater, which in turn may replace water within an aquifer.

In the Town of Deerfield, a brief analysis of water supply systems requires a separate discussion of its two main water districts, the South Deerfield Water Supply District and the Deerfield Fire District. Each utilizes a different system of public water sources, aquifers, and each has different issues and concerns. There is one other district in town in East Deerfield. The Town of Greenfield supplies B&M Railroad with its drinking water supply which it distributes to approximately ten households.

South Deerfield Water Supply District

The South Deerfield Water Supply District (SDWSD) utilizes a water distribution system that withdraws water from two reservoirs connected to each other by way of Roaring Brook. The primary source is a service reservoir located in Whately with a total water volume or capacity of 6.7 million gallons. The secondary reservoir located upstream in Conway has a total storage capacity of 166 million gallons. In comparison, the Roaring Brook Reservoir system has a firm yield of 1.42 million gallons per day. The firm yield is the amount of water which can be utilized on a continuous basis during an extended dry period without adverse hydrological or ecological impacts (Dumais;1980). The permitted water withdrawal volume is currently 650,000 gallons per day. A system is not considered to be in violation of this permit until it exceeds this amount, plus an additional 100,000 gallon allowable overrun. In calendar year 2004, the system averaged 621,637 gallons withdrawn daily (Sadowski; 2006).

Although this withdrawal volume is well within permitted limits, the district is actively seeking new sources of drinking water. In recent years they have undertaken extensive groundwater exploration within the district, without coming up with any good new sources. Discussions have also taken place with the Deerfield Fire District about sharing a new well in that district, but no agreement has been reached to date.

To assist the SDWSD in limiting future demand on its water supply systems, the Town of Deerfield may adopt zoning bylaws that restrict new commercial and industrial development to companies that use less water within the district. The SDWSD may also encourage the adoption of district-wide water conservation practices, such as a fee structure that charges more as usage increases, and other methods.

Deerfield Fire District

The Deerfield Fire District (DFD) provides its customers with water primarily from two sources. The first is the Stillwater Well, with an average daily flow rate of 95,000 gallons per day. The Stillwater well taps into an aquifer straddling the Deerfield River between the bridge and Interstate 91. The Harris-Stillwater Springs in the same area were shut down in July 2003 for failure to pass the microscopic particulate analysis (MPA). Engineers are working to bring this extremely productive source back on line by installing a filtering system. When these springs were in operation they generated average daily flow rates of 70,000 gallons per day.

The second water source area is located off of Pine Nook Road near Eagle Brook School. The Keats Spring and the new Cistern Spring, with their source the Pocumtuck Range, fill a tank reservoir that feeds into the distribution system. The Keats and Cistern Springs produce average daily flows of 50,400 gallons per day. The DFD's total water supply system's registered withdrawal is 100,000 gallons per day.

The Wapping well located along Route 5/10 just south of Childs Cross Road is currently inactive due to road salt contamination, though in the past it was considered as the emergency well. Currently, the Deerfield Fire District can purchase water from the Town of Greenfield in the case of an emergency.

Each well or spring is surrounded by land owned by the water district which is considered to have a high level of protection. According to John Thorn of the Deerfield Fire District, the water withdrawal rate rarely exceeds its registered amount, has no contamination problems, and has no apparent concerns with respect to future water demands. Originally, the Deerfield Fire District used the Stillwater Well as their primary drinking water source. Over the years, the district has developed its spring water sources with new pipes and collection boxes. Overall, 35 percent of the DFD's water currently comes from springs, down from 66 percent when the Harris-Stillwater Springs were on line.

The Deerfield Fire District provides water to a stable customer base of primarily residential users with a small amount of agricultural, commercial and industrial services. One hundred percent of the users are metered and they pay a flat rate of \$4 per 100 cubic feet of water. The use in the late 1990s exceeded the registered withdrawal volume, but was within the allowable overrun. The DFD has maintained its distribution system and has been able to keep up with normal increases in residential development. However, the proposed sewer expansion in both districts could place additional demands on the DFD's supply if new sewer system clients also request extensions of the district's water distribution system.

D.2.3 Wastewater Treatment

The Town of Deerfield is served by two wastewater treatment plants, one in South Deerfield and one in Old Deerfield. Table 3-10 summarizes the current conditions as measured by flow rates for these plants. The South Deerfield plant is receiving wastewater at a rate only 8 percent below its design capacity. (These figures do not include the Oxford Pickle Co., which has its own wastewater flow meter.) Wastewater treatment plants are required by the Department of Environmental Protection to initiate plans for expansion when the rate at which wastewater comes into the system, called the influent loading rate, reaches 80 percent of the facility's design capacity for 90 days. The Old Deerfield plant is currently operating at 60 percent of its design capacity.

Table 3-10: Wastewater Treatment Facilities in Deerfield

Facility Name and Location	Facility Type	Number Persons Served	Design Capacity (MGD)	Average Monthly Flow (MG)	% of Design Capacity Remaining	Sludge Treatment or Disposal	Effluent Disposal Location
Deerfield (South)	EA	3,000	0.85	0.78	8%	Incineration	Connecticut River
Deerfield (Old)	EA	2,000	0.25	0.15	40%	Incineration	Deerfield River

Source: Massachusetts Department of Environmental Protection

Note: EA = Extended Aeration. MGD = Millions of Gallons per Day. MG = Millions of Gallons.

The issue of wastewater treatment expansion is a difficult one since areas with a high frequency of septic system failures are spread throughout Deerfield. In addition, the South Deerfield Wastewater Treatment Facility is near capacity, some of which is caused by water entering the sewer system from areas other than the initial points of generation. This problem is referred to as “infiltration and inflow”. Infiltration represents groundwater entering the collection system via breaks within the piping, open joint pipes, or cracks within manholes. Inflow represents the water that enters the system through direct connections such as catch basins, roof gutter leaders, sump pumps, and leaking manhole covers. The South Deerfield Wastewater Treatment plant is currently operating under a DEP mandate to fix these problems by June 30, 2006. An analysis of the inflow and infiltration rates since the late 1980s was conducted by Weston & Sampson Engineers in 1999. They calculated that infiltration sources represented 20 percent of the overflow problem and identified five specific sections of the sewer system as contributing the greatest percentages of infiltration flow. The Town has conducted sewer system upgrades in these critical areas to address the infiltration, completing this work in 2003. The remaining 80 percent of the overflow is represented by inflow into the system and is more difficult to address because of the multiple sources of generation. Since July 1, 2005 the district is offering up to \$500 to residents for disconnecting sump pumps, cellar drains and roof gutters emptying into the wastewater system. To date, few residents have taken advantage of this program, but officials in the district expect the pace to pick up with the warmer weather in the spring and summer of 2006.

The Weston and Sampson Engineers (WSE) Wastewater Strategic Plan prepared for the Town of Deerfield in 1999 presented a series of alternatives that would attempt to solve the extensive septic failures experienced by residents around Town. The primary cause of the septic problems identified by WSE is an historic high water table in the affected areas. As a result, many people have to pump out their septic tank two or three times per year. The three levels of changes proposed were: sewer line extensions within ½ mile of the existing system, shared Title 5 septic systems for areas outside of the ½ mile buffer, and alternative or conventional on-site systems.

Since 1999, Town officials have continued to study these options. Expansion of the sewer line would be expensive, in part because of the necessity for a pumping station. Further, the South Deerfield Wastewater Treatment is near capacity and the plant in Old Deerfield is experiencing erosion problems that would have to be addressed before its use could be expanded. In the meantime, septic failures have been continuing. In recent years, the Mill Village Condos have had to replace ten failed septic systems that serve duplexes. Further, recent construction of new homes is reported to be affecting the water table for local farmers and homeowners. As development continues, the Town will have to deal with these wastewater treatment problems and whatever action it takes will likely have an impact on available open space.

Of the three treatment options prescribed as part of WSE's proposed strategic plan, the sewer line extension would have the most immediate and direct impact on active farmland. The shared systems may need additional open space for a more extensive leach field but this does not immediately affect the development value of abutting properties. The conventional and alternative on-site systems may have some impact on surrounding farmland by demonstrating that on-site septic systems can work on lands with a high water table.

D.3 Long-term Development Patterns

D.3.1 Land Use Controls

Deerfield's Zoning Bylaw (Chapter 179 of the Deerfield Code) sets out the zoning districts, permitted uses and required lot sizes and dimensions that govern the Town's patterns of development. The town is divided into six districts, according to Article II, Section 2100: Residential-Agricultural (RA), Center Village Residential (CVRD), Small Business (C-I), Commercial (C-II), Industrial (C-III), and Planned Industrial (PI). The town also has three overlay districts: a Watershed Protection District (Section 4200), a Flood Plain District (Section 4300), and a Wireless Communications District (Section 4400). The majority of the town (84%) is in the Residential-Agricultural District. The three commercial districts are located in South Deerfield, with the exception of a portion of C-II located in East Deerfield north of Petroleum Road, at the confluence of the Connecticut and Deerfield Rivers. The Center Village Residential District is a mixed use district also located in South Deerfield, east of the Boston & Maine Railroad and north of Route 116. The Planned Industrial District is located south of Route 116 to the border

with Whately. The Watershed Protection Overlay District is located south of the Deerfield River and west of Route 91 on the town's western boundary and its restrictions to development and associated uses are stricter than the underlying Residential-Agricultural district (*see Zoning Map at the end of this section*).

Use regulations for these districts are included in Section 2230 of the Zoning Chapter. Residential uses are permitted by right only in the RA and CVRD districts. Only single-family dwellings are allowed in the RA district, while both single-family and detached two-family dwellings are allowed in the CVRD. Multi-family dwellings are allowed only by special permit in the CVRD and C-I districts. Flexible developments and conservation subdivisions can be constructed in both the RA and CVRD districts by right. The purpose of these types of development is to encourage the preservation of open space, countering the effects of ANR lot development described above. Flexible developments (Section 3500) can be constructed in any residence district when five or more lots are being created, whether in a subdivision or not. Conservation subdivisions can be constructed in the RA district whenever five or more lots are created and require the permanent protection of at least 20 percent of the parcel as open space. In each case, the lots are subject to less stringent dimensional requirements than are traditional lots in the underlying district.

Community uses allowed in all districts include most religious or educational uses, exempt agricultural uses, child care and day care facilities, municipal uses, and nonprofit events. Uses allowed by special permit include non-exempt educational and agricultural uses (such as a piggery or raising of other animals), as well as "essential services" (such as gas, electric, water distribution systems and collection, communication, supply, or disposal systems).

Commercial uses are allowed primarily in the Small Business (C-I) and Commercial (C-II) districts, though many require special permits. Even many of the uses allowed by right are limited by size, i.e. buildings in excess of 2,500 gross sq. ft. in C-I and 10,000 gross sq. ft. in C-II also require a special permit. Few commercial uses are permitted under any circumstances in the Industrial District (C-III), where only offices, printing or publishing establishments, and bakery/ coffee shops/delis are allowed by right. Only a limited number of commercial uses are allowed by special permit in C-III (such as banks and ATMs, retail sales, landscaping, commercial recreation and groceries). The Planned Industrial district allows almost no commercial activities either by right or special permit. Only offices, printing, and major commercial projects are allowed by right in the PI district and offices, ATMs, and bakeries are the only commercial uses allowed with a special permit.

Industrial uses are allowed by right primarily in the C-III and PI districts. These would include light manufacturing; manufacturing, processing, and assembly plants; research facilities; and wholesale facilities. These and other industrial uses are allowed by special permit in the C-II district, where retail sales and wholesale facilities are allowed by right but limited in size as described above. Uses that are not permitted anywhere in Deerfield

include: junkyards, fast food restaurants or drive-in services, arcades or amusement parks, self-storage warehouses, and radioactive waste disposal.

Dimensional requirements for the Town of Deerfield are set out in Section 2300 of the Zoning Chapter. Required minimum lot sizes range from 12,000 square feet in the CVRD to 80,000 in the C-III and PI districts. The minimum lot size required in the RA district is 60,000 square feet; in C-I it is only 15,000 square feet. Frontage requirements are 200 feet in most districts; although the minimum is 100 feet in CVRD and 125 feet in the C-I district. These requirements increase by 25 percent for two-family dwellings and by 50 percent for multi-family dwellings, where applicable. The dimensional requirements also set maximum limits for lot coverage by buildings and by impervious surfaces in each of the districts.

Deerfield's Subdivision Bylaw includes an alternate procedures plan (APP) that allows for development of two to six lots on a common private way under less stringent requirements than standard subdivision procedures. The APP is designed to address the issue of ANR development along the roadways in town. The purpose of the APP is reduce the number of lots having egress and frontage on existing public ways, reduce cut and fill in road construction for subdivisions, promote public safety and welfare in regard to traffic and pedestrian safety, reduce the visual impact of development, and promote affordable housing.

These land use controls direct commercial and industrial development to appropriate areas of Deerfield, protect some critical water resources, and provide options to minimize the negative effects of development on the character of the town. Nonetheless, since such a large percentage of the town is located in the Residential-Agricultural district, this is where further development will occur. This district includes most of the farmland and forestland that defines Deerfield's rural/agricultural character. Without a concerted effort to protect in perpetuity more of these critical resources, this land will ultimately be consumed by development and the open land in Deerfield will be restricted to only that which is currently protected. The following section presents a stark picture of the long-term impacts on the Town of the maximum development potential under current land use controls and levels of protection.

D.3.2 Build-out Analysis

To illustrate some of the long-term effects of current zoning on development, results of a build-out study are included here. The following build-out analysis methodology was developed by the Metropolitan Area Planning Council (MAPC) and adapted by MassGIS and the Executive Office of Environmental Affairs (EOEA) Statewide Build-out Analysis program. This build-out program examines the potential for redevelopment of commercial, industrial, and residential areas if all potentially developable land were built on to the maximum extent allowed by current zoning laws. Housing units and commercial and industrial square footage estimated to occur at build-out are used to calculate the total additional community facilities required, from drinking water and municipal waste disposal to school enrollment figures. The build-out analysis does not

predict how fast or slow growth will occur, only what the end result will be. The time frame for build-out to be reached is probably many decades, but now is the time to implement better zoning if the result of current regulations is not what is desired.

The purpose of a build-out analysis is to determine potentially developable land areas for residential, commercial, and industrial development. The process, completed in 2001, started with identifying existing development based on 1997 MacConnell Land Use data and new subdivisions built since that time. Developed areas were subtracted from the town's total acreage and the remaining area was classified as undeveloped. Undeveloped areas were then screened for environmental constraints such as steep slopes in excess of 25 percent. Wetland areas identified by the National Wetlands Inventory, Rivers Protection Act buffer areas and Zone I Recharge areas to public water supplies were subtracted. In addition, protected open space was removed from consideration, but only those areas that were protected in perpetuity, such as land owned by the state's Division of Conservation Resources (DCR) and farmland in the Agricultural Preservation Restriction (APR) Program. Some areas that many residents would expect to be protected, such as land owned by municipal water districts to protect public water supplies, were not considered to be off-limits to development unless a conservation restriction or some other legal mechanism was in place to protect the land in perpetuity as open space. Slopes between fifteen and twenty-five percent were 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 slopes of fifteen and twenty-five percent would prevent commercial and industrial development and residential development on small lots. However, it was also assumed that large lot residential development could occur on slopes between fifteen and twenty-five percent given greater flexibility to grade and site structures. The areas that remained after the screening process are considered potentially developable.

Zoning districts were then overlain on the potentially developable areas and a "build factor" was calculated based on 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 was used to convert potentially developable acreage into either house lots or commercial or industrial square footage depending on the zoning district. Once the number of house lots was calculated, it was then translated via averages into estimated population growth, miles of new roads and additional water consumption and solid waste generation. Commercial and industrial square footage was similarly calculated and its associated demand for water was estimated.

The build-out analysis in Deerfield illustrates an unbalanced land use plan where the land that can be developed is in the Residential/Agriculture zoning district, and the impacts of this design on the natural systems and on the community's facilities and infrastructure are staggering. In 2004, the total amount of drinking water used per day by customers of both public water supply districts was 767,037 gallons, which is slightly in excess of their current combined registered withdrawal volumes (750,000 gallons per day), but still within allowable overruns. At build-out there will be a demand for an additional 2,272,094 gallons per day from new residential, commercial, and industrial development.

The total future demand for drinking water at build-out is over 3 million gallons per day and will clearly exceed existing capacity and will require new ground water sources in both districts. The costs for establishing new ground water sources can cost between one and three million dollars. Excessive drinking water withdrawals in the future could also greatly impact water levels of wetlands and streams. Tables 3-11 and 3-12 present the results of the potential build-out for commercial/industrial and residential development using the build factors and multipliers.

Table 3-11: Summary of Commercial/Industrial Land Uses Build-out Analysis Results

Zoning District	Potentially Developable Land (acres)*	Additional Commercial/Industrial square Footage (square feet) At Build-out	Additional Commercial/Industrial Water Usage (gallons) (75 Gallons per Day/1000 square feet) at Build-out**
Small Business (C-I) District	5.70	93,110	6,983
Commercial (C-II) District	571.90	9,341,987	700,649
Industrial (C-III) District	197.40	2,149,686	161,226
Planned Industrial District	7.90	86,031	6,452
Totals	782.90	11,670,813	875,311

*All mapped wetland areas removed from Potentially Developable Acreage.

** Estimate from the Department of Housing & Community Development's Growth Impact Handbook

At maximum build-out Deerfield will have lost its rural character. Consider that, in 1997, MassGIS Land Use coverage data for Deerfield indicated that roughly 11 percent of the Town's total land area was developed. The current population density is equal to 147 people per square mile. After the build-out, the population density will be equal to 748 people per square mile. Imagine Deerfield with that many people and without the presence of nearly as much undeveloped open space. Currently, roughly 65 percent of the total landscape is undeveloped and at build-out only 30 percent would remain undeveloped. This percentage represents the amount of land that is currently protected in perpetuity and land that is considered undevelopable because of the Rivers Protection Act, wetlands, or excessive slopes, etc.

Table 3-12: Summary of Residential Land Uses Build-out Analysis Results

Zoning District	Amount of Land that can be Potentially Developed (Acres)*	# of Lots	# of Units	Additional Residents at Build-out ***	Additional School Children at Build-out ****	Additional Water Use (in Gallons per Day) at Build-out **	Additional Non-Recycled Solid Waste (tons/year) at Build-out *****	Additional New Road (miles) at Build-out
Residential/Agriculture	10,996	6,818	6,818	16,362	2,782	1,227,154	5,969	129
Watershed Protection Overlay District	405	186	186	447	76	33,517	163	4
Central Village Residential District - 1 Family	193	597	597	1,433	244	107,475	523	6
Central Village Residential District - 2 Family	22	53	159	382	65	28,637	139	1
Totals	11,616	7,654	7,760	18,624	3,167	1,396,783	6,794	139

*All mapped wetland areas removed from Potentially Developable Acreage.

** The figure 75 Gallons per day/person is from the Department of Housing and Community Development's Growth Impact Handbook.

***The figure 2.4 people/unit is from the 1990 Census; Population/Housing Units.

**** MISER; Percentage of School Children/Population in 1997.

***** The figure 0.3648 tons/person/year for non-recycled solid waste is the State-wide Average.

The results of the build-out forecast a future for the Town of Deerfield where land use will be dominated by residential development, not forests and farmland. At build-out there will be an estimated 7,760 more homes than there are today. There will be nearly 19,000 more people and over 3,000 more school-aged children (compared to the 661 children in grades pre-K to 12 in 2005-06). New subdivisions can result in the need for 139 new miles of roads. An additional 7,000 tons of municipal waste will have to be managed. Finally, fire and police services will have to expand to protect the increased population. These impacts, although only estimated, will clearly transform Deerfield into a suburban community which would very likely have higher tax rates and diminished environmental quality. The rural character and agricultural landscapes will be largely gone.

