

Town of Northfield
**OPEN SPACE AND
RECREATION PLAN**
2013

Prepared by the
Northfield Open Space Committee

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SECTION 1

PLAN SUMMARY

The Northfield Open Space and Recreation Plan (OSRP) was approved by the town in November 2005. The Open Space Committee (OSC) was formed in early 2006 to implement the action plan (Section 9) specified in the OSRP. In 2009 the state changed the time frame for an active OSRP from five years to seven years, and in 2010 the Northfield OSRP was extended for another two years after some changes/updates to the action plan. This document, the 2012 Northfield OSRP, is a major revision of the 2005 OSRP, and is intended to provide, until 2019, a framework for decisions dealing with land use, which may impact ecosystems and the lands that contain unique forest, agricultural, historical, recreational, and scenic values.

The 2012 Northfield Open Space and Recreation Plan is based on the community members' collective understanding of the interdependence of contiguous forests, recreational trails, streams and wetlands, agricultural fields, scenic views, and significant historical structures and landscapes with the town's rural character. The OSRP 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 benefits of new and existing natural and recreational resources to the town, including:

- Large blocks of contiguous forest;
- Trail systems on private and public lands;
- Rare wildlife habitats;
- The Connecticut River and its floodplain forests;
- Prime farmland and working agricultural businesses;
- Abundant supplies of high-quality ground and surface waters;
- Other scenic and historic landscapes; and
- A community park to provide various recreational facilities.

The Seven-Year Action Plan provides concrete substance to the goals and objectives, which were developed from the results of the 2011 Open Space Survey, from the results of the 2008 Trust for Public Land Greenprint for Northfield, and from community members' understanding of their town's significant yet vulnerable natural and cultural resource base.

The 2012 Northfield Open Space and Recreation Plan emphasizes actions that will encourage the Open Space Committee to:

- Work on implementing the conservation priorities developed by the 2008 Trust for Public Land greenprint process for Northfield.
- Work with the Northfield Trails Association in trail construction, maintenance and documentation, and in sponsoring hikes on town and area trails.
- Work with the Recreation Commission in investigating the advisability/feasibility of a community park in Northfield.
- Work with the Finance Committee and Community Preservation Committee to provide funding, including matching funds, for protecting and improving appropriate properties.
- Work with the Greater Northfield Watershed Association and their stream teams to maintain the health of the tributaries to the Connecticut River watershed in Northfield.
- Work with area Land Trusts to identify appropriate opportunities for open space preservation and the necessary funding.
- Work with the Conservation Commission and private land owners in drafting management plans for land protected under conservation restrictions.
- Work with First Light Power and other property owners in providing additional public access to the Connecticut River.

SECTION 2

INTRODUCTION

A. STATEMENT OF PURPOSE

The purpose of this plan is to provide an accurate and thorough basis for decision-making involving the current and future open space and recreation needs of the residents of Northfield. Specifically, it is designed to help town officials decide which conservation opportunities they should act upon, whether the situation entails signing off on a conservation restriction in town or on assigning the town's right-of-first-refusal to a land trust (as is allowed when Chapter 61 lands are to be developed). This OSRP represents consensus on the most important recreational, scenic, and natural resources, related needs in town and on the best solutions for addressing them. The Seven-Year Action Plan, when carried out by the Open Space Committee and other town boards and community groups, will successfully implement the town's open space and recreation goals and objectives.

B. PLANNING PROCESS AND PUBLIC PARTICIPATION

In September 2011, the Northfield Open Space Committee (OSC) developed an updated open space and recreation survey. The survey was mailed to approximately 1,366 households in Northfield (*see Appendix A for a copy of the survey and the results*). Overall, 158 were returned, which represents a 11.6 percent rate of return. The survey responses were used by the OSC to revise Sections 8 and 9 - Goals and Objectives and the Action Plan.

In February 2012 a public forum was held to review the survey results and get further input on the goals and objectives and on specific action items. The results of this forum were also used to help formulate Sections 8 and 9; these results are in Appendix A.

The draft revised OSRP was then placed on the Open Space Committee website; the Northfield Select Board, Planning Board, and Conservation Commission, the Mount Grace Land Conservation Trust, the Franklin Regional Council of Governments, and the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) as well as the general public were invited to review the draft revision and offer comments and suggestions.

SECTION

3

COMMUNITY SETTING

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

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

A. REGIONAL CONTEXT

Regional Context concentrates on the location of the Town of Northfield relative to natural and socio-economic resources as well as conditions shared by communities in the region. It describes the significant influence a town's physical location can have on its characteristics, including the quality and quantity of open space in the town as well as its recreational resources. Regional Context also considers the impact that different land uses, located within Northfield and surrounding communities, have on regional open space and recreational resources.

The Town of Northfield