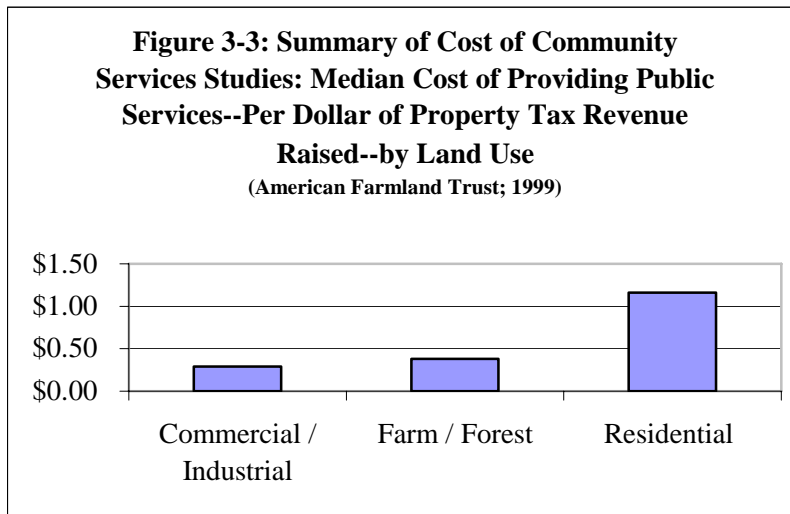
D.3.3 Cost of Community Services

Although it is not possible to determine exactly when build-out might occur, this may not even be necessary. The economic impacts of the projected level of population growth and development would be felt well before maximum build-out was reached. Long before the last acre was developed in Deerfield residents would begin to experience negative impacts, such as drinking water shortages and the need for new schools. Would the additional commercial and industrial property help to pay for the costs of supporting the increasing demand for municipal services like education as well as the loss of the local farms? The challenge for Deerfield 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.

Over the past fifteen years, the American Farmland Trust (AFT) and other organizations conducted Cost of Community Services (COCS) analyses for many towns 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 fifty-eight 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. Open space can therefore help to produce fiscal stability over time.



Source: American Farmland Trust; 1999.

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 Deerfield might have some of the following characteristics: locally owned and operated; in the manufacturing sector; using a large amount of taxable personal property; 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 Deerfield, 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 and zoning measures that balance development with the protection of natural resources, Deerfield will be able to sustain and enhance the community’s agricultural and rural village character and help to maintain a high quality of life for residents.

SECTION 4

ENVIRONMENTAL INVENTORY AND ANALYSIS

The natural resources and scenic landscapes of the Town of Deerfield have been cherished by residents for generations. This Open Space and Recreation Plan is intended to help residents protect the town's scenic value and natural resources in the face of increasing development pressure, while recognizing that people need places to live, learn, work and play. These needs require infrastructure: homes, roads, power, water, wastewater systems, etc. These collective needs, in turn, both depend upon and have an impact on critical natural systems like the water cycle. One way to understand the impact of development on natural resources is to study ecosystems of the town and the region.

An ecosystem is a concept that describes how living organisms (plants, animals and microorganisms) interact with each other and their physical environment (soil, climate, water, air, light, etc.). Ecosystems exist at different scales. A large forest can be an ecosystem and so can a decayed tree trunk. The integrity of ecosystems depends on the interdependent relationship between living beings and their environment. Wetlands, for example, are ecosystems consisting of plants and animals that depend on water from the surface and the ground. Wetland vegetation grows where soils are saturated by water for at least several weeks a year. This vegetation provides shade, food, and habitat for a wide variety of insects, birds, and fish.

Ecosystems provide a variety of “services” that are very important to human communities. Wetlands, for example, trap and remove sediments, nutrients and toxic substances from surface water. They store floodwaters during and after storms, preventing damage to public and private property, recharge water to groundwater aquifers, and retain it during droughts. These functions are vulnerable to the impacts of land development. Construction in and around wetlands not only displaces the animals that depend on this ecosystem; it may also result in increased flooding, storm damage, and reduction in the quality and quantity of drinking water. Deerfield residents need to understand the impact of their actions and land uses on the environment and on their quality of life.

The information provided in this section explores the biological and physical components of the town's ecosystems. These components include soils, surface and ground water, vegetation, fisheries and wildlife. The subsection entitled *Geology, Soils, and Topography* provides a general understanding of the ways different soil characteristics can impact land use values. *Landscape Character* provides an overall scenic context of the farms and forests in the Town of Deerfield. *Water Resources* describes all of the water bodies in town, above and below ground, including their recreational value, public access, and any current or potential quality or quantity issues. In the subsection

Vegetation, plants found in Deerfield's forests, farmland, and wetlands are documented. In *Fisheries and Wildlife*, wildlife, habitat, special corridors, and rare, threatened, and endangered species are discussed. Deerfield's *Scenic Resources and Unique Environments* are identified. Finally, *Environmental Challenges* addresses current and potential problems that may influence open space and recreation planning.

Decisions relating to open space and recreation planning should take into consideration the inherent suitability of a site for different uses. An understanding of the geology, soils, and topography of Deerfield are essential in determining potential sites for future residential, commercial, and industrial development and for new parks, hiking trails, and open space.

A. GEOLOGY, SOILS AND TOPOGRAPHY

Deerfield is nestled in the Connecticut River Valley, a 410-mile long stretch of fertile bottomland and breathtaking scenery that extends from the Canadian border to Long Island Sound, Connecticut. The valley as it appears today developed over millennia of geologic activity, climatic change and human influence. The most significant era of its development began with the Triassic Period, when an aborted continental rift formed the Valley. Alternating periods of volcanic activity, shifting faults and erosion led to the formation of the Sugarloaf Arcos during the Jurassic and Cenozoic Periods. The geologic history of the valley was documented in the 1984 book by Richard Little entitled, Dinosaurs, Dunes and Drifting Continents: The Geohistory of the Connecticut Valley.

Severe temperature changes further transformed the area. Glacial sculpting during the Pleistocene Era, 11,000 to 1.8 million years ago, molded the Sugarloaf Arcos. Great sheets of ice, estimated to have a thickness of up to two miles, scraped and wore deep grooves into the land. As the glaciers retreated, Lake Hitchcock formed. Dried up long ago, this huge body of water straddled Connecticut and Massachusetts. The thickness of alternate layers of fine sands, silts, and clay deposits along the bed of the ancient lake point to an estimated life of nearly 4,000 years.

Deerfield's rich, alluvial soils are the result of the deposition of Lake Hitchcock as well as annual flooding of local streams and rivers. Over thousands of years, sediments ran off the hills surrounding Lake Hitchcock and collected on the lake bottom. When the lake drained, the rich sediments were left behind. The Connecticut and Deerfield Rivers carved valleys and terraces into these deep, varied glacial deposits of sand, gravel, silt, and clay. Regular flooding of these rivers and their tributary streams enhances the rich soils by leaving alluvial deposits within the level areas of their floodplains. As a result of this activity, seventy percent of the Town of Deerfield, or 6,460 acres, consists of prime agricultural soils (Franklin County Planning Department; 1990). For thousands of years, farmers have recognized the value of these rich soils.

Geologic activity and the last glacier also left a deep imprint on Deerfield's topography, resulting in the formation of the majestic hills and graceful valleys that Deerfield

residents hold dear. In the eastern portion of town, the Pocumtuck Range rises sharply from the floor of the Connecticut River Valley to an average height of nearly 800 feet above sea level, representing a vertical height of approximately 650 feet. Mount Sugarloaf State Reservation lies to the south of this range and contains two peaks, South and North Sugarloaf Mountains, with heights of 652 feet and 791 feet, respectively. A ridge stretches north from the Sugarloafs, steadily climbing until it reaches Pocumtuck Rock with an elevation of 852 feet. This area looks like a “saddle” which diagonally crosses the range and contains scenic Pine Nook Road. On the other side of the saddle, the range rises again to Trap Rock Ledge and Woolman Hill with respective heights of 450 feet and 400 feet. A significant amount of sand and gravel deposits are found here, which have been recently mined. The range then plunges to the confluence of the Deerfield and Connecticut Rivers. With the exception of a narrow strip of relatively flat land along the banks of the Connecticut River, extremely steep slopes of exposed bedrock dominate the area. The Prime Farmland Soils and Development Constraints Map at the end of the section shows steep slopes, floodplains, and soils that make particular areas unsuitable for development.

According to the Franklin County Soil Survey (1967) most of the soils throughout the Pocumtuck Range are of the Holyoke-Sunderland-Cheshire Association, which is characterized in part by ridges of reddish bedrock locally referred to as “redrock.” The Holyoke soils are shallow, with bedrock generally no more than 18 inches from the surface. The Sunderland soils are also shallow and have a reddish fine sandy loam surface. The range tends to be densely wooded, with state and local park areas occupying a large part of the terrain in which these soils appear. Overall, the area does not readily lend itself to development.

In contrast, land adjacent to the Connecticut River consists of the Hadley-Winooski-Limerick Association which are silty, predominantly stone-free, well-to-moderately well-drained soils that lend themselves easily to both development and agriculture, except for small depressions where surface drainage is impeded and water is ponded for long periods. According to the Soil Survey, these soils are the most productive in Franklin County. Presently, this area is intensively farmed.

The central section of Deerfield is a stepped valley and is dominated by soils of the Hartland-Ninegret Association and the Hadley-Winooski-Limerick Association which together comprise more than one-third of the town’s soils. The southern end of this valley is 60 to 90 feet higher than the north end and contains the village of South Deerfield. The valley stretches north to approximately the geographic center of town, where Fuller Swamp and an area known as The Bars are located. The village of Wapping, or South Meadows, lies just to the north of Fuller Swamp, on the bank of the Deerfield River. North Meadows lies north of Old Deerfield and contains an outcrop of bedrock, known as Pine Hill, which rises to approximately 80 feet. According to the Massachusetts’ Department of Agricultural Resources (DAR), soils throughout this central portion of Deerfield are among the “most fertile agricultural soils in the country” and are comparable to those of the Danube River Valley. These prime soils contain the best combination of physical characteristics for producing food, feed, forage, fiber, and

oilseed crops. With 9-12 inches of topsoil and 4-20 inches of subsoil, they are without rocks, highly permeable, and easily worked (Crolius, et al; 1989). This area has been extensively farmed and is highly productive, yielding cash crops that include shade tobacco, potatoes, onions, pickling cucumbers, carrots, and winter squash. These soils appear near population centers and their flat, well-drained character has made them attractive to residential and commercial development.

The western section of Deerfield is bounded by the town of Whately to the south, the Deerfield River to the north, Interstate 91 to the east and the foothills of the Berkshires to the west. The eastern portion of this section is fairly level and is under the greatest development pressure of any region in town. Soils here are also of agricultural significance. To the west, extending north into Greenfield and west into Conway are the foothills of the Berkshire Range. The range is split by the Deerfield River in an area referred to as the Gorge. This area of steep slopes and dense forest has not been subject to much development pressure. The foothills are grouped in the Westminster-Colrain-Buckland Association, which makes up roughly one-sixth of the Town's soils. They are shallow soils, generally steep, with numerous ledge and rock outcroppings (Fuller, et al; 1967). This section of town is dominated by forested, rolling to steep hills and narrow valleys with swift flowing streams. Steeply sloped, wooded cliffs overlook the Deerfield River. The range contains several minor peaks, including Boyden Mountain, 840 feet; Pine Ledge, 694 feet; and Arthur's Seat, the highest point in Deerfield at 960 feet. The steeply sloped hills lend themselves well to a variety of recreation opportunities including hiking, rock climbing and bird watching.

The remainder of Deerfield's soils are comprised of the Hinckley-Windsor-Merrimac Association, which is characteristic of the Connecticut River Valley. These soils have formed in deep sandy and gravelly pockets and include the "Deerfield Series" of moderately well-drained loamy fine sands, located along the terraces which border the major streams. These soils are extensively used for farming, particularly corn, but drainage is often required for good yields since the water table is often quite high.

Please note that the map "Prime Farmland and Development Constraints" at the end of this section displays available GIS information that typically reflect soil characteristics: slopes over 25 percent grade (depth to bedrock), prime farmland soils (slope, organic matter content, and permeability), wetlands (depth to groundwater and slope) and areas that produce constraints to development including protected lands and the first 100 feet of the Rivers Protection Act zone. Because the United States Natural Resources and Conservation Service (NRCS) has yet to complete digital soils mapping for Franklin County communities, this map which reflects soil attributes rather than identifying the actual locations of soil types, must suffice for the purposes of the Deerfield Open Space and Recreation Plan.

B. LANDSCAPE CHARACTER

Deerfield's physical beauty is one of its most priceless assets and is indicative of the classic New England landscape. A visit to Deerfield could include a country drive past agricultural fields and meadows, a step back to colonial time, a mountaintop hike that unveils a stunning vista of the valley below, and a canoe trip along the majestic Deerfield River. The features that set Deerfield apart from the surrounding communities include a wealth of archeological artifacts, a colonial village, the Pocumtuck Ridge, a diversity of wetlands, rivers and streams, and prime agricultural soils unparalleled in the country (*see the Scenic Resources and Unique Environments Map at the end of this section*).

Despite increasing development on former agricultural lands, the farming tradition remains strong in Deerfield. The land continues to be cultivated as it has been since Native Americans settled here thousands of years ago. Woodlands blanket the floodplain and skirt the surrounding hills of the Pocumtuck Range. These farmlands and large contiguous blocks of forest are among the most significant features that define the character of the Town of Deerfield and each is discussed in detail below.

B.1 Farmland

In 1999, there were 4,825 acres of land in agricultural use in Deerfield, representing approximately 23 percent of the total acreage in town, according to MASS GIS data. Between 1971 and 1999, the numbers of acres devoted to cropland in Deerfield decreased by 566 acres, which is an 11.5 percent reduction. During the same time period, the number of acres of land in Deerfield containing housing on lots 1/2 acre or larger expanded from 507 acres to 919 acres, an increase of 81 percent. The vast majority of residential development built during this period occurred on land containing farmland soils considered prime, unique, and of statewide importance.

In Franklin County overall, the number of farms is decreasing as is the land acreage devoted to farming. Between 1997 and 2002, the number of farms decreased by 14 percent, down from 679 farms to 586 as compared to 17 percent for the state. Acreage devoted to farming in Franklin County declined by 8 percent, from 81,121 in 1997 to 74,281 acres in 2002, as compared to 10 percent for the state as a whole.

Development pressures threaten to further reduce the acreage that is dedicated to farming in Deerfield, as these are the only available lands for building new homes. Residential development along existing roads and on large lots is consuming farmland at a fast pace and is causing conflicts between farms and non-farming areas. The 2000 Deerfield Master Plan has identified specific trends in farming in recent years, including a reduction in the number of farms and an increase in the size of remaining farms. The future for farming in Deerfield must begin with protecting the most valuable cropland from development. The Master Plan identifies two areas that should be a high priority for protection, representing approximately one-third of the Town's remaining farmland. The northernmost priority area is within the National Historic Landmark area, specifically including farmland located north of the Bars and south of Old Deerfield Village, on land

just east of Route 5/10 and the North Meadows. The second priority area includes farmland within and to the north and east of the Central Village Residential District, to the west of the Pocumtuck Range, and to the east of Route 91, reaching just north of Clark Cross Road. Farmland protection will continue to require the support of a majority of Deerfield residents working together with local land trusts. Funds will need to continue to be set aside in the Town budget towards protecting parcels of farmland in conjunction with the Agricultural Preservation Restriction Program.

B.2 Large Blocks of Contiguous Forestland

Another important natural resource that defines the character of the Town of Deerfield and the region are the large blocks of contiguous forests. In 1999, forestland accounted for 58 percent of the total land area of the Town of Deerfield, according to MASS GIS data. Much of this forestland is located on peaks and ridges formed as the result of millennia of geologic activity, climatic change, and human influence (Little; 1984).

Large blocks of contiguous forestland that are not traversed or fragmented by paved roads, wide rivers, development, or by open fields are important regional resources for several reasons. Two of the most important things that result from protecting forestland are maintaining the long-term integrity of wildlife habitats and water quality within the watersheds' surface and ground waters. Wildlife species that require a certain amount of deep forest cover tend to migrate out of fragmenting landscapes like suburban residential developments. Forestland conserves water supplies by sustaining the soil's ability to receive precipitation and recharge ground and surface waters slowly. Woodlands and their changing foliage give residents gorgeous surroundings for hiking and other recreational activities. Forests clean the air and provide cool air currents in warm months. Larger blocks of forest are more suitable for active forest management as well.

The forested hills in south and northwest Deerfield provide large blocks of contiguous forestland that provide interior forest habitats for a variety of birds and mammals, as well as protection of first and second order stream tributaries. The Pocumtuck Range in the eastern portion of Town contains large contiguous forest patches running parallel to the Connecticut River floodplain. Wildlife biologists believe that ridges are used as travel corridors by wildlife (*see Scenic Resources and Unique Environments Map at the end of this section*).

To the west and extending north into Greenfield and west into Conway are the foothills of the Berkshire Range, split by the Deerfield River to form the Gorge. This area of steep slopes and dense forest has not been subjected to much development pressure. This section of Town is dominated by forested hills and narrow valleys with swift flowing streams and contains several major peaks, including the highest point in Deerfield. The steep slopes in this area have limited the pressure for development.

C. WATER RESOURCES

Extensive water resources are another of the unique features that define the rural character of the Town of Deerfield. Watersheds are the areas of land that drain to a single point along a stream or river. Sub-watersheds contain first and second order stream tributaries. These are the most extensive component of any watershed. They are also the most sensitive to land use, both the negative impacts of runoff and the positive effects of forest cover. Deerfield is contained within the Connecticut River Watershed and the Deerfield River Watershed. The Connecticut River Watershed includes the eastern slopes of the Pocumtuck, as well as the southern half of the Town. The Deerfield River Watershed includes the northern half of the Town west of the Pocumtuck Range.

A number of other rivers, streams, and brooks flow through Deerfield before eventually converging with the Connecticut River. The most significant of these is Mill River, located in the southwestern section of town, which is a subwatershed of the Connecticut River Basin. These watersheds—the Connecticut River, the Deerfield River, and the Mill River Watersheds—are discussed below. In addition, this subsection describes the surface waters and wetlands, aquifer recharge areas, and flood hazard areas that contribute to the overall water resources in Deerfield.

C.1 Watersheds

C.1.1 Connecticut River Watershed

The Connecticut River Watershed is the largest river ecosystem in New England and spans four states, including Vermont, New Hampshire, Massachusetts, and Connecticut. From its beginnings on the Canadian border to its end in Long Island Sound, the Connecticut River drains a landscape that is 11,000 square miles in size, 410 miles long. The river drops 2,400 feet from its source to the sea and is one of the most developed rivers in the Northeast. It enters Massachusetts through the Town of Northfield and flows through forty-five communities before entering the state of Connecticut. The watershed is 80 percent forested, 12 percent agricultural, 3 percent developed, and 5 percent wetlands and surface waters.

The Connecticut River forms Deerfield's eastern border and provides floodplain soils unparalleled in the region and in the country. The banks of the Connecticut are steep, often forming two steppes between the normal daily flow and the floodplain itself. These banks provide portions of a woody vegetative riparian corridor. However, where farmers have fields right up to the river's edge, soil erosion along the banks of the Connecticut River has resulted in the loss of farmland and negative water quality impacts downstream. The 2002 Connecticut River Watershed Five-Year Action Plan identified the need to reduce human-influenced erosion along the Connecticut River and its tributaries as one of the major objectives in the Central Reach of the watershed, including the Town of Deerfield.

In 1999, President Clinton declared the Connecticut River one of ten American Heritage Rivers in the United States. Under this program, communities within the Connecticut River Watershed enjoy special access to Federal programs that will help to conserve, protect and enhance the resources of the watershed. To coordinate and administer the various fisheries and wildlife programs taking place within the watershed, the Silvio O. Conte National Fish and Wildlife Refuge (“Conte Refuge”) was formed by an act of Congress in 1991.

The main stem of the Connecticut River between Turners Fall Dam and the Route 116 bridge in Sunderland includes riverine and riparian habitats and several river islands. American shad, blueback herring, and shortnose sturgeon spawn within this stretch of the river which forms the eastern boundary of Deerfield. In addition, there are over thirty rare plant and animal species found within this habitat area (U.S. Fish & Wildlife Service; 1995). Secondly, the Connecticut represents a wildlife corridor for anadromous fisheries as well as for mammals like the bobcat that may use the riparian forests to move between habitat areas.

The Connecticut River has a Class B designation from the New Hampshire-Vermont Border to Holyoke and is classified as a warm water fishery. Class B waters are supposed to provide suitable habitat for fish and other wildlife, and to support recreational purposes such as fishing and swimming. The water should also be suitable for irrigation and other agricultural uses.

A report entitled, The Health of the Watershed, published in January 1998 by the New England Interstate Water Pollution Control Commission (NEIWPC) listed bioaccumulation and toxicity as specific water quality issues for the entire length of the Connecticut River in Massachusetts and specifically identified polychlorinated biphenyls (PCBs) in fish. Also in 1998, the Massachusetts Department of Public Health issued a public health advisory for certain species of fish contaminated by PCBs in the Connecticut River (DEP; 1998). The general public should not eat any affected fish species, which include Channel and White Catfish, American Eel and Yellow Perch. Pregnant women and nursing mothers are advised not to eat any fish from the Connecticut River. There is a paucity of current, comprehensive water quality data for the main stem of the Connecticut River due to a severely curtailed DEP water quality monitoring program. Monitoring and follow-up investigations regarding the source and extent of pollutants are urgently needed.

Published water quality information for the Connecticut River is limited. There are numerous point sources of pollution along the Connecticut River such as wastewater treatment plants and industries with National Pollution Discharge Elimination System permits. While a listing of NPDES permit holders exists, there is no published analysis of the water quality testing required to be conducted by the permit holders and many point sources have permits which have expired (DEP; 1995). Clearly additional water quality testing and an evaluation of existing NPDES permits testing results is needed to determine the health of the Connecticut River ecosystem and to clearly identify which uses the river supports.

A 1998 publication issued by the U. S. Geological Survey as part of the National Water Quality Assessment Program, entitled Water Quality in the Connecticut, Housatonic, and Thames River Basins, identified various pesticides used by agricultural operations as pollutants in the Connecticut River in Franklin County. While current drinking water standards were not exceeded, the report noted that existing drinking water standards do not include some pesticides detected or their breakdown products. In addition, the current drinking water standards do not consider the cumulative impacts of more than one pesticide in the water. As a result, the actual health concern posed by these results is uncertain.

C.1.2 Deerfield River Watershed

The Deerfield River is the main tributary to the Connecticut River in Deerfield. From its headwaters at Stratton Mountain in Vermont, the Deerfield River flows southward for 70 miles through the steep terrain of the Berkshires to its confluence with the Connecticut River. In the north central portion of Deerfield, the river meanders until its confluence with the Connecticut River along its border with Greenfield. Throughout its length, ten hydroelectric facilities take advantage of extreme drops in elevation (2,000 feet) to supply thousands with power. The Deerfield River Watershed covers all or part of twenty municipalities. In 2000, the population of the watershed was over 37,000. (FRCOG; 2004) Land use in the watershed is approximately 81 percent forest, 13 percent agricultural and open land, 4 percent developed, and 2 percent surface water (EOEA; 1995/1996).

According to the 2004 Deerfield River Watershed Open Space and Recreation Plan prepared by the Franklin Regional Council of Governments, between 1985 and 1999, the Deerfield River Watershed lost 10 percent of its cropland, 22 percent of its pastureland, and 1 percent of forest. At the same time, the watershed experienced a 58 percent increase in large-lot residential development, which occurred primarily through the construction of single-family homes on lots along existing roadways. During roughly the same period, the population of the watershed grew by 14 percent.

The Deerfield River provides spawning habitat for the blueback herring and the American shad. The Deerfield River is one of Massachusetts' premier Atlantic salmon restoration rivers. The river and its tributaries are nursery habitat for juvenile Atlantic salmon. Adult sea-run salmon are expected to use the river for natural reproduction (U.S. Fish & Wildlife Service; 1995).

Although the river's flow has been heavily regulated because of the requirement of power generation, the Deerfield River has been identified as containing one of the best fisheries in the Commonwealth since the early 1990s (Franklin County Planning Department; 1990). In 1985 and 1986, of all the water quality parameters measured in the Deerfield River, bacteria were the principal water quality problem. This was due in part to the lack of treatment of sewage entering into the river from certain towns in the watershed. This

water quality problem has largely been resolved with the construction of wastewater treatment facilities.

Fortunately, the segment of the Deerfield River in Deerfield supports all recreational uses and has tremendous recreation potential. Angling for trout and other species is a popular pastime for many Deerfield residents who enjoy the natural beauty of the river and surrounding landscape. The public can access the river at the Stillwater Bridge where canoes and kayaks can be launched. Swimming, tubing and canoeing are also popular uses of the river from the Bardswell Ferry Bridge in Shelburne to the Stillwater Bridge area in Deerfield.

C.1.3 Mill River Watershed

The Mill River is a tributary to the Connecticut River that flows through heavily populated areas of central western Massachusetts. Water quality testing at several points along the Mill River and its tributaries took place throughout 1997 as part of the Mill River Watershed Project. Supported by the Conte Refuge, this multidisciplinary, multi-year study included an assessment of water quality, geology, ecological integrity, fish, freshwater mussels and vegetative patterns as part of the process of developing a Mill River Watershed Protection Plan. Testing revealed that Bloody Brook, which flows through agricultural fields and pastures, residential lawns, and below Route 5 and Interstate 91, contained high concentrations of coliform bacteria and nitrates. This, in combination with low alkaline and dissolved oxygen levels, makes it difficult for aquatic life to thrive. Both the relatively high acidic nature of the water and the low dissolved oxygen levels are mostly due to natural causes. The bedrock below Bloody Brook lacks normal buffering capacities in comparison to other streams in the area. The meandering nature of the brook and low stream flows contribute to the low dissolved oxygen levels. A survey of invertebrates in the Mill River and its tributaries found invertebrates in all of the tributaries except Bloody Brook (Mill River Watershed Assessment Project Summary; 1997).

Water quality problems in the Bloody Brook were also identified in a report done in 2000 by researchers from Smith College studying the Mill River Watershed (Rhodes & Sanders; 2000). Authors of the study noted that the Mill River contains Massachusetts' most diverse community of freshwater mussels, including nine of the Commonwealth's twelve mussel species, four state-listed endangered species and the federally-endangered Dwarf Wedge Mussel.

The high concentration of coliform bacteria and nitrates are most likely due to cultural uses. Most of the vegetation surrounding Bloody Brook consists of row fields, cropland, pastures and grassland, and there are no native vegetated strips to act as buffers. Polluted runoff from nearby roads and farms is therefore not filtered through plant roots but is instead directly deposited into the brook. Studies indicate that the presence of a 50- to 70-foot forested buffer improves water quality significantly and can even reduce harmful concentrations of phosphorous and nitrogen by 80 to 90 percent (Report on the Mill River Watershed Project; 1998).

C.2 Surface Waters and Wetlands

Other tributaries in Deerfield include Pole Swamp Brook, Clapp Brook, Fuller's Swamp Brook, Hawks Brook, and Shingle Brook. Many of these water bodies are popular fishing spots. According to land use data generated by the University of Massachusetts using aerial photographs from 1997, 593 acres in Deerfield are covered by surface water.

Although there are no significant ponds or lakes located within the town boundaries, wetlands typically adjacent to a brook or river are extensive. According to the National Wetlands Inventory of the United States Fish and Wildlife Service, 1,586 acres in Deerfield are classified as wetlands (*see Water Resources Map at the end of this section*). Wetlands are transitional areas where land-based and water-based ecosystems overlap. Inland wetlands are commonly referred to as swamps, marshes and bogs. Technically, wetlands are places where the water table is at or near the surface or the land is covered by shallow water. Sometimes, the term wetland is used to refer to surface water as well. Wetlands represent unique and special habitats that help to maintain biological diversity and support approximately 43 percent of the nation's threatened and endangered species (Kinne; 1999). Inland wetlands provide flood storage and control, pollution filtration, and habitat for fish and wildlife. Since they are commonly recharge zones for groundwater sources, it is important that Deerfield identify and protect its wetlands.

Unfortunately Deerfield's wetlands are only marginally mapped. The Wetlands Protection Act requires a permit for any alteration of wetland areas or for any landscape disturbance within 100 feet of wetlands bordering a river or stream, or within 100 feet of isolated wetlands larger than one quarter of an acre. Permits are also required for landscape alterations within 200 feet of rivers and perennial streams. The loss of wetlands in Deerfield has not yet been determined. Several towns in the Pioneer Valley (Hatfield, Sunderland, Amherst, Northampton, Shutesbury, and Pelham) have adopted local wetlands bylaws which protect wetlands more stringently than the State Wetlands Protection Act.

Historically, wetlands have been viewed as unproductive wastelands, to be drained, filled and "improved" for more productive uses. Over the past several decades, scientists have recognized that wetlands perform a variety of extremely important ecological functions. They absorb runoff and prevent flooding. Wetland vegetation stabilizes stream banks, preventing erosion, and trap sediments that are transported by runoff. Wetland plants absorb nutrients, such as nitrogen and phosphorus, which would be harmful if they entered lakes, ponds, rivers and streams. They also absorb heavy metals and other pollution. Finally, wetlands are extremely productive, providing food and habitat for fish and wildlife. Many plants, invertebrates, amphibians, reptiles and fish depend on wetlands to survive. Wetlands have economic significance related to their ecological functions: it is far more cost-effective to maintain wetlands than build treatment facilities to manage stormwater and purify drinking water, and wetlands are essential to supporting lucrative outdoor recreation industries including hunting, fishing and bird-watching.

In recognition of the ecological and economic importance of wetlands, the Massachusetts Wetlands Protection Act is designed to protect eight “interests” related to their function: public and private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, land containing shellfish, fisheries, and wildlife habitat. To this end, the law defines and protects “wetland resource areas,” including banks of rivers, lakes, ponds and streams, wetlands bordering the banks, land under rivers, lakes and ponds, land subject to flooding, and “riverfront areas” within two hundred feet of any stream that runs all year. Local Conservation Commissions are responsible for administering the Wetlands Protection Act.

The conversion of wetlands is a serious problem with high-priced consequences. Watersheds with degraded or destroyed wetlands experience substantially higher flood peaks. Moreover, wetlands replicated with engineered solutions do not function nearly as well ecologically as undisturbed natural wetland systems. The identification, mapping, and protection of all Deerfield’s wetlands should be considered a high priority.

Wetlands also help wildlife, providing habitat for both prey and predators. Wetlands and other types of surface water are interconnected to another water related resource that is extremely valuable to Deerfield residents, ground water and drinking water supplies. Special protection should be afforded to this important natural resource.

C.3 Aquifer Recharge Areas

The water that Deerfield residents drink may come from private wells or public water district supplies. Water district supplies have both groundwater and surface water sources. Groundwater sources are springs and wells while surface water sources include reservoirs and rivers. The underground water collects in layers of sand and gravel called aquifers. Rain permeating through layers of soil can reach groundwater, which in turn may replace water within an aquifer.

Wells are placed to take advantage of existing aquifers. Aquifer levels are maintained from areas called aquifer recharge areas. When rain falls in the hills in the northwestern portion of Deerfield, for example, some of it ends up in the small streams that course down to the Deerfield or the Mill River, but much of it enters the ground water. That ground water slowly moves through the aquifer, ultimately to arrive via private and public wells to residences and businesses. Protecting groundwater and aquifers from contamination by hazardous materials, sewage, salts pesticides, etc. is critical to the quality of both community and non-community water sources.

A number of aquifers are known to underlie the Town of Deerfield (*see Water Resources Map at the end of this section*). These were initially identified in a 1985 report, entitled A Hydrogeologic Investigation of South Deerfield, Massachusetts, produced by the University of Massachusetts. A large, high volume aquifer lies beneath the Interstate 91 corridor, in the floodplain deposits of the Deerfield River. The Deerfield Fire District taps into this aquifer along Stillwater Bridge Road. A shallow unconfined aquifer, known as the Sugarloaf Street aquifer, lies in the central part of South Deerfield.

Bounded on the east by the Pocumtuck Range and on the south and west by Sugarloaf Brook, this aquifer is recharged from the surrounding hills and by infiltrating rainwater along its entire length. The Sugarloaf well field pumped water from this source until it was shut down in 1984 due to excessive ethylene dibromide (EDB) levels. EDB is a chemical found in pesticides commonly used in the cultivation of shade tobacco. Because of this contamination, it is doubtful that the aquifer will provide a satisfactory supply of groundwater without costly treatment.

A deep confined aquifer system of three separate valleys exists between the bottom deposits of Lake Hitchcock and the underlying bedrock. While the extent of the aquifer has been documented by the United States Geological Survey, the recharge areas are not yet mapped. A significant amount of the recharge may originate from the eastern slope of the Berkshires, the Deerfield River, or the glacial Deerfield River delta.

Another productive aquifer may lie beneath the Connecticut River, and its recharge areas are also unknown at this time. Extensive testing of both the quantity and quality of the water is required before determining if a viable supply exists. Since the area above this aquifer is predominantly used for agriculture, which normally entails the use of chemical fertilizers and pesticides, testing would also focus on these potential pollutants. Even if chemicals common to pesticides and fertilizers were not found in the aquifer, its use as a public drinking water source would need to be balanced against the use of the land for farming purposes.

C.4 Flood Hazard Areas

Flooding along rivers is a natural occurrence. Floods happen when the flow in the river exceeds the carrying capacity of the channel. Some areas along rivers flood every year during the spring, while other areas flood during years when spring runoff is especially high, or following severe storm events. The term “floodplain” refers to the land affected by flooding from a storm predicted to occur at a particular interval. For example, the “100-year floodplain” is the area predicted to flood as the result of a very severe storm that has a one percent chance of occurring in any given year. Similarly, the 500-year floodplain is the area predicted to flood in a catastrophic storm with a 1 in 500 chance of occurring in any year.

Flood hazard areas or floodplains located along the river corridors in Deerfield help to protect and regenerate public water sources. Stronger measures enacted to avoid some of the detrimental effects of building on Deerfield’s flood plains have not been as effective in practice as anticipated. Development can still occur in flood prone areas. The Flood Plain Overlay District Bylaw, which was adopted in 1980 to help ensure an adequate quality and quantity of water, needs to be evaluated and updated. The District regulates land uses in all special flood hazard areas designated as Zone A, A1-30 on the Deerfield Flood Insurance Map and the Flood Boundary- Floodway Maps (Deerfield Planning Board; 1998).

D. VEGETATION

The soils and water resources in Deerfield create ecosystems that support a broad range of types of vegetation. The plants that are a critical component of these ecosystems convert solar energy into food, which supports all animal life. Plants cycle energy through the ecosystem by decaying, by removing carbon from the atmosphere and by shedding oxygen. Plants help moderate temperatures and act as shelter and feeding surfaces for herbivores, omnivores, and carnivores.

Plants and animals together make up *natural communities*, defined as interacting groups of plants and animals that share a common environment and occur together in different places on the landscape. Over the past decade, ecologists and conservationists in Massachusetts have devoted increasing effort to studying and protecting these natural communities, rather than focusing on individual species. This section and the following section will address both natural communities and their component species.

Deerfield is rich in a variety of plant life including coniferous and deciduous forests, meadows, cropland, wetlands, and riparian vegetation. Soil type, elevation, and climate largely determine the types of vegetation that exist. Approximately 58 percent of the total land area of the Town of Deerfield is forested. Most of Deerfield's forested areas lie in the eastern and western portions of Town where the Pocumtuck Ridge, North and South Sugarloaf, Arthur's Seat, and Pine Ledge are located. These forests are largely dominated by hardwood species such as northern red oak, sugar maple, American beech, white birch and white ash; although eastern hemlock and white pine are also prevalent. Common shrub and herbaceous species that are important food sources for local wildlife are flowering dogwood, choke cherry, high bush and low bush blueberry, mountain laurel, witch hazel, aster, dandelions, goldenrod, sweet fern, cattail, and water lilies (NHESP; 2001).

The Natural Heritage and Endangered Species Program, a program of the Massachusetts Department of Fisheries and Wildlife, identified 241 native plant species as rare in the Commonwealth. Twenty-four of these species are located in Deerfield, which places it among those towns in Massachusetts that contain the most rare species. Two of the rare plant species found have not been identified anywhere else in the Commonwealth. These are Snowberry (*Symphoricarpos albus* var. *albus*) and Boreal Wormwood (*Artemisia campestris*). These plants, as well as two others found in Deerfield, Nodding Pogonia (*Triphora trianthophora*) and Spiked False Oats (*Trisetum spicatum* var. *molle*), are endangered. The rare plant species that are located in Deerfield are shown in Table 4-1 on the following page.

Vegetation along the banks of the Deerfield and Connecticut Rivers, as well as their tributary streams, provides several important benefits. Forested buffers purify water by filtering out harmful nutrients from road run-off, lawns, and agricultural fields, therefore reducing the amount of suspended solids and phosphates that may enter the river. On Deerfield's floodplains willow, birch, trembling aspen, and red maple decrease erosion and sedimentation by slowing water velocity. Vegetation also adds to the organic matter

content of local soils, shelters and feeds wildlife, and cools water temperatures, which inhibits excessive growth of algae and aquatic vegetation. Vegetation acts as a natural sponge that absorbs, holds, and slowly disperses water toward rivers. This is particularly important during major storm events and the springtime thaw when flooding may be an issue. Floodplain forests are considered to be among the most threatened, globally significant wetland community types in New England. Unfortunately due to their high soil fertility and scenic qualities, many floodplain forests throughout the country have been converted to agricultural uses or cleared for residential and commercial development.

Table 4-1: Rare Plant Species found in the Town of Deerfield

Scientific Name	Common Name	Taxonomic Group	State Status
<i>Artemisia campestris</i> ssp. <i>borealis</i>	Boreal Wormwood	Vascular Plant	Endangered
<i>Deschampsia cespitosa</i> ssp. <i>glauca</i>	Tufted Hairgrass	Vascular Plant	Endangered
<i>Symphoricarpos albus</i> var. <i>albus</i>	Snowberry	Vascular Plant	Endangered
<i>Triphora trianthophora</i>	Nodding Pogonia	Vascular Plant	Endangered
<i>Trisetum spicatum</i> var. <i>molle</i>	Spiked False Oats	Vascular Plant	Endangered
<i>Arisaema dracontium</i>	Green Dragon	Vascular Plant	Threatened
<i>Asclepias verticillata</i>	Linear-leaved Milkweed	Vascular Plant	Threatened
<i>Asplenium ruta-muraria</i>	Wall-rue Spleenwort	Vascular Plant	Threatened
<i>Carex lenticularis</i>	Shore Sedge	Vascular Plant	Threatened
<i>Ludwigia polycarpa</i>	Many-footed False-loosestrife	Vascular Plant	Threatened
<i>Alnus viridis</i> ssp. <i>Crispa</i>	Mountain Alder	Vascular Plant	Special Concern
<i>Amelanchier sanguinea</i>	Roundleaf Shadbush	Vascular Plant	Special Concern
<i>Aster tradescantii</i>	Tradescant's Aster	Vascular Plant	Special Concern
<i>Corallorrhiza odontorhiza</i>	Autumn Coralroot	Vascular Plant	Special Concern
<i>Lophopodella carteri</i>	River Moss Animal	Moss	Special Concern
<i>Minuartia michauxii</i>	Michaux's Sandwort	Vascular Plant	Special Concern
<i>Podostemum ceratophyllum</i>	Threadfoot	Vascular Plant	Special Concern
<i>Prunus pumila</i> var. <i>depressa</i>	Sandbar Cherry	Vascular Plant	Special Concern
<i>Salix exigua</i>	Sandbar Willow	Vascular Plant	Special Concern

Source: Natural Heritage and Endangered Species Program, Massachusetts Department of Fish and Game

An inventory of Massachusetts floodplain forest communities undertaken by the Massachusetts Natural Heritage Programs and The Nature Conservancy revealed six examples of floodplain forests in Deerfield. These are North Meadows Island, Wapping Floodplain, South Meadows, Academy Island, the Pine Hill Floodplain, and the Deerfield Academy Playing Fields Woods. While all of these sites should be protected from development, the South Meadows site was listed as particularly important due to its size and unusual diversity.

E. FISHERIES AND WILDLIFE

Deerfield's landscape consists of a valley and floodplain filled with patches of cultivated fields, pasture, and woodland surrounded to the east and west by sparsely populated hills. The region's wildlife flow across the landscape in patterns that disregard the political boundaries of towns. There are fourteen major habitat types within Deerfield. Rivers, wetlands, hardwood, coniferous, and mixed forests, open meadows, croplands, and mountain ridges provide sustenance, mating grounds, and vegetated cover to the wildlife who dwell within. Since many species rely on a variety of habitats during different periods of their life cycle, species diversity is greatest in areas where several habitat types occur in close proximity to each other. With this in mind, the protection of all habitat types is vital for maintaining and enhancing biodiversity in Deerfield.

How do we determine the quality of the wildlife habitat in Deerfield and the most appropriate conservation strategies? There are three general paths to follow in conserving the health of wildlife populations. One way is to protect the habitat of specific species that are rare, threatened, or endangered. It is thought that while protecting their habitats other species will benefit. A second path is to conserve certain landscape level resources like a large contiguous forest or riparian habitats along rivers. This helps to conserve the habitats of a large number of species but it might lose sight of some rare and endangered species. The third method is a combination of the two. Conserving the long-term biodiversity of the town and the region requires efforts to protect unique habitats, networks of habitats that assist population dynamics, and landscape level resources like large contiguous forest patches and riparian areas.

Recognizing the general areas where wildlife mate, feed, and travel is often the first step. The forested hills in south and northwest Deerfield provide large blocks of contiguous forestland, which provide interior forest habitats for a variety of birds and mammals. The Pocumtuck Range contains large contiguous forest patches running along ridges parallel to the Connecticut River floodplain, which biologists believe are used as travel corridors by wildlife. The forest/field interface and the extensive network of hedgerows provides extensive opportunities for both edge species, predatory activity by birds and mammals, as well as travel lanes from one contiguous forest to another. Large expanses of open farmland are important to species such as the Northern Harrier, turkey vultures, hawks, and flocks of migratory birds.

The Connecticut and Deerfield Rivers play a dual role for the region's wildlife. Riparian corridors often contain a greater degree of species diversity than any other portion of the landscape. The rivers also serve as important regional migration corridors. In 1996 the Conte Refuge sponsored a survey of migratory birds along the Connecticut River that revealed that 133 species, mostly woodland species, use the riverside habitat as a migratory corridor (Conte Refuge; 1997). Also, the Natural Heritage and Endangered Species Program considers the riparian areas along the Deerfield and Connecticut Rivers as critical habitats. In addition, there are over thirty rare plant and animal species found within this habitat area (U.S. Fish & Wildlife Service; 1995). Finally the rivers provide clean water habitats for native freshwater fisheries as well as anadromous fish species.

American shad, blueback herring, and shortnose sturgeon spawn within the stretch of the Connecticut River, which forms the eastern boundary of Deerfield. The Deerfield River provides spawning habitat for the blueback herring and the American shad and is one of Massachusetts' premier Atlantic salmon restoration rivers.

Periodic logging of forestland has created early successional habitats favored by deer and certain bird species. The Massachusetts Department of Fish and Game uses a percentage of the income derived from hunting and fishing licenses for the purchase of wildlife habitat and important research into wildlife management. Sporting associations such as the Franklin County League of Sportsman and the South Deerfield Rod and Gun Club take advantage of the variety of prime game habitat in town. Hunters in Deerfield typically target white tail deer, turkey, snowshoe hare, raccoon, black bear, cottontail, ruffed grouse, and gray squirrel. Beaver, red fox, gray fox, bobcat, weasel, coyote, and fisher are also found in the area.

The Department of Fish and Game has sponsored several programs aimed at subsidizing local wildlife populations. The ringed-neck pheasant, which is not native to North America, is stocked annually as game for Deerfield hunters. Another successful program involves the reintroduction of the wild turkey. Since the 1960s, wild turkeys have been captured in other states and released in Massachusetts. When the Pilgrims landed at Plymouth Rock, an estimated 75,000 wild turkeys lived in New England. Unfortunately unrestricted hunting and deforestation led to the eradication of the species from the State in the mid-1800s. Yet, since their reintroduction, Massachusetts' wild turkey population has soared. This is largely due to strict hunting regulations and reforestation.

Fishing has been an important economic and recreational activity in Deerfield since the early days of European settlement. The rivers did not originally support a diversity of species but the creation of new habitats and the degradation of others led to the reduction of native fish numbers and the introduction of exotic species. The Massachusetts Division of Fisheries and Wildlife stocks a variety of trout species (non-native rainbow, eastern brook, and brown) for sport fishing on both rivers. The Deerfield is the most intensively fished and managed trout fishery in Massachusetts. This is due to the fact that the river has relatively clean water, is accessible, and there are a variety of fish habitats along its length. Limited access to the Connecticut River in Deerfield has meant that it is generally a less utilized fishing destination. Resident fish species include walleye, channel catfish, northern pike, small and largemouth bass, and pickerel.

Anadromous fish species (those which are born in fresh water, migrate to salt water where they mature and then return to freshwater to spawn) include striped bass, sea lamprey, blueback herring, American shad, Atlantic salmon and shortnose sturgeon. The Conte National Fish & Wildlife Refuge is responsible for restoring migratory fish to the Connecticut River Watershed and has funded a number of projects to enhance their populations. One project involved stocking river herring in streams where they are absent to determine where fishways will be most appropriate (Conte Refuge; 1997).

Unfortunately, dams along both the Deerfield and the Connecticut Rivers threaten many species—especially Atlantic salmon, blueback herring, and American shad—by blocking fish passage and altering natural flows. During spawning season, fluctuating water releases sweep away fish eggs and larvae. Dams also have a detrimental effect on young fish and place stress on older fish that must constantly alter their feeding and resting areas due to habitat changes resulting from fluctuating flows. Fish may be killed by turbines or stranded in isolated pools when high flow releases recede.

The construction of fishways at key points on the Connecticut River has reduced some of the harmful effects of dams. Regular stocking has led to marginal populations of Atlantic salmon and increased populations of American shad. Lamprey eel numbers have also increased significantly, which indicates improving water quality throughout the Connecticut River Watershed and more efficient fish passage installations.

Many anadromous fish are threatened by a variety of human actions. Fisheries in the Massachusetts portion of the Connecticut River Watershed are threatened by sedimentation, erosion, toxicity, bacterial contamination, elevated stream temperatures, bioaccumulation, and low flow due to damming for hydroelectric operations (Connecticut River Forum; 1998).

Deerfield provides habitat for a diversity of wildlife species that are either threatened, endangered or considered to be of special concern by the Massachusetts Natural Heritage and Endangered Species Program (*see Table 4-2*). The species that most often catch the public's eye are those that are considered "glamorous" such as the Atlantic Salmon, the Dwarf Wedge Mussel and the Peregrine Falcon, all of which have been found in Deerfield. While the importance of these species is undeniable, lesser-known species should not be overlooked, since all play a crucial role in Deerfield's ecosystems. Permanently protecting the habitat areas of these species should be a top priority.

Individual animals move within a landscape. When and where wildlife and fish species move is not completely understood by wildlife biologists. However, it is known that animals pay little attention to political boundaries. Wildlife seek natural cover for shelter and food, but some species willingly forage where human uses, such as farm fields, gardens and even trash cans, provide food. As the land within Deerfield continues to be fragmented by development, it is reasonable to expect that remaining large blocks of undeveloped forest and the parcels of land connecting them will become more important to area wildlife, and that conflicts between the needs of wildlife and residents will become more common.

Table 4-2: Rare Fish and Wildlife Species Found in the Town of Deerfield

Scientific Name	Common Name	Taxonomic Group	State Status
<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Fish	Endangered
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird	Endangered
<i>Lampsilis cariosa</i>	Yellow Lampmussel	Mussel	Endangered
<i>Ambystoma opacum</i>	Marbled Salamander	Amphibian	Threatened
<i>Clemmys guttata</i>	Spotted Turtle	Reptile	Special Concern
<i>Clemmys insculpta</i>	Wood Turtle	Reptile	Special Concern
<i>Desmocerus palliatus</i>	Elderberry Long-horned Beetle	Beetle	Special Concern
<i>Gomphus vastus</i>	Cobra Clubtail	Dragonflies/Damselflies	Special Concern
<i>Gomphus ventricosus</i>	Skillet Clubtail	Dragonflies/Damselflies	Special Concern

Source: Natural Heritage and Endangered Species Program, Massachusetts Department of Fish and Game

Many species of wildlife in Deerfield have home ranges greater than fifty acres in size. Even those species with smaller home ranges move across the landscape between sources of shelter, water, food and mating areas. Some animals, including white-tailed deer and black bear, seek both interior forest habitat and wetland edges where food sources may be more abundant. Connections between bodies of water and sub-watersheds are also important for wildlife and fisheries species. Some of the more common animals that use river and stream corridors are beaver, muskrat, raccoon, green heron, kingfish, snapping turtle, and many species of ducks, amphibians, and fish.

Roads are a form of connection for humans but they can be an impediment to some wildlife movement. Wildlife benefit from having land to move within that is isolated from human uses. Conservation planning that recognizes this need often focuses on the development of wildlife corridors. Permanently protected wildlife corridors are particularly critical in a landscape which is experiencing development pressures, to ensure that animals have the ability to travel across vegetated areas between large blocks of habitat.

F. SCENIC RESOURCES AND UNIQUE ENVIRONMENTS

The characteristics that allow a stranger to distinguish Deerfield from other towns in the region may be different than the unique qualities and special places that only residents can really know. This section identifies the scenic resources and unique environments that most town residents would agree represent the essence of Deerfield’s character. In many ways the history of Deerfield--how people came to settle the land, use its resources, and enjoy its forests, streams, and bodies of water--can be seen in the landscapes that have retained a sense of the past. The unique environments in Deerfield play a very important role in providing residents with a sense of place. Brooks, mountains, wetlands, and village centers provide markers on the landscape within which we navigate our lives. Scenic landscapes often derive their importance from their location relative to other landscape features. The unique environments inventories in this section include archeological and historic areas that also define the character of Deerfield. The purpose of inventorying scenic resources and unique natural environments in Deerfield is to provide a basis for setting priorities for resource protection.

F.1 Scenic Resources

In 1982, the Massachusetts Department of Environmental Management (now the Department of Conservation and Recreation) and the Nature Conservancy conducted a “landscape inventory” which classified rural landscapes of the Commonwealth’s six physiographic regions. The three classes of scenic quality are Common, Noteworthy, and Distinctive. Together, Noteworthy and Distinctive landscapes are considered scenic. Only 9 percent of the state fell into these categories, but nearly half of Deerfield’s landscape was considered scenic. According to the report, the Pioneer Valley (of which Deerfield is a part) “covers the largest area of relatively unspoiled Connecticut River Valley scenery” and “contains more vestiges of the 18th century landscape than anywhere in the Commonwealth”.

Distinctive landscapes are larger than one square mile and typically exhibit the following attributes (noteworthy landscapes have the same characteristics but are of lesser, nevertheless important, visual quality):

- Openness
- High relative relief (hills, mountains and valleys)
- Historic structures and land uses
- Agriculture
- Surface water
- Significant vegetation
- Important geological features
- Low population density
- Lack of contemporary development

The areas listed below meet one or more of the above criteria (*see Scenic Resources and Unique Environments Map at the end of this section*):

North and South Sugarloaf: These mountain peaks afford spectacular views of large expanses of farmland, the Connecticut River and wooded hillsides. In addition to offering prime scenic vistas, the NHESP acknowledges this as a site of rare and endangered species.

Historic Deerfield: Surrounded by agricultural fields that are still actively farmed, twenty-four 18th and 19th century homes remain in this well-preserved colonial village and national historic site. Thirteen are enjoyed as popular tourist attractions. In 1988 and 1989, the National Trust for Historic Preservation named Old Deerfield one the country’s eleven most threatened historic sites due to the potential development of surrounding farmlands and meadows. The Deerfield Land Trust has spent the last decade helping to protect farmland north and south of the village by encouraging farmers to obtain conservation restrictions on their properties.

The Deerfield River: The Deerfield River flows into the western portion of town from the Berkshires and winds to the north past Old Deerfield before eventually merging with the Connecticut River at the town's eastern border. It is a popular destination for nature enthusiasts who canoe, kayak, fish, and swim along its length. Rare plant species inhabit the river's banks while a number of rare and endangered fish thrive below the surface. The Stillwater Bridge area boasts the highest density of known archeological artifacts per site within Deerfield.

Pine Nook Road: A trip along Pine Nook Road is a step back in time. A walk in any direction brings one in contact with remnants from the past such as ruins of an old farmhouse or maple sugar operation. The road winds uphill through young evergreen forests to the summit where a panoramic view of the Connecticut River and the surrounding landscape unfolds. Occasionally a falcon or bald eagle is sited here. In 1989, Pine Nook Road was designated as "Scenic" under Massachusetts General Laws, Chapter 40 section 15C, meaning that no trees, stone walls, or roads can be altered without the written consent of the Deerfield Planning Board. Two large parcels adjacent to the intersection with Keith Cross Road are permanently protected; however, residential development threatens to damage the natural beauty and cultural significance of the remainder of this scenic and special road.

The Pocumtuck Range: Located on the eastern side of town, the Pocumtuck Hills rise 700 feet above the valley and stretch 7 miles from the Deerfield River to Mount Sugarloaf at its southern end. Site of the Pocumtuck Ridge Nature Preserve, the Range is a popular walking spot and scenic asset. On a clear day, one can see agricultural fields, the Deerfield River and the Berkshire Hills. The ridge is predominantly ledgerrock, which is unsuitable for development, although scattered houses can be found there. Even so, this area is coming under increasing development pressure that threatens its unspoiled beauty. The Deerfield Land Trust has successfully obtained some conservation easements in this sensitive area.

River Road: Sections of River Road attest to what Deerfield must have looked like during its peak as a thriving agricultural community. Large, prosperous farmsteads dot the landscape and a number of 19th century houses and tobacco barns remain intact. Magnificent views of the Connecticut River and the valley exist along this stretch of road. Fortunately, a number of parcels along the length of River Road are enrolled in Agricultural Preservation Restriction (APR) Program.

The Connecticut River: The Connecticut River delineates Deerfield's eastern boundary and is treasured by Deerfield's residents. Boaters, fishermen, and hikers enjoy views of water, farmland and distant mountaintops. The river and its adjoining lands are a symbol of Deerfield's cultural heritage. An abundance of archeological sites yielding artifacts from 10,000 years of human settlement attest to the importance the river and the rich soil played in decisions to inhabit and cultivate the land. The area is also home to a number of rare and endangered species. The purchase of conservation easements along the river's banks help preserve this cherished scenic resource although a significant amount

of land remains unprotected. The Connecticut's designation as an American Heritage River should help to preserve this resource.

Hawks Road: In the northwestern portion of Deerfield is a place fondly referred to as “The Old World.” In 1985, Hawks Road was added to the list of scenic roads in Deerfield, a reminder of how the town once looked.

Arthur's Seat: The highest point in town, Arthur's Seat is fondly remembered by Deerfield's older residents as a spot that afforded a spectacular view of the town. Over the years, trees and shrubs have obstructed the view, but Arthur's Seat remains much the same as it did many years ago—devoid of homes and roads—and visitors can still follow the ridge to the top of this privately owned land.

F.2 Archeological Resources

Deerfield's rich colonial heritage is well known throughout New England. Less well known is that Deerfield also boasts an ancient heritage that dates thousands of years prior to the arrival of the first European settlers. One of the oldest archeological sites in the eastern United States is located within the town's borders, attesting to the people who occupied the area for more than 10,000 years. Evidence suggests that Native Americans lived here continuously from the end of the last Ice Age until the arrival of the English in the late 1600s. They chose to make their homes on flat lands that were close to water and consisted of well-drained soils. Over the millennia, the character of the landscape and the societies that inhabited it changed dramatically. Thus the complete history of the town is neither a history of English settlement nor of a single Native American group. It is the history of a multitude of peoples living in a complex and changing landscape.

In 1984, D.F. Dincauze, A.S. Keene and D. Lacy from the University of Massachusetts' Department of Anthropology wrote a report entitled The Prehistoric Archeological Resources of Deerfield Massachusetts, A Guide for the Community. The guide documents 85 prehistoric sites although possibly hundreds more exist and lie yet to be uncovered. Most receive a mere cursory investigation since no in-depth study was undertaken at the time the report was written. Fifty-four of the eighty-five sites yielded artifacts, an average of thirty-one artifacts per site. The remaining twenty-five sites were identified by the presence of particular features, such as hearths, middens, fire-cracked rock, storage pits and burials. Three sites received a more thorough examination and one site was excavated extensively.

One very important site is called the DEDIC (Deerfield Economic Development and Industrial Corporation) site due to its location on the grounds of the Deerfield Industrial Park just southwest of Mt. Sugarloaf. It contains artifacts from the Paleo-Indians (Old Indians) who inhabited the area 9,000 to 12,000 years ago. A 1977 excavation of the site yielded nearly 2,000 artifacts and sufficient information to place it on the National Register of Historic Places. This designation affords limited protection from the adverse effects of federally assisted projects and state actions but in no way interferes with the

property owner's right to alter, manage or sell the property when using private funds. Given this fact, damage to the archeological find from insensitive land use decisions remained a possibility. To protect the priceless contents from vandalism and so that future study can be undertaken, the site was buried under twenty feet of fill. It lay undisturbed until investigations of one section of the site resumed in 1995. The profusion of artifacts recovered there indicates that Sugarloaf was a major Paleo-Indian encampment. The site now enjoys greater protection since the Massachusetts Department of Environmental Management (now the Department of Conservation and Recreation) purchased a 30-acre parcel in 1997. The exploration rights for the remainder of the site was granted to the University of Massachusetts (Gramly; 1998).

Other important sites include:

- The Stillwater Bridge area. This site exhibits the greatest quantity of artifacts per site in town; it was studied extensively due to proposed hydroelectric projects.
- Lower terraces, from the eastern bank of the Deerfield River east to Highway 5 and 10 and north-south from Wapping to the Green River.
- River Road, from Pine Nook Cemetery south to Mt. Sugarloaf.
- Terraces along the western bank of the Deerfield River, north of Stillwater Bridge and parallel to the North and South Meadows (several of these sites may have been destroyed by I-91).
- River Road, north of Pine Nook Cemetery to McClelland Farm Road.
- Southern part of town, just north of the Whately line (especially along Sugarloaf and Bloody Brooks).

The Department of Anthropology at the University of Massachusetts, in conjunction with Historic Deerfield Inc., conducted additional archeological research at a site located on the lower terrace of Pine Hill during the summers of 1989, 1991, 1993, 1995 and 1997. Excavations recovered ceramics (as many as fifty-six vessel lots), lithics, faunal and floral remains, and numerous features including post molds, large pits and fire reddened soil that date from at least the Late Archaic through the Late Woodland periods (approximately 4,500 to 1,200 B.P.).

More than a third of Deerfield's known sites are well preserved and present opportunities for additional research. Unfortunately 34 percent of the sites face potential destruction and hundreds have already been lost due to natural events (flooding, erosion and natural decay) and human causes (farming, construction and looting). The 1984 report attests that looting has been and continues to be the leading cause behind the destruction of archeological sites in Deerfield and the surrounding towns. In an effort to curb this trend, Massachusetts' law requires that the location of archeological sites remain confidential but this law has proven inadequate and looting continues to be a problem. Since all but one of the sites is found on privately owned land, Deerfield should take a proactive role in protecting these important artifacts so that they may be available for future study.

G. ENVIRONMENTAL CHALLENGES

A number of environmental challenges loom on the horizon for the Town of Deerfield including: farm and forestland fragmentation; chronic flooding exacerbated by floodplain development; wastewater treatment; and non-point source pollution. All of these problems are interrelated and all are the result of increasing population and development. In the coming years, the Town must contemplate what actions to take in order to resolve these pressing problems and plan for a future that preserves Deerfield's rich agricultural, cultural, and natural heritage.

G.1 Farm and Forestland Fragmentation

The population of Deerfield has been growing at a faster rate than in the state overall over the course of the last thirty years. This has led to an ever-increasing demand for single-family detached housing in Deerfield. Most of this development has taken place on farm and forestlands. Taking other constraints into consideration, including wetlands and buffer areas to surface waters, 12,400 acres of land could still be developed in town. This is equal to 58 percent of the town. There is enough land in town to fit 7,654 more building lots. This means that 18,624 residents and 3,167 more school-aged children could live in Deerfield at some point in the future.

Many of the largest undeveloped parcels in town are also the most suitable for development and include farm and forestland with slopes under 25 percent which are not protected from development. These open and forested lands contribute most to the town's rural character and are owned by a handful of families. Their agricultural businesses maintain the landscapes as they are: pastoral, historic, and overall, simply breathtaking. Were these farm businesses to fail, the future of the farms and their families, as well as the rural character of the town itself, would be in jeopardy.

G.2. Chronic Flooding/ Flood Plain Development

Deerfield's major flood events have resulted from rainfall alone or in combination with snowmelt. Snowmelt in the early spring causes annual flooding which often inundates the floodplains of the Deerfield and Connecticut Rivers and their tributary streams. The flat, low area surrounding Bloody Brook in South Deerfield is sometimes subject to severe flooding, which is exacerbated by undersized culverts and excessive growth on marginally developable land. At times, Main and Pleasant Streets are impassible due to standing water. Mill Village Road is also prone to flooding. Several houses built in this area during the past ten years have substantial septic system problems stemming from the high water table. As a result the Town has been studying the feasibility of extending the public sewer system. Were this to happen, however, it would likely only increase the fragmentation of existing farmland by encouraging further development.

High groundwater is also a long-term problem that some residents believe has been exacerbated by development in the South Deerfield area in the 1990s. Many residents in Deerfield deal with increases in runoff, high water tables, and basement flooding.

G.3 Wastewater Treatment

In the last decade, the Town of Deerfield has taken extensive measures to address wastewater treatment issues throughout town. Nonetheless, the South Deerfield Wastewater Treatment District is particularly challenged by increased residential and commercial development in that area of town. There the wastewater treatment has been upgraded and older sections of sewer pipe have been replaced to reduce the excess amount of water flowing into the wastewater plant. The district is currently offering rebates to residents who take specific action to reduce the amount of runoff from their properties that goes into the system. Even with these actions, increased development pressures in this part of town will quickly overwhelm existing wastewater treatment capacity. Further, as development spreads along the roads and farm fields throughout town, the need for additional wastewater treatment infrastructure will pose a continuing challenge.

G.4 Non-point Source Pollution

The water quality of a river or lake fluctuates periodically along with surface runoff trends and other factors; therefore water quality must be periodically measured to look for trends. Water that is determined to be safe for one use may be unacceptable for another purpose or species. Pollution occurs in many different forms and can impact the natural environment in many ways. Point source pollution is broadly defined as any discernible, confined and discrete conveyance from which pollutants may be discharged and can be easily identified and managed. Non-point source (NPS) pollution is contaminated runoff that is deposited into surface and ground waters. NPS pollution is caused by rainfall or snowmelt flowing over the surface of the landscape picking up and carrying away natural and human-made pollutants and depositing them into lakes, rivers, wetlands, and groundwater aquifers. Non-point sources of pollution are harder to identify and, thus, to remedy. There are four main sources of NPS pollution: sediments, nutrients, toxic substances and pathogens (EPA; 1999). NPS pollution loads are closely associated with land use types, particularly agricultural and industrial uses. In Deerfield there is concern regarding the pollution caused by informal dumps and junk yards. Loss of wetlands and increased impervious surfaces also contribute to increases in polluted runoff from NPS sources. Erosion along riverbanks is a major source of sedimentation that can have a negative impact on water quality.

The 2004 Town of Deerfield Community Development Plan reviewed total NPS pollution loads for the Deerfield and Connecticut River Watersheds. The analysis found steady increases in both watersheds between 1971 and 1999 in four critical measures of NPS pollution from within the political boundary of Deerfield based on current and historical land use. These measures included: total suspended sediments, nitrogen, phosphorous and effective imperviousness. The report also identified increased levels of

phosphorous in the Connecticut River upstream from Deerfield, indicating a problem with runoff from agricultural areas in town.

Earlier reports had also identified problems with NPS pollution in Deerfield. A 1990 report on the Deerfield River had also identified high fecal coliform bacteria counts near the Deerfield's confluence with the Connecticut River. This may have been due to significant non-point agricultural runoff and discharges from wastewater treatment facilities in Greenfield (Franklin County Planning Department; 1990). Non-point source pollution was also responsible for the contamination of South Deerfield's ground water supply. In addition, water quality problems in Bloody Brook were identified in a study done in 2000 by researchers from Smith College studying the Mill River Watershed (Rhodes & Sanders, 2000). This report states that the source of pollution in this area is NPS runoff from residential, agricultural and commercial development.

These land uses may lead to the runoff of sediments, pesticides, fertilizers, chlorides, effluent and hazardous wastes into water bodies. To thwart further deterioration of Deerfield's water supplies, concerted action will need to be taken to address and minimize these non-point sources of pollution.

SECTION 5

INVENTORY OF LANDS OF CONSERVATION AND RECREATION INTEREST

The previous sections of this Plan have identified areas within the Town of Deerfield that are significant for their cultural, scenic, or ecological values. This information is helpful for understanding the character of Deerfield and for outlining issues, which may be of particular interest in open space and recreation planning decisions. This section provides an inventory of existing undeveloped land containing these significant values. It identifies public and private parcels, current land use, the degree of protection, as well as existing land management practices.

In general terms, ‘open space’ is defined as undeveloped land. In an Open Space and Recreation Plan, the focus is on undeveloped land, which is valued by residents because of what it provides: actively managed farm and forestland; wildlife habitat; protection and recharge of groundwater; public access to recreational lands and trail systems; important plant communities; structures and landscapes that represent the community’s heritage; flood control; and scenery. The term ‘natural resource’ describes the biological and physical components of an ecosystem that people depend on for their existence and, for some, their livelihood. These components are air, surface and ground water, wood fiber, soil nutrients, vegetation, fisheries, and wildlife. Recreational facilities can include open space, parks, and developed areas like tennis courts and swimming pools. Open space and recreation plans typically identify areas of undeveloped land that contain precious natural and recreational resources and prioritize them for protection.

Open space can be protected from development in several ways that differ in the level of legal protection they provide, the method by which they are protected, and by the type of landowner. When land is considered to be “protected,” it is intended to remain undeveloped in perpetuity. This level of protection is ensured in one of two ways: (1) ownership by a state conservation agency, a not-for-profit conservation land trust, or the local Conservation Commission; or (2) attachment of a conservation restriction or similar legal mechanism to the deed.

Land is considered to be protected from development when it is owned by the Commonwealth of Massachusetts and managed by a state conservation agency, including the Department of Fish and Game (DFG) or the Department of Conservation and Recreation (DCR). Land is also considered protected when it is owned by a town and is under the authority of the Conservation Commission, or when it is owned by a land trust for conservation purposes.

Private landowners can also protect their properties through the attachment of a conservation restriction (CR). A CR is a legally binding agreement between a landowner (grantor) and a holder (grantee)—usually a public agency or a private land trust—whereby the grantor agrees to limit the use of his/her property by forfeiting interests in the land (development being one type of interest) for the purpose of protecting certain conservation values. The conservation restriction may run for a period of years or in perpetuity and is recorded at the Registry of Deeds. Certain income, estate or real estate tax benefits may be available to the grantor of a conservation restriction.

There are several types of conservation restrictions. Some protect specific resources, such as wildlife habitat, or farmland. Actively farmed land with prime soils or soils of statewide importance may be eligible for enrollment in the state’s Agricultural Preservation Restriction (APR) Program. Adopted by the State Legislature in 1977, the Agricultural Preservation Restriction Program (APR) ensures the permanent protection of large blocks of farmland by making it economically feasible for farmers to keep farming. Administered by the Massachusetts Department of Agricultural Resources (DAR), this program offers farmers the difference between the “fair market value” and the “agricultural value” of their land. In exchange, a permanent deed restriction is placed on the property, which precludes uses that may harm the agricultural viability of the land. The farmer continues to own the land and can sell it, but only for agricultural uses.

The development of any parcel of land that is in the APR Program, protected with a conservation restriction, owned by a state conservation agency, or owned by a land trust or a town for conservation purposes, would require a vote by two thirds of the State Legislature as outlined in Article 97 of the Amendments to the Massachusetts State Constitution. For the purposes of this Open Space and Recreation Plan, cemeteries will also be considered to be protected from development.

This protection conveyed by Article 97 does have its limits. The state legislature has voted to release this protection at the request of local communities, so that conservation land can be used for schools, roads, economic development, or other public projects not related to resource protection. Reforms have been proposed to make this process more difficult. It is important for local advocates of conservation to be vigilant of attempts to remove the protection status from open space in the Town of Deerfield.

The Farmland Assessment Act was enacted by the State Legislature in 1973. Parcels enrolled in Massachusetts Chapter 61 tax abatement programs created by this Act are considered to be “temporarily protected” from development. This program offers landowners reduced local property taxes in return for maintaining land in productive forestry, agricultural or recreational use for a period of time. These “chapter lands” provide many public benefits, from maintaining wildlife habitat and recreational open space to sustaining rural character, and local forest and farm-based economic activity. Another benefit of the Chapter 61 programs is that they offer towns the opportunity to protect land. When a parcel that has been enrolled in one of the Chapter programs is proposed for conversion to a use that would make it ineligible for the program, the town is guaranteed a 120-day waiting period during which it can exercise its right of first

refusal to purchase the property. The right of first refusal can be sold to, or given to, a land trust that can often respond much more quickly than the Town can. It is important for the Town of Deerfield not to consider land under Chapters 61 (forest), 61A (farm) or 61B (recreation) as permanently protected. At the same time, the value the program offers to the Town should not be disregarded.

Land in Massachusetts owned by towns or water districts may be considered to have “limited protection” from development. If a town-owned parcel of land is under the legal authority of the Select Board, rather than the conservation Commission, it is considered to have limited protection from development. The parcel could be called a wildlife sanctuary or a town forest, but may not have the long-term protection afforded by Conservation Commission lands. In this case, converting a town forest to a soccer field or a school parking lot could be decided by the Board of Selectmen or Town Meeting. A parcel of land used for the purposes of water supply protection is considered in much the same way. Unless there is a legal restriction attached to the deed or if the deed reads that the land was acquired expressly for water supply protection, the level of protection afforded these types of parcels varies depending on the policies of each community. In most cases, the water district would be required to show the Massachusetts Department of Environmental Protection just cause for converting the use of the land. However, this is not an insurmountable hurdle. The Town of Athol recently took their surface drinking water supplies off-line after developing a productive well field. A change in land use around the reservoir from water supply protection to active recreational use may occur.

The portion of the total land area in Deerfield that is protected as open space is summarized in Table 5-1. It is divided into two main sections based on type of ownership: private and public. Within each of these major categories, parcels are differentiated by use (farm or forestland), by ownership and management, and by level of protection: protected, temporary, and limited (*see Protected Open Space Map at the end of this section*).

Approximately 10,715 acres in Deerfield are open space with some level of protection from development. This represents 50 percent of the total land area of the town (21,388 acres). Of that total, 1,927 acres are enrolled in the APR program. The Deerfield Land Trust has worked in partnership with the Massachusetts Department of Agricultural Resources (DAR), the Department of Conservation and Recreation (DCR) and the Division of Fish and Game (DFG) to protect hundreds of acres in Deerfield over the years, the majority of it working farmland. What these figures demonstrate is that, while farm and forestland is being converted to other more intensive land uses, some land is being protected.

The inventory that follows in Sections A and B lists parcels by private, public and non-profit ownership and then by protection status: protected, temporary, limited or unprotected. These types of open space are identified on the Protected Open Space Map found at the end of this chapter.

Table 5-1: Summary Areas of Farmland and Forest Open Space by Ownership and Level of Protection from Development in Deerfield

PRIVATELY OWNED OPEN SPACE	Acres	% Of Total Land Area
Farmland		
<i>Protected by Agricultural Preservation Restriction</i>	1,927	9.0%
<i>Temporarily Protected Farmland under Ch 61A</i>	3,819	17.9%
Forestland		
<i>Protected by Conservation Restriction</i>	688	3.2%
<i>Temporarily Protected Forestland</i>		
Chapter 61	2,263	10.6%
Chapter 61B	63	0.3%
TOTAL PRIVATELY OWNED OPEN SPACE WITH SOME LEVEL OF PROTECTION	8,760	41.0%
PUBLICLY and QUASI-PUBLICLY OWNED OPEN SPACE		
Protected Farmland		
University of Massachusetts (under Ch. 97)	357	1.7%
Deerfield Land Trust, Inc.	13	0.1%
Protected Forestland		
<i>Protected by Federal Conservation Agencies</i>		
United States Fish and Wildlife Service	4	0.02%
<i>Protected by State Conservation Agencies</i>		
Department of Fish and Game	51	0.2%
Department of Conservation and Recreation	736	3.4%
<i>Protected by Quasi-Public Non-Profit Conservation Land Trusts</i>		
New England Forestry Foundation	136	0.6%
<i>Protected by Quasi-Public Public Fire and Water Supply Districts</i>		
Deerfield Fire District	164	0.8%
South Deerfield Water District	268	1.3%
Land with Limited Protection & Owned by Town of Deerfield	193	0.9%
Other Protected Land		
Cemeteries	16	0.1%
TOTAL PUBLICLY AND QUASI-PUBLICLY OWNED OPEN SPACE WITH SOME LEVEL OF PROTECTION	1,938	9.0%
TOTAL OPEN SPACE WITH SOME LEVEL OF PROTECTION	10,698	50.0%

Source: Deerfield Master Plan, 2000; Town of Deerfield Assessor's Dept., 2006; masslandrecords.com

A. PRIVATE PARCELS

Approximately 82 percent of the undeveloped land with some degree of protection in Deerfield is privately owned. Most of this land is owned by private individuals and nearly two-thirds of it is in agricultural use. Privately owned parcels contribute to the amount of open space in Deerfield through deed restrictions, conservation easements and tax abatement programs. However as mentioned above, these programs offer varying degrees of protection. For instance, lands under the Farmland Assessment Act (various Chapters of 61) can be taken out of the program at the landowner's will while lands

enrolled in the Agricultural Preservation Restriction (APR) Program or with other conservation restrictions are protected in perpetuity.

Since the intention of the APR program is to attain a fair distribution of lands throughout Massachusetts, priority is given to areas suffering from intense development pressure. Throughout the State, 131 municipalities now have land in the program. In Deerfield alone, 1,927 acres are protected in perpetuity under this program, as detailed in Table 5-2 below. This represents approximately 9 percent of the Town’s total acreage. Two areas concentrated along the Connecticut River and to the west of I-91 will help to ensure that Deerfield’s agricultural heritage is preserved, but the Town may want to continue to look for opportunities to protect farmland as development pressures mount.

Table 5-2: Privately Owned Land Protected from Development in Deerfield with an Agricultural Preservation Restriction (APR)

Parcel ID	Owner(s)	Location	Land Area
106 7	Barway Farm Inc.	Sand Gully Rd. North	30.0
106 17	Barway Farm Inc.	Stillwater Rd.	11.6
123 19	Barway Farm Inc.	Mill Village Rd.	29.0
112 1	Barway Farm Inc.	Mill Village Rd.	25.0
123 5	Barway Farm Inc.	Mill Village Rd.	8.60
123 4	Barway Farm Inc.	Mill Village Rd.	3.4
123 1	Barway Farm Inc.	Mill Village Rd.	13.4
94 1	Barway Farm Inc.	Off Childs Cross Rd.	16.0
123 28	Barway Farm Inc.	Off Mill Village Rd.	57.0
94 7	Barway Farm Inc.	Childs Cross Rd.	12.4
94 2	Barway Farm Inc.	Off Childs Cross Rd.	9.9
94 19	Barway Farm Inc.	188 Mill Village Rd.	25.0
104 2	Barway Farm Inc.	174 Mill Village Rd.	111.0
45 4	Bolton, Donald G./Howard, Laura J.	641 River Rd.	90.0
45 5	Bolton, Donald G./Howard, Laura J.	Off River Rd.	4.1
119 5	Bridges, Ethel M. & Richard D.	River Rd.	25.0
98 5	Bank of America	River Rd.	86.0
98 4	Bank of America	433 River Rd.	56.0
66 2	Fisher, David, Benjamin et al	River Rd.	34.0
66 4	Fisher, David, Benjamin et al	River Rd.	10.90
184 7	Grybko, Lena R. & John A. Jr.	Sunderland Rd.	13.0
57 2	Herron, John H. Jr.	Hawks Rd.	51.0
140 13	Karas, Frank H. Jr. & Christine A.	Jackson Rd.	15.27
151 33	Karas, Frank H. Jr. & Christine A.	Hillside Rd.	29.0
151 25	Karas, Frank H. Jr. & Christine A.	Hillside Rd.	22.0
121 3	Kownacki, Walter J. & Stella V.	Hillside Rd.	53.0
123 21	Kownacki, Walter J. & Stella V.	Hillside Rd.	5.7
111 64	Marsh, Herbert V. & Mary C.	Mill Village Rd.	4.9
45 6	Melnik, George H. & Claire L.	River Rd.	4.6
45 3	Melnik, George W. & Gregory S.	635 River Rd.	30.0
123 20	Melnik, William W. Sr. & Sharon M.	Mill Village Rd.	13.9
123 22	Melnik, William W. Sr. & Sharon M.	Mill Village Rd.	10.1
124 1	Melnik, William W. Sr. & Sharon M.	Off Sand Gully Road West	62.0
125 75	Melnik, William W. Sr. & Sharon M.	Plain Road West	17.0

Parcel ID	Owner(s)	Location	Land Area
95 7	Melnik, William W. Sr. & Sharon M.	2 Childs Cross Rd.	16.0
100 31	Melnik, William W. Sr. & Sharon M.	Off Sunrise Ave.	41.0
143 19	Melnik, William W. Sr. & Sharon M.	Settright Rd.	20.0
131 3	Melnik, William W. Sr. & Sharon M.	Settright Rd.	35.0
142 18	Melnik, William W. Sr. & Sharon M.	Settright Rd.	1.53
142 19	Melnik, William W. Sr. & Sharon M.	Settright Rd.	1.30
131 2	Melnik, William W. Sr. & Sharon M.	Settright Rd.	1.25
131 4	Melnik, William W. Sr. & Sharon M.	Settright Rd.	1.29
131 1	Melnik, William W. Sr. & Sharon M.	Settright Rd.	8.4
86 10	Molenaar LLC	Off Greenfield Rd.	0.2
87 9	Molenaar LLC	Mill Village Rd.	5.1
78 7	Molenaar LLC	Mill Village Rd.	4.1
86 6	Molenaar LLC	423 Greenfield Rd.	24.0
87 11	Molenaar LLC	Mill Village Rd.	7.1
86 7	Molenaar LLC	Greenfield Rd.	60.0
87 2	Pioneer Gardens Inc.	Mill Village Rd.	1.8
87 6	Pioneer Gardens Inc.	Mill Village Rd.	0.1
87 9	Pioneer Gardens Inc.	Mill Village Rd.	5.1
78 6	Pioneer Gardens Inc.	Mill Village Rd.	11.6
84 2	Rogers, Arthur A. & Anne D.	105 Pine Nook Rd.	79.0
97 2	Rogers, Arthur A. & Anne D.	Pine Nook Rd.	7.8
84 4	Rogers, Arthur A. & Anne D.	Pine Nook Rd.	30.0
78 3	Rosario D. L& Maynard C./Clark S.	Mill Village Rd.	33.0
78 2	Rosario D. L& Maynard C./Clark S.	Mill Village Rd.	2.1
149 4	Savage, Jay G.	Conway Rd.	9.02
158 60	Smead, Charles D. & Arlene M.	North Main Street	40.0
132 36	Sobieski, Francis G.	218 Greenfield Rd.	3.2
122 17	Sobieski, Francis G.	North Hillside Rd.	44.0
132 16	Steve & Kathy Melnik Family Trust	Mill Village Rd.	12.6
117 1	Steve & Kathy Melnik Family Trust	Whitmore Ferry Rd.	40.0
18 4	Steve & Kathy Melnik Family Trust	Lower Rd.	87.0
117 7	Steve & Kathy Melnik Family Trust	Whitmore Ferry Rd.	0.2
94 5	Stewart's Nursery, Inc.	Childs Cross Rd.	3.3
94 4	Stewart's Nursery, Inc.	Off Childs Cross Rd.	3.5
78 4	Stewart's Nursery, Inc.	Mill Village Rd.	6.3
94 9	Stewart's Nursery, Inc.	Off Mill Village Rd.	4.0
10 1	Williams, Kenneth S. III	Off Pogues Hole Rd.	7.1
10 2	Williams, Kenneth S. III	Off Pogues Hole Rd	24.0
18 7	Williams, Kenneth S. III	Off Pogues Hole Rd	0.96
18 8	Williams, Kenneth S. III	Off Pogues Hole Rd	1.10
18 14	Williams, Kenneth S. III	Off Pogues Hole Rd	1.6
18 15	Williams, Kenneth S. III	Off Pogues Hole Rd	1.6
19 1	Williams, Kenneth S. III	Off Pogues Hole Rd	3.7
19 2	Williams, Kenneth S. III	Off Pogues Hole Rd	2.2
19 3	Williams, Kenneth S. III	Off Pogues Hole Rd	2.2
19 4	Williams, Kenneth S. III	Off Pogues Hole Rd	4.5
19 10	Williams, Kenneth S. III	Off Pogues Hole Rd	1.5
19 11	Williams, Kenneth S. III	Off Pogues Hole Rd	1.6
19 14	Williams, Kenneth S. III	West Side Old Ferry Rd.	0.13
19 16	Williams, Kenneth S. III	Off Old Ferry Rd.	4.9
19 17	Williams, Kenneth S. III	Off Old Ferry Rd.	3.8

Parcel ID	Owner(s)	Location	Land Area
20 1	Williams, Kenneth S. III	Off of Greenfield Rd.	21.0
28 2	Williams, Kenneth S. III	Off Old Ferry Rd.	7.3
28 11	Williams, Kenneth S. III	West Side Old Ferry Rd.	0.11
28 13	Williams, Kenneth S. III	Off Old Ferry Rd.	4.3
28 14	Williams, Kenneth S. III	Off Old Ferry Rd.	4.6
28 15	Williams, Kenneth S. III	West of Greenfield Rd.	3.9
29 12	Williams, Kenneth S. III	Off Pogues Hole Rd	1.7
29 14	Williams, Kenneth S. III	Off Old Ferry Rd.	4.0
70 8	Williams, Kenneth S. III	Mill Village Rd.	31.0
70 3	Williams, Kenneth S. III & Milton Jr.	Off Mill Village Rd.	16.0
70 4	Williams, Kenneth S. III	Off Mill Village Rd.	30.0
70 5	Williams, Kenneth S. III	Off Mill Village Rd.	29.0
78 1	Williams, Kenneth S. IV	Mill Village Rd.	58.0
70 9	Williams, Kenneth S. IV	Mill Village Rd.	11.7
70 1	Williams, Milton Jr. & Kenneth S. III	Off Mill Village Rd.	4.2
		TOTAL APR ACRES	1,927.36

Source: Town of Deerfield Assessor's Dept., 2006

Table 5-3 details privately owned properties with a conservation restriction protecting them from development, including the holder of the CR.

Table 5-3: Privately Owned Land Protected from Development in Deerfield with a Conservation Restriction (CR)

Parcel ID	Owner(s)	CR Holder	Location	Land Area
44 6	Bernstein, Rose Lynn F.	MA DCR	River Rd.	18.0
44 9	Bernstein, Rose Lynn F.	MA DCR	River Rd.	24.0
53 1	Cosby, Camille O.	Deerfield Land Trust	Hawks Rd.	100.0
57 1	Cosby, Camille O.	Deerfield Land Trust	Hawks Rd.	97.9
73 3	Cosby, Camille O.	Deerfield Land Trust	Hawks Rd.	38.8
91 3	Dejnak, Brian W. & Rebecca M.	Deerfield Land Trust	Off Stillwater Rd.	38.0
61 45	McInerney, Linda C.	Deerfield Land Trust	Route 5 & 10	0.9
109 10	Mizula, Russell P. and Robin	Deerfield Land Trust	Mathews Rd.	19.8
121 5	Pocumtuck Stewards of the Land	Deerfield Land Trust	East of Hillside Rd.	6.5
135 3	Pocumtuck Stewards of the Land	Deerfield Land Trust	Off Stage Rd.	9.9
135 4	Pocumtuck Stewards of the Land	Deerfield Land Trust	Off Stage Rd.	78.0
98 5	Rogers Trust	MA DCR	River Rd.	41.7
66 5	Swedlund, Mary Allen	MA DCR	River Rd.	9.9
4 1	Stewarts Nursery Inc.	MA DCR	McClelland Farm Rd.	118.5
56 1	Weiskel, Portia W.	Deerfield Land Trust	Hawks Rd.	86.0
			TOTAL CR ACRES	688.0

Source: Deerfield Master Plan, 2000; Town of Deerfield Assessor's Dept., 2006; masslandrecords.com

Chapters 61, 61A and 61B enable qualifying forest, farm, and recreational lands to be taxed at their use value rather than full market value so as to promote their conservation. Chapter 61 applies to forested parcels of ten or more contiguous acres that are managed under a 10-year forest management plan. Chapter 61A parcels must be at least five

contiguous acres, must be “actively devoted” to agricultural or horticultural uses, and must earn at least \$500 in annual gross sales. Chapter 61B lands are a minimum of five acres and are devoted to open space or recreational uses. According to assessor’s records, Deerfield contains 2,263 acres in Chapter 61, 3,819 acres in Chapter 61A, and 63 acres in Chapter 61B (which consists of two sportsmen’s clubs), all considered to be temporarily protected.

Tax abatement programs offer some benefits to those interested in preserving the rural character of a community. Landowners are required to notify certain Town boards by certified mail if they intend to sell these lands or discontinue the forested or agricultural use. Not only is the Town granted the right of first refusal if a landowner sells or converts the classified land to another use, but a penalty in the form of either a conveyance tax or a roll back tax is assessed. Unfortunately, while this program does offer financial incentives to continue these open space uses, it does not guarantee that lands will be permanently maintained in their current state. If a landowner is presented with an attractive offer from a developer, a Town can often do little unless there is an active program in place to acquire land. Between 1998 and 2000, four of Deerfield’s agricultural parcels (6.7 acres) were rolled out of Chapter 61A to make way for three new house lots and one business. More recently, in 2004, approximately nine acres on Mill Village Road were rolled out to build four new homes. Nonetheless, when combined with other protection tools, tax abatement programs can be an effective method of preserving open spaces.

The Town of Deerfield also benefits from the existence of private open space parcels that are technically unprotected, but are made available for use by the community. Primary among these resources is the Channing L. Bete Soccer Field. The publishing company, Channing L. Bete, maintains a soccer field on land adjacent to their office complex. Recognizing that Deerfield does not possess a sufficient supply of recreational space, the corporation grants the community permission to use the field for local sporting events. In addition, Deerfield’s private schools own land that is not protected, but much of which is undeveloped. The Eaglebrook School, in particular, owns in excess of 500 acres in town. Deerfield Academy owns over fifty acres. Historic Deerfield also owns approximately 115 acres, including many fields and open lands surrounding the colonial village that are not protected but nonetheless contribute to the rural character of Deerfield.

B. PUBLIC AND NON-PROFIT PARCELS

Publicly owned protected open space equals approximately 9 percent of all of the open space that has some level of protection in town. Most of this land is protected from development and is owned by the State of Massachusetts. A few other public and non-profit entities own parcels of land throughout Deerfield that contribute to the town’s supply of recreational open space. While these properties do not comprise a significant portion of Deerfield’s total acreage, they do play an important role in satisfying wildlife and community needs. The following inventory includes the significant public and semi-

public lands in town and highlights their potential as conservation or recreation areas. These are divided into protected parcels and unprotected parcels.

B.1 Protected Public Parcels

Deerfield residents value the fact that the Massachusetts Department of Conservation and Recreation (DCR) owns and manages over acres of lands open to the public for passive and active recreational activities active. For example, the 2006 survey respondents felt that one of the most popular recreational sites in town was Mt. Sugarloaf State Reservation.

Table 5-4: State and Federal Owned Land Protected from Development in Deerfield

Owner	Name/Location	Map & Parcel	Acres	Current Use
Department of Conservation (DCR)	Steam Mill Rd.	102 3	18.0	Conservation and Recreation
DCR	Steam Mill Rd.	102 4	8.2	Conservation and Recreation
DCR	Steam Mill Rd.	102 5	7.8	Conservation and Recreation
DCR	Off Steam Mill Rd.	102 6	19.1	Conservation and Recreation
DCR	Off North Hillside Rd.	103 10	8.4	Conservation and Recreation
DCR	Steam Mill Rd.	103 11	23.5	Conservation and Recreation
DCR	Greenfield Rd.	20 12	2.1	Conservation and Recreation
DCR	Off Mclelland Farm	3 1	8.3	Conservation and Recreation
DCR	Off River Rd.	64 3.2	39.3	Conservation and Recreation
DCR	Steam Mill Rd.	79 40	15.5	Conservation and Recreation
DCR	Mclelland Farm Rd.	8 11	12.3	Conservation and Recreation
DCR	Off Mclelland Farm	8 9	9.3	Conservation and Recreation
DCR	Off Steam Mill Rd.	95 19	5.5	Conservation and Recreation
DCR	Steam Mill Rd.	95 23	11.9	Conservation and Recreation
DCR	Steam Mill Rd.	95 24	9.3	Conservation and Recreation
DCR	Mt. Sugarloaf	153 7	447.0	Conservation and Recreation
DCR	Mt. Sugarloaf	184 1	90.0	Conservation and Recreation
SUBTOTAL DCR ACRES			735.50	
Department of Fish and Game (DFG)	Off Whately Rd.	177 1	28.5	Wildlife Habitat
DFG	Off Mill Village Rd.	70 2	18.0	Wildlife Habitat
DFG	Stillwater Rd.	89 15	4.3	Wildlife Habitat
DFG	Stillwater Rd.	93 9	0.5	Wildlife Habitat
SUBTOTAL DFG ACRES			51.3	
University of Massachusetts (UMass)	River Rd.	137 1	45.5	Farmland

Owner	Name/Location	Map & Parcel	Acres	Current Use
UMass	River Rd.	153 4	148.7	Farmland
UMass	River Rd.	156 15	26.1	Farmland
UMass	River Rd.	156 16	15.0	Farmland
UMass	River Rd.	171 1	85.4	Farmland
UMass	River Rd.	171 2	16.1	Farmland
UMass	River Rd.	184 3	19.9	Farmland
SUBTOTAL UMASS ACRES			356.7	
United States Fish and Wildlife Service (USFWS)	Third Island		4.0	Recreation and Wildlife Habitat
SUBTOTAL USFWS ACRES			4.0	
TOTAL PROTECTED STATE & FEDERAL LAND			1,147.5	

Source: Town of Deerfield Tax Assessors' Records, April 2006.

The following section provides more detailed descriptions of some of the critical publicly owned and quasi-publicly owned properties of particular interest in the Town of Deerfield that are protected from development in perpetuity:

- Mount Sugarloaf State Reservation:* Mount Sugarloaf is a dominant geologic formation and an unmistakable gateway to South Deerfield. Consisting of 537 acres, the Reservation is a favorite destination for hikers, picnickers, and other outdoor enthusiasts. An auto road winds to the summit where commanding views of the Connecticut River, the Pioneer Valley, and the Pocumtuck Range can be observed from an observation tower and visitors can relax in the shade of an outdoor pavilion. Restrooms are also available and the area is handicap accessible.
- Third Island:* This four-acre island is located on the Connecticut River, four and a half miles north of the Rt. 116 Sunderland/ Deerfield Bridge and south of the confluence of the Saw Mill River in Montague. On October 4, 1998, the Silvio O. Conte Refuge, a National Fish and Wildlife Refuge, acquired Third Island from the Connecticut River Watershed Council. Already a popular picnicking and boating destination, the Conte Refuge's acquisition of the island may lead to enhanced recreation activities there.

- *Mount Sugarloaf Field:* This small parcel is presently owned and maintained by the Department of Conservation and Recreation as a playing field. Frequently enjoyed by local sport leagues, permission to use this field rests with DCR.
- *University of Massachusetts:* The University owns a 357-acre tract of land along River Road in South Deerfield. Although the main dairy herd was relocated in 1994, approximately eighty cows and a few dozen pigs remain and are used for research. The University also uses turf and vegetable plots for agricultural research. The University insists that the land is secured for agricultural use under Article 97 of the General Laws, but over the years there has been considerable debate over what will become of this prime farmland. Discussions concerning the protection of this parcel continue.

The Town of Deerfield also owns nine cemeteries that contain sixteen acres that are considered to be protected from development. All other lands owned by the town that are undeveloped are considered to have only limited protection, as none of them are under the control of the Conservation Commission.

B.2 Protected Quasi-Public Non-Profit Parcels

The Deerfield Land Trust and the New England Forestry Foundation are non-profit 501(c) 3 conservation land trusts that include in their mission the ownership of undeveloped lands for the purposes of supporting agriculture and forest management. These lands are considered to be held for conservation purposes in perpetuity.

Table 5-5: Protected Quasi-Public Non-Profit Parcels Protected from Development in Deerfield

Owner	Name/Location	Map & Parcel	Acres	Current Use	Condition	Recreation Value	Public Access
Deerfield Land Trust (DLT)	Greenfield Road	61 73	0.21	Side of road	Fair	Very Low	Good
DLT	Mill Village Rd.	69 1	12.83	Farmland	Good	Low	Limited
DLT	Mill Village Rd.	69 4	0.32	Farmland	Good	Low	Limited
New England Forestry Foundation (NEFF)	River Rd.	100 11	70.0	Actively Managed Forestland with Trails	Good	High	Yes
NEFF	River Rd.	116 5	65.5	See above.	Good	High	Yes
TOTAL			148.86				

Source: Deerfield Assessor's Department, April 2006.

One popular recreational site is the Pocumtuck Ridge Nature Preserve, an area owned by a local non-profit land that is protected from development with a conservation restriction (see Table 5-3).

- *Pocumtuck Ridge Nature Preserve:* This 121-acre site is composed of three parcels that were donated or purchased by the Deerfield Land Trust in 1993. In 1998, this preserve was conveyed to a new local non-profit group, the Pocumtuck Stewards of the Land. Located on the southern end of Mount Pocumtuck, this woodland contains a few popular and well-maintained trails and is open to the public for hiking, bird watching, horseback riding, and cross-country skiing. The Pocumtuck Stewards of the Land hopes to eventually complete the ridge trail by achieving public access through abutting properties or acquiring additional land.

B.3 Protected Quasi-Public Fire and Water Supply Districts

The Deerfield Fire District and the South Deerfield Water Supply District are quasi-public entities established through acts of the state legislature to serve their districts with water for drinking, sanitation, and for fire protection. Their lands are typically held for water supply purposes. For the scope of this plan, it is assumed that most, if not all of the acreage held by these two districts, is protected under Article 97 of the Amendments to the Massachusetts State Constitution.

The Deerfield Fire District owns 164 acres and the South Deerfield Water District owns 268 acres, for a total of 432 acres of densely wooded land. The area is safeguarded for the districts' water supplies and therefore can only support certain limited recreation uses such as hiking, hunting, and bird watching.

B.4 Public Parcels with Limited Protection

The Town owns a total of 193 acres, which contribute to the undeveloped land with limited protection, as shown in Table 5-5 at the end of this section. These properties include a 6-acre recreational field on Conway St. purchased in 2004 from Channing Bete and the nearly 12-acre Deerfield Elementary School. The school was built in 1992 and has one multi-use playing field, two basketball courts, a tot lot, a playground for young children, and an obstacle course for older children. The facilities are in good condition and are frequented by children throughout the Town. Municipal park and conservation areas and programs in Deerfield are being evaluated for accessibility for people with disabilities as part of this plan. The results of this evaluation are included in Appendix B: ADA Access Self-Evaluation.

Other town-owned lands with limited protection include the following parcels:

- *Town Memorial Forest:* The Town of Deerfield owns this 20-acre, World War II memorial located off of Pine Nook Road. The public can access the parcel from Pine Nook Road although no sign attests to its exact location. Currently, the Baystate Forestry Service of Shutesbury actively manages the woodland for forest products. An informal trail passes along the border of this parcel, extending from the Pocumtuck Ridge Nature Preserve to the summit of Mount Pocumtuck.

- *Nature Sanctuary:* Located near Hillside and Stage Roads, this 34-acre parcel owned by the Town of Deerfield offers residents access to the habitat of a variety of small New England birds. Two dirt roads skirt the area in a mile-long loop but the sanctuary itself is difficult to access without trespassing through private yards. According to one frequent user, the sanctuary is currently used by only a handful of neighborhood residents. The potential does exist for a trail network that, if publicized, may satisfy residents' demand for more areas for passive recreation. If this occurs, the natural beauty of this woodland may be experienced by a larger segment of the population. The potential exists to create a continuous greenway network in this area that extends from the Sugarloaf Mountains to the Pocumtuck Ridge Nature Preserve by way of the Nature Sanctuary.

B.5 Unprotected Public Parcels

The Town of Deerfield also benefits from the existence of publicly and quasi-publicly owned open space parcels that are technically unprotected, but are made available for use by the community. A number of these properties are described in detail below:

- *Frontier Regional High School:* The school property encompasses roughly twenty-three acres upon which there is a large playing field, a running track, basketball courts, and tennis courts. The field is used during the school's athletic seasons and in the summer by softball leagues. An additional field is not currently in use due to drainage and construction problems. There are two gymnasiums: one full size, and one half size. The facilities appear in good condition overall.
- *Old Deerfield Grammar School:* A few years ago the bulk of this parcel was purchased by the Pocumtuck Valley Memorial Association, although a small area of recreational open space remains in Town ownership. Maintained for the Town by the Association, the lot doubles as a little league and soccer field.
- *Town Field:* The Recreation Committee recently constructed a community park on land adjacent to the Deerfield Municipal and Police Building. The park includes a multi-use recreational area for field games such as baseball, soccer, and general recreation use. Since the park links the Tilton Library, Deerfield Senior Center, and St. James Church, it may also be an optimal location for community events and summer programs.

Table 5-5: Town-owned and Managed Land with Limited Protection from Development in Deerfield

Site Name/Location	Acres	Assessor's Map	Assessor's Lot	Current Use	Condition	Recreation Value	Public Access	Type of Grant	*Zoning
North Main St.	1.1	132	41	Planned town garden	Good	Low	Yes	N/A	C III
Birchwood Dr.	36	138	5	Hiking, etc.	Good	High	Yes	N/A	RA
Recreation Field/Greenfield Rd.	6.1	159	15	Open Land	Poor (wet)	Low	Yes	N/A	C III
28 Pleasant St.	0.9	159	23	Elem. School Play Area	Good	High	Yes	N/A	CVR
Elementary School/21 Pleasant	11.7	159	27	Playground and Fields	Good	High	Yes	N/A	CVR
Off Conway St.	0.2	168	138	Access to Elem. School Fields	Good	Low	Yes	N/A	CVR
Off Conway St.	1.8	168	140	Playing field behind Town Hall	Good	High	Yes	N/A	CVR
Park St.	0.2	168	5	Town Common	Good	Low	Yes	N/A	CVR
Off North Main St./Braeburn	3.4	169	23	Open Space	Good	Medium	Limited	N/A	CVR
Braeburn Ave.	2.8	169	24	Open Space	Good	Medium	Limited	N/A	CVR
Off Memorial St.	1.5	61	47	Ball Field	Good	High	Yes	N/A	RA
Off Pine Nook Rd.	8.4	63	8	Hiking, Hunting, etc.	Good	High	Limited	N/A	RA
Steam Mill Rd.	31.0	79	39	Town Forest	Fair	Medium	Limited	N/A	RA
Old Pine Nook Rd.	63.0	80	1	Town Forest	Fair	Medium	Limited	N/A	RA
Pine Nook Rd.	18.0	81	3	Town Forest	Fair	Medium	Limited	N/A	RA
Off Mill Village Rd.	5.5	87	8	Fishing	Fair	Low	Limited	N/A	RA
Off Childs Cross Rd.	0.96	94	3	Fuller Swamp	Poor	Low	No	N/A	RA
TOTAL TOWN LAND WITH LIMITED PROTECTION	192.6								

Source: Deerfield Board of Assessor's, April 2006. Note: RA= Residential Agricultural; CVR=Central Village Residential; CIII=Small Business.

SECTION 6

COMMUNITY GOALS

A. DESCRIPTION OF PROCESS

The Town of Deerfield's Open Space and Recreation Goal Statement was developed through the following planning process:

- In March 2006, an open space and recreation survey was developed by the Town of Deerfield. The random sample survey was mailed to approximately 200 households in Deerfield (*see Appendix A for a copy of the survey*). Of these, 79 were returned, which represents a 40 percent rate of return. The survey responses were used to help focus the attention of the Deerfield Open Space and Recreation Planning Committee in the development of the Preliminary Draft Section 8-Goals and Objectives.
- On March 29, 2006, approximately twenty-six (26) individuals participated in a kick-off meeting for the Deerfield Open Space and Recreation Plan. During the meeting, residents took part in an activity that recorded their opinions on the most important natural, recreational, and historical resources in Deerfield and the best actions for the town to take to protect or enhance them. Another mapping exercise encouraged citizens to identify areas in town that were the most important to protect as well as the locations of environmental problems e.g. dumping and unauthorized recreational use. The results of this exercise were used to develop the draft goals and objectives.
- During the months of March, April, May and June 2006, the Deerfield Open Space and Recreation Planning Committee held a series of public meetings at a rate of two per month. During each of these meetings, Committee members discussed open space and recreation goals and objectives, their opinions on the most critical environmental problems in Deerfield, and then created the five-year action plan.
- On June 21, 2006, the Open Space and Recreation Planning Committee held a public forum to present and receive feedback on the Town's Five-Year Open Space and Recreation Action Plan including the geographic information systems maps.

B. STATEMENT OF OPEN SPACE AND RECREATIONAL GOALS

Deerfield residents who responded to the Open Space and Recreation Survey and participated in the process of developing this plan have a vision for the future of Deerfield's natural, scenic, recreational, and historical resources.

Their vision for Deerfield rests in these main themes: sense of place; networks of vegetation and habitat; walk-able and sociable neighborhoods that are connected to each other; an active and adaptive agricultural industry and farmland; and collaborative democratic action.

Sense of Place: Deerfield retains the distinctive landscape characteristics of its five sub-regions: South Deerfield, Old Deerfield, East Deerfield, West Deerfield, and Wapping. The historical, cultural, and scenic resources of each sub-region and of the town as a whole are cherished, revered, and preserved for the enjoyment of current and future generations.

Networks of Vegetation and Habitat on Land and Associated with all Surface Waters Including the Connecticut and Deerfield Rivers: Deerfield sustains a network of ecologically important forests, wetlands, and riverside forests for rare and common native plant and animal species. Land is protected and areas are taken care of because Deerfield residents have a strong relationship with the land, the rivers, and the natural environment as a whole.

Walk-able and Sociable Neighborhoods Connected to Each Other: Deerfield residents succeed in establishing meaningful relationships at the local neighborhood-scale based on a shared understanding of concerns and goals and need for a greater sense of community where people live. The Town receives support and funding to sustain well maintained trails, paths, and routes for non-motorized transportation. Deerfield continues to support policies and actions that create a diverse citizenry in regards to race, age, and income.

An Active and Adaptive Agricultural Industry and Protected Farmland: Deerfield residents support farmers and the agricultural industry as a whole to continue to utilize prime farmland soils for the production of food and cash crops in ways that are most effective, from the farmers' perspectives.

Collaborative Democratic Action: Each year, Deerfield's citizens continue to be even more involved in town affairs by working together to identify issues and solve problems with agreed upon solutions using a fair, transparent, and accessible process.

SECTION 7

ANALYSIS OF NEEDS

The Deerfield Open Space and Recreation Plan incorporates an inventory of land-based natural, historic, scenic, and recreational resources in town (Section 4), identifies the areas that contain these resources (Section 5), and based on the community's general goals (Section 6), makes comparisons between the supply of resources and the demand (Section 7). In the following subsection, A. Summary of Natural Resource Protection Needs, the most important environmental issues are highlighted. In B. Summary of Community's Needs, the most important needs of the residents are discussed. Finally, in C. Management Needs, the obstacles to the effective resolution of these needs are addressed.

A. Summary of Natural Resource Protection Needs

The previous sections of this Open Space and Recreation Plan examined the variety of natural and cultural resources, which provide Deerfield its distinctive rural character. Public input, in the form of survey results and comments from Deerfield Open Space and Recreation Planning Committee members, provided a basis for discussion as to what resources are of priority concern to residents. The following section outlines key natural resource protection needs. Each resource need is followed by a recommended strategy. Most of these strategies are reflected in the Goals and Objectives and the Action Plan.

Areas of Conservation Interest

According to the 2006 Open Space and Recreation Planning Survey, at least 80 percent of survey respondents felt it was important to conserve clean air, drinking water supplies, the Deerfield River, walking and hiking trails, forests, ponds and streams, historic landscapes, farmland, and wildlife habitat. These attributes can be linked to a specific place or to multiple areas in town.

Recommendation 1: The Town should continue to work with Deerfield Land Trust and encourage private conservation efforts. Deerfield should also continue to set aside funds annually to provide local matches for Agricultural Preservation Restrictions as well as to assist in paying for a share of other types of land protection transactions in town. At the same time, the Town should develop a way of prioritizing

opportunities with a focus on ranking these popular attributes. This could help the Town in choosing whether to exercise its right-of-first refusal with Chapter lands.

Environmental Protection

Section 4 - Environmental Inventory and Analysis includes a discussion of environmental problems in Deerfield. There is a need for vigilance among residents and town officials to ensure that identification, monitoring and clean up of existing sources of pollution, including non-point pollution, continues (*see Section 4G*). In addition, as dumping and other forms of environmental contamination occur, the Town needs to have an established means for dealing with these issues that is satisfactory to residents.

Recommendation 2: Neighborhood and community-oriented volunteer groups can be encouraged by the Town to assist officials in the identification and response to dumping and trash issues. The Town should explore the use of surveillance, signage, and fines for prevention and mitigation of these problems.

Recommendation 3: Consider adopting and enforcing a local wetlands protection bylaw that would be more stringent than state laws but which would also provide for exemptions for agriculture, forestry operations, and for non-motorized recreational uses.

Farmland and Forests

Farmland and forests give Deerfield its rural, small town feel. Active farming and forestry support the town's and the region's economy. Wildlife abound in Deerfield because large areas of contiguous forest and undeveloped agricultural areas exist.

Farmland and forests provide multiple public benefits to Deerfield residents. The support of local farms affords residents access to fresh vegetables, fruits, and dairy products, as well as the opportunity to buy forest products grown by neighbors. Farms also provide passive recreational value as roadside views and scenic vistas. Forests cover sub-watershed slopes and help replenish streams and wetlands over time. Forests provide habitat for wildlife and can provide public and private landowners periodic income. In addition, local residents value these areas for their passive recreational value for many multi-purpose trail networks traverse sections of town.

Among towns in Franklin County, Deerfield is the only one with its own land conservation trust. Deerfield has been very active in protecting farmland over time. However, there still remain many parcels with prime farmland soils that are threatened by development. This fact is not lost on residents. Town residents have indicated in the 2006 survey that all manner of actions to protect natural resources should be exercised from zoning changes to accepting and purchasing land and development rights of farm and forestland.

Recommendation 4: The Town may consider whether revisions to its zoning bylaws could be made to encourage the conservation of forest and farmland and other natural and historical resources.

Water Resources

People value the role that ground and surface waters play in the quality of their lives. Overall, 94 percent of survey respondents considered that it was important to conserve drinking water supplies in Deerfield. Both of the community water supply districts in Deerfield are aware of limits to their current supplies based on existing demand and there is on-the-ground evidence of well contamination at two different sites in town. In addition, there is of a medium yield aquifer (potential drinking water resource) in East Deerfield where drinking water for existing residential uses is needed. The main public water suppliers, the two water districts, serve only a portion of the drinking water needs for Deerfield residents. There is no comprehensive data on the needs and availability of water supplies for drinking water and fire control for the entire town.

Recommendation 5: The Town should continue to work closely with the Deerfield Fire District and the South Deerfield Water Supply District to assist in their own efforts to identify and secure access to sustainable water supplies for drinking water and fire control through new source development, inter-municipal connections and agreements, water supply protection measures, conservation, and other forms of demand management for their existing customers. At the same time, the Town should identify areas of Deerfield that do not have sufficient water supplies for drinking water and fire control through a town-wide needs and supply assessment.

B. Summary of Community Needs

Deerfield residents and town officials have been engaged in implementing their Master Plan ever since it was adopted by Town Meeting in 2000. Through a process of forming special committees to implement recommendations of the Master Plan (e.g. for economic development, senior housing, agricultural advocacy, and non-point source pollution assessment), the town, its residents, officials, and community leaders are well versed in addressing town needs in an effective manner.

Over the next five years, town boards and commissions may need to focus on how they can collaboratively and positively impact several key community needs: 1) addressing high water issues in Deerfield; 2) improving recreational access to rivers, trails, and natural areas and reducing impacts to unauthorized recreational areas; 3) protection of the

visual rural character of Deerfield; and, 4) attention to residents' experiences related to their sense of community.

High Water Table

In 2006, all across Massachusetts, there are communities dealing with high groundwater levels. According to the Office of the State Geologist at the University of Massachusetts, this may be due in part to the significant amount of rainfall received by these areas in the fall of 2005.

For Deerfield, high groundwater has been a concern for over twenty-five years, however some residents believe that their situations have been worsened due to development in the South Deerfield area in the 1990s. Many residents in South Deerfield pump out their basements continuously between the months of October and May. Many homeowners have connected their sump pumps to the sewer system, which has taxed the capacity of the wastewater treatment facility. Solutions being discussed by town officials and residents include clearing out drainage ditches originally designed to drain farmland.

Recommendation 6: Deerfield may want to apply for grants to complete a hydrogeologic assessment, a stormwater drainage assessment and/or an engineering study to determine how groundwater flows from Pocumtuck into key problem areas, how stormwater drainage and surface water runoff occur, and which engineering solutions would be most effective in addressing existing problems and which would result in a lower risk of high water conditions in the future.

Recreational Needs

According to the survey respondents, the most needed recreational resources in Deerfield were the following in order of importance from most to least: hiking and skiing trails, bicycle trails, public access to natural areas, children's play areas, and neighborhood parks.

Massachusetts Outdoors 2000, the *Statewide Comprehensive Outdoor Recreation Plan* (SCORP) is a five-year plan developed by the state to be eligible for federal Land and Water Conservation Fund (LWCF) grants. The SCORP is the state's Open Space and Recreation Plan, and provides regional data for the entire state. Overall, the greatest statewide recreational need is for trail-based activities including walking (ranked #2), road biking (#3), hiking (#7), and mountain biking (#8). All together, these four activities accounted for 40.5 percent of the most desired recreational facilities. Clearly, Deerfield residents are right in line with those figures—trail activities are very popular in town.

Recommendation 7: Form a volunteer trail group to facilitate the establishment, maintenance, and mapping of trail systems and authorized access points for seasonal non-motorized uses.

Recommendation 8: Assess official and unauthorized current river access points and develop a means to enhance the value of official recreation sites to local residents and protect the unauthorized sites through police surveillance and diverting use to authorized areas. Identify new sites for development.

Recommendation 9: Assess whether there are small lots near neighborhoods that could be acquired for the purposes of developing local tot lots, playgrounds, and pet lots.

Deerfield's Rural, Small Town Character

Approximately 70 percent of the 2006 survey respondents, considered seven attributes of Deerfield as being important in their decision to live in town: rural or small town character, safety from crime and vandalism, a sense of quiet, forests, open space, air/water quality, and farmland.

Deerfield is known for its scenic and historically significant pastoral landscapes, and the broad forested slopes of the Berkshire Hills and the Pocumtuck Range. The Town has aggressively pursued both economic development and community preservation. As a result, Deerfield continues to be a strong regional employment center, a significant New England tourist destination, and a leader in farmland conservation. Despite difficult fiscal times, residents seem to support maintaining efforts to protect priority lands from development and to design town policies and practices that reflect life in a small, rural community.

Recommendation 10: Deerfield officials may want to continue to consider neighborhoods as an organizing context for engaging residents, business owners, and officials in addressing common concerns.

Recommendation 11: The Deerfield Planning Board may want to consider assessing its current zoning bylaws to determine whether any revisions should be sought to increase the town's capacity to maintain its small town, rural character where it can.

Recommendation 12: The Deerfield Board of Selectmen may want to consider holding all-board meetings several times a year to improve communication among municipal officials and interested residents to foster a greater understanding of complex town issues and consensus on the most promising solutions.

Recommendation 13: Develop a pamphlet for residents of Deerfield that could contain information on community resources and contacts, establish a community

welcoming committee, and possibly host a town fair of all town committees for residents to meet the members and learn about their activities.

C. Summary of Management Needs

This section addresses opportunities for improvement in the ways open space and recreation areas are managed and maintained in the Town of Deerfield.

Town-wide Cooperation

The Town of Deerfield has had a fair amount of participation by landowners, town officials, Deerfield Land Trust members, and residents in the development of their Open Space and Recreation Plan. The key to successful implementation of the plan will reside both in the leadership of the town's champions and the willingness of others to participate in the ways that bring them the most value. Like any new endeavor, ongoing land conservation, natural resource protection and recreation projects may need the input and effort of many individuals.

In particular, the implementation of the Deerfield Open Space and Recreation Plan (OSRP) may be best overseen by a standing Open Space Committee. The Open Space and Recreation Planning Committee could propose to the Board of Selectmen that an Open Space Committee be formed from interested citizens and representatives of existing boards. The towns of Colrain, Leyden, Shelburne, Wendell, Northfield, Gill and Warwick recently completed their OSRPs and have all established standing Open Space Committees (OSC). Each of these OSCs is involved in implementing their action plans and in promoting conservation in their community. Three towns have already protected land with funding from the Self-Help Program, administered through the Massachusetts Division of Conservation Services.

Recommendation 14: Consider submitting a warrant article at the next Town Meeting to establish a standing Open Space Committee that would be made up of concerned citizens and representatives from Deerfield town committees and boards intent on implementing the Deerfield Open Space and Recreation Plan.

A Dialogue with Motorized Recreational Vehicle Users

The town Open Space Committee or the Deerfield Land Trust might consider working with the Department of Conservation and Recreation (DCR) to hold a meeting to discuss all-terrain vehicle (ATV) and snowmobile use in Deerfield. ATV use has been blamed for the degradation of rare species and natural communities especially where they occur near trails and wetlands. This is a common issue for communities, land conservation

trusts, and state conservation agencies. Rogue snowmobile users have been blamed for crossing lands very near homes and destroying property and vegetation. Deerfield could take a leadership role in seeking to create a forum trail users to come together to try to discover a shared solution.

Recommendation 15: Hold an informal meeting at the Town Hall between recreational trail users and landowners to discuss common issues, identify the problems, and establish consensus on solutions.

Stewardship of Deerfield's Natural, Recreational, and Cultural Resources

Engaging residents as volunteers in the stewardship of the town's natural, recreational, and cultural resources will be a key undertaking of the Open Space and Recreation Plan implementers. Whether through expanded efforts conserving trail systems, or important historical structures, volunteers can learn and enjoy a new found sense of community through efforts led by others. Once people experience working to conserve something that they themselves value, in community with their peers, they will want to come back for similar experiences time and time again. The main ingredient needed to initiate this level of community organizing and involvement is leadership. The leader that produces a fun, meaningful, and satisfying stewardship project will develop among the participants, opportunities for feelings of responsibility and ownership that will be directed towards the special resource and to the town as a whole. Leadership is the most important ingredient to successful implementation of a community's vision.

Recommendation 16: Continue to encourage diverse opportunities for residents to be able to participate on community projects. Help people to understand that all volunteers and the projects they work on play a critical role in supporting the whole community (*see Recommendation 13*).

SECTION 8

GOALS AND OBJECTIVES

The following Goals and Objectives were formulated from the results of the Deerfield Open Space and Recreation Planning Survey, which was conducted in March of 2006. Surveys were distributed to 200 randomly selected households in town. Of these, seventy-nine were returned and counted as responses. The survey responses represent a 40 percent rate of return. In addition, another six surveys were returned from drop-off locations. Although the responses may not reflect the opinions of all residents, they do represent an important source of community input.

On March 29, 2006 approximately twenty-six individuals participated in a kick-off meeting for the Deerfield Open Space and Recreation Plan. During the meeting, residents took part in an activity that recorded their opinions on the most important natural, recreational, and historical resources in Deerfield and the best actions for the town to take to protect or enhance them.

The results of the kick-off meeting and the survey were used as a starting point for discussions concerning open space and recreation resources that are most important to Deerfield residents.

Goal A: Preserve and enhance the unique small town, rural character of Deerfield as reflected by connected farms, forests, ridgelines, and village centers that showcase carefully maintained historic buildings.

Objectives:

- A1. Explore the adoption of zoning measures, like a ridge protection bylaw, that would seek to protect the slopes of the Pocumtuck Ridge and the “Hills of Wisdom” from poorly planned development.
- A2. Begin the process towards implementing existing plans for the redevelopment of South Deerfield’s sidewalks and streetscapes, etc.
- A3. Identify areas in Chapter 61, 61A and 61B that would be a priority for protection due to their contributions to significant scenic viewsheds.
- A4. Continue to identify, document, and monitor significant historical sites and work towards their conservation and renovation.
- A5. Encourage the Deerfield Historical Commission to partner with Historic Deerfield, Inc. to produce a cross-town celebration of historic arts and

crafts that would serve to raise money to support the preservation and renovation of historic buildings and sites town-wide.

Goal B: Ensure that Deerfield maintains or improves the quality of its natural resources (e.g. air, water, native flora and fauna) by maintaining the presence of working farmland, forestlands, and wildlife habitat through land conservation and other methods including pollution prevention and mitigation.

Objectives:

- B1. Develop, adopt, and enforce a local wetlands bylaw to better protect against pollution to streams, wetlands, and other water bodies.
- B2. Through landowner education and advocacy activities within the town and state, promote organic techniques for farming, lawn care, and roadside vegetation control practices.
- B3. Seek to understand the connections between high water tables in and around Deerfield, the capacity of the wastewater treatment facility, the area's topography, and the presence of development. Develop strategies that seek to mitigate the high water problem while recognizing the complex relationships involved.
- B4. Adopt a zoning bylaw that provides more restrictions on development within the 100-year floodplain.
- B5. Focus conservation efforts to areas that abut protected lands to create larger areas of contiguous farm and forestland. Recognize the key roles that Deerfield's landscapes play within the region as a whole.
- B6. Employ the following methods to protect land from development in Deerfield:
 - Accept donated open space and/or development rights.
 - Educate landowners about land protection opportunities and estate planning.
 - Adopt zoning bylaws that result in protected lands for farming, forest management, wildlife habitat, or groundwater management.
 - Encourage the conservation of land in Deerfield by private non-profits and state conservation agencies.
 - Purchase conservation land.
 - Invest municipal funds in support of local Agricultural Preservation Restriction (APR) applications.
 - Consider adopting the Community Preservation Act.
- B7. Consider the need for maintaining ditches of unwanted materials against the potential for increasing erosion in these water bodies and to encourage seasonal drainage.
- B8. Document and address current dumping and trash-polluted sites in Deerfield.

- B9. Enforce existing zoning codes and Board of Health regulations regarding non-permitted junkyards.
- B10. Consider environmental impacts when permitting industrial development.
- B11. Seek to understand the relationship between residential, commercial, and agricultural land uses to ground and surface water quality.

Goal C: Ensure that Deerfield maintains and improves the quality and accessibility of all of its recreational facilities and programming, especially those that connect people with the town’s diverse natural environments and landscapes. Encourage the development of new facilities and programming where feasible.

Objectives:

- C1. Educate the general public on the proper use of private lands for recreational purposes, where permission is granted.
- C2. Identify, protect, and enhance new river access points for the Deerfield and Connecticut Rivers.
- C3. Monitor and maintain all existing sidewalks.
- C4. Identify the best prospects for future roadside biking, walking and jogging paths in town and work to develop those facilities.
- C5. Install facilities that encourage people to walk or ride their bikes to shopping and other destinations.
- C6. Provide access points to major recreational trails and scenic areas including the Pocumtuck Ridge Trail and Arthur’s Seat, including the development of parking.
- C7. Work with community groups to establish a team of trail volunteers that could be available for trail and parking area maintenance.
- C8. Develop a series of signs at trailheads and bike trails that describe a set of trail use standards and etiquette.
- C9. Work with the State’s Environmental Police and the Deerfield Police Department to explore ways of increasing the level of policing for the most popular and most often abused recreational facilities in town, as well as to minimize the unauthorized and unwanted use of private lands.
- C10. Produce articles for viewing on the local cable channel as well as the Town website and Town Crier newspaper, which provide information on the location of recreational resources in town, the most important issues or problems experienced by users at each site, and what the public can do to contribute to the solutions.
- C11. Foster a greater level of collaboration among town officials and citizens towards understanding complex issues and gaining consensus on the most promising solutions.

SECTION 9

FIVE YEAR ACTION PLAN

The Five-Year Action Plan is intended to provide concrete steps toward implementing the objectives of the Open Space and Recreation Plan. The Open Space and Recreation Planning Committee developed the action steps outlined below.

The objectives in the far left column of Table 9-1 are listed in the same order as in Section 8. They are followed in the same row by recommended actions, the board or group responsible for implementation, start dates, and potential funding sources if applicable. By implementing the recommended actions, each of the objectives will begin to be realized.

Successful implementation will require the participation of existing town boards, committees and staff, including but not limited to the Board of Selectmen, Planning Board, Conservation Commission, and Sustainable Development Committee.

Accomplishing the actions identified in this section will require time and commitment from dedicated volunteers. Where money is required, it may be sought from state and federal governmental agencies, private non-profit conservation agencies, charitable foundations and individual donations, in addition to municipal funds. A broad base of community support for the Open Space and Recreation Plan should facilitate fundraising to achieve its goals and objectives.

Table 9-1: Recommended Action Steps to Implement the Deerfield Open Space and Recreation Plan

OBJECTIVE	ACTION	RESPONSIBLE BOARD/ GROUP	START DATE	POTENTIAL FUNDING SOURCES
A1. Explore the adoption of zoning measures, like a ridge protection bylaw, that would seek to protect the slopes of the Pocumtuck Ridge and the “Hills of Wisdom” from poorly planned development.	Revise and review the Deerfield Ridge Protection Bylaw to prevent impacts of erosion and runoff from development on steep slopes.	Planning Board	2007	Smart Growth Technical Assistance Grants
A2. Begin the process towards implementing existing plans for the redevelopment of South Deerfield’s sidewalks and streetscapes, etc	Utilize existing streetscape funds to pay for the engineering of the parking lot in South Deerfield.	Board of Selectmen	2007	\$7,500 in existing streetscape funds
A3. Identify areas in Chapter 61, 61A and 61B that would be a priority for protection due to their contributions to significant scenic viewsheds and other public benefits.	Prioritize parcels (including Chapter 61, 61A, and 61B lands) for protection of multiple values, including scenic viewsheds, river access and agricultural lands.	Open Space Committee, Greenprinting Program Committee, The Trust for Public Land, Deerfield Land Trust, and American Farmlands Trust	2006	Existing funding via The Trust for Public Lands
	Establish a standing Open Space Committee to oversee the implementation of the Deerfield Open Space and Recreation Plan.	Board of Selectmen and Town Meeting	2007	Not Applicable

OBJECTIVE	ACTION	RESPONSIBLE BOARD/ GROUP	START DATE	POTENTIAL FUNDING SOURCES
A4. Continue to identify, document, and monitor significant historical sites and work towards their conservation and renovation.	Identify and document all of Deerfield's significant historical sites.	Deerfield Historical Commission	2007	Department of Conservation and Recreation
A5. Encourage the Deerfield Historical Commission to partner with Historic Deerfield, Inc. to produce a cross-town celebration of historic arts and crafts that would serve to raise money to support the preservation and renovation of historic buildings and sites town-wide.	Initiate event planning for the purpose of creating a cross-town celebration of historic arts and crafts.	Historical Commission	2008	Massachusetts Historical Commission
B1. Develop, adopt, and enforce a local wetlands bylaw to better protect against pollution to streams, wetlands, and other water bodies.	Work with the Conservation Commission to develop a draft wetlands protection bylaw.	Sustainable Development Committee	2009	Not Applicable
B2. Through landowner education and advocacy activities within the town and state, promote organic techniques for farming, lawn care, and roadside vegetation control practices.	Identify current pest management practices in town and explore educational and technical resources for integrated pest management (IPM) and organic methods, especially with regard to the maintenance of roadside ditches. Ensure that safety continues to be a top consideration. Coordinate activities with MassHighway and the Hilltown Pesticide Coalition.	Sustainable Development Committee	2007	Grants such as from the Toxic Use Reduction Grant Program

OBJECTIVE	ACTION	RESPONSIBLE BOARD/ GROUP	START DATE	POTENTIAL FUNDING SOURCES
B3. Seek to understand the connections between high water tables in and around Deerfield, the capacity of the wastewater treatment facility, the area's topography, and the presence of development. Develop strategies that seek to mitigate the high water problem while recognizing the complex relationships involved.	Fund and develop a Comprehensive Water Needs and Supply Assessment as well as a Hydrogeologic Assessment and Action Plan for the Town of Deerfield.	Board of Selectmen	2007	Town Meeting
B4. Adopt a zoning bylaw that provides more restrictions on development within the 100-year floodplain.	Draft a Floodplain Zoning Overlay District.	Board of Selectmen and Planning Board	2009	Smart Growth Technical Assistant Grant
B5. Focus conservation efforts to areas that abut protected lands to create larger areas of contiguous farm and forestland. Recognize the key roles that Deerfield's landscapes play within the region as a whole.	Identify areas of contiguous farm and forest lands that would be most important to protect were there willing landowners seeking conservation as a main objective. Identify funding sources.	Deerfield Agricultural Commission, Deerfield Land Trust, and the Deerfield Greenprinting Program Committee	2007	Not Applicable

OBJECTIVE	ACTION	RESPONSIBLE BOARD/ GROUP	START DATE	POTENTIAL FUNDING SOURCES
<p>B6. Employ the following methods to protect land from development in Deerfield:</p> <ul style="list-style-type: none"> • Accept donated open space and/or development rights. • Educate landowners about land protection opportunities and estate planning. • Adopt zoning bylaws that result in protected lands for farming, forest management, wildlife habitat, or groundwater management. • Encourage the conservation of land in Deerfield by private non-profits and state conservation agencies. • Purchase conservation land. • Invest municipal funds in support of local Agricultural Preservation Restriction (APR) applications. • Consider adopting the Community Preservation Act 	Place an announcement on the town’s website and on cable TV describing how the Town can receive lands for conservation purposes that can be transferred to the Deerfield Land Trust (DLT) or other land conservation agencies or trusts.	Board of Selectmen	2007	Not Applicable
	Hold periodic workshops on estate planning and land management options.	Deerfield Land Trust and Deerfield Assessors	2008	Highland Communities Initiative
	Review and improve the Cluster Zoning Bylaw and explore the use of a model groundwater protection overlay district bylaw.	Planning Board	2008	Smart Growth Technical Assistant Grant
	Encourage local and regional land conservation trusts (e.g., DLT and Valley Land Fund) to work together with state conservation agencies like Mass. Department of Conservation and Recreation (DCR) to provide resources for landowners interested in protecting their land.	Open Space Committee	2008	Highland Communities Initiative
	Apply for a Self-Help grant to help acquire recreation lands.	Board of Selectmen	2007	Deerfield Town Administrator time
	Continue to invest municipal funds in support of local Agricultural Preservation Restriction (APR) applications.	Agricultural Commission and Board of Selectmen	2007 and annually after that	Town Meeting
	Organize and facilitate several public information meetings on the Community Preservation Act.	Open Space Committee	2008	Not Applicable

OBJECTIVE	ACTION	RESPONSIBLE BOARD/ GROUP	START DATE	POTENTIAL FUNDING SOURCES
B7. Consider the need for maintaining ditches of unwanted materials to prevent erosion of surrounding soils into these water bodies and to encourage seasonal drainage.	Determine what landowners can legally do to maintain drainage ditches.	Board of Selectmen	2006	Not Applicable
B8. Document and address current dumping and trash-polluted sites in Deerfield.	Seek to prevent future dumping problems by aggressively prosecuting identified violators, site cleanup, and publicly identifying known sites and polluters.	Deerfield Highway Superintendent, Board of Selectmen, Chief of Police, and State Environmental Police	2007	Town Funds
B9. Enforce existing zoning codes and Board of Health regulations regarding non-permitted junkyards.	Explore the need for developing a Board of Health policy or protocol to deal with junkyards based on a thorough assessment of current regulations and their effectiveness. If there is a need for additional protocols, develop one.	Board of Health Agent	2008	Town Funds
B10. Consider environmental impacts when permitting industrial development.	Enhance and update the DEDIC process to include specific environmental impacts and quality of life issues for application within the Special Permit process town-wide.	Planning Board and Sustainable Development Committee	2008	Not Applicable
B11. Seek to understand the relationship between residential, commercial, and agricultural land uses to ground and surface water quality.	While working on the “Comprehensive Water Needs and Supply Assessment and Hydrogeologic Assessment and Action Plan,” facilitate a public meeting to educate residents about the impacts of different land uses on water quality and quantity.	Sustainable Development Committee	2008	Not Applicable

OBJECTIVE	ACTION	RESPONSIBLE BOARD/ GROUP	START DATE	POTENTIAL FUNDING SOURCES
C1. Educate the general public as to the proper use of private lands for recreational purposes, where permission is granted.	Develop a pamphlet providing guidelines about engaging in recreational activities on private lands. Consider doing this in cooperation with surrounding towns.	Recreation Department	2009	Highland Communities Initiative
C2. Identify, protect, and enhance new and existing river access points for the Deerfield and Connecticut Rivers.	Petition the county to relocate specific county roads so that the bounds of existing river access points can be established at Old Sunderland Bridge, French's Ferry, Whitmore's Ferry, Rice's Ferry, and two others off McClelland Road.	Open Space Committee and Recreation Department	2007-2008	Not Applicable
C3. Monitor and maintain all existing sidewalks.	Develop a plan for maintaining all existing sidewalks.	Highway Department	2007	Town Funds
C4. Identify the best prospects for future roadside biking, walking and jogging paths in town and work to develop those facilities.	Work with the Franklin Regional Council of Governments to ensure that the Franklin County Bikeway Spur in Deerfield is successfully developed.	Recreation Department	2007	Not Applicable
	Encourage the South Deerfield Streetscape Plan to maximize walk-ability and bicycle use.	Board of Selectmen	2007	Not Applicable
C5. Install facilities that encourage people to walk or ride their bikes to shopping and other destinations.	Contact the Franklin Regional Council of Governments to order additional bike racks for installation throughout town.	Board of Selectmen	2007	Not Applicable
	Explore the creation of additional sidewalks in town.	Board of Selectmen	2007	Not Applicable
C6. Provide access points to major recreational trails and scenic areas including the Pocumtuck Ridge Trail and Arthur's Seat, including the development of parking.	Develop a handicapped access trail for the Pocumtuck Ridge.	Board of Selectmen	2007	Urban Self Help
	Update the Town Forest management plan and seek to increase recreational use of the property.	Board of Selectmen	2007	Urban Self Help

OBJECTIVE	ACTION	RESPONSIBLE BOARD/ GROUP	START DATE	POTENTIAL FUNDING SOURCES
C7. Work with community groups to establish a team of trail volunteers that could be available for trail and parking area maintenance.	Work with community groups to establish a team of trail volunteers for trail and parking area maintenance.	Recreation Department	2008	Not Applicable
C8. Develop a series of signs at trailheads and bike trails that describe a set of trail use standards and etiquette.	Investigate existing trail use standards and etiquette developed by trail groups such as the Appalachian Mountain Club.	Open Space Committee	2009	Not Applicable
C9. Work with the State's Environmental Police and the Deerfield Police Department to explore ways of increasing the level of policing for the most popular and most often abused recreational facilities in town, as well as to minimize the unauthorized and unwanted use of private lands.	Work with the Environmental Police, Deerfield Police Department, and landowners to identify the best protocols for dealing with specific and general unauthorized and unwanted use of private lands.	Open Space Committee and Board of Selectmen	2008	Not Applicable
C10. Produce articles for viewing on the local cable channel as well as the Town website and Town Crier newspaper, which provide information on the location of recreational resources in town, the most important issues or problems experienced by users at each site, and what the public can do to contribute to the solutions.	Produce locally viewed articles on recreational resources and the wise use of these resources.	Citizens Communication Committee and Recreation Department	2007	Not Applicable

OBJECTIVE	ACTION	RESPONSIBLE BOARD/ GROUP	START DATE	POTENTIAL FUNDING SOURCES
C11. Foster a greater level of collaboration among town officials and citizens towards understanding complex issues and gaining consensus on the most promising solutions.	Hold bi-annual all-board meetings to foster a greater understanding among town officials and citizens of the various tasks pursued by each of the town boards and committees and to identify areas of potential collaboration.	Board of Selectmen	2007	Not Applicable
	Have each town board & committee present an oral report prior to the Annual Town Meeting.	Board of Selectmen	2007	Not Applicable
	Create a pamphlet (and updates every year) containing contact information for all town boards and committees that would be available at the Town Offices to all residents.	Board of Selectmen	2007	Town Funds

Source: Deerfield Open Space and Recreation Planning Committee Members; 2006.

SECTION 10

PUBLIC COMMENT

Public feedback was sought throughout the entire open space and recreation planning process. The text and maps included in the Plan reflect these enhancements. A more direct request for feedback on the Five-Year Action Plan was made at the public forum held on June 21, 2006, which resulted in changes to the final draft of the Five-Year Action Plan.

Copies of the final version of the Deerfield Open Space and Recreation Plan were sent to the following boards and organizations for review and comment:

- Massachusetts Division of Conservation Services (DCS);
- Deerfield Board of Selectmen;
- Deerfield Planning Board;
- Deerfield Conservation Commission;
- Deerfield Recreation Department; and,
- Deerfield Land Trust.

Letters of comment are inserted into the plan at the end of this section. The letters reflect a broad base of support for the research, analysis, outreach and recommendations developed by the Deerfield Open Space and Recreation Planning Committee.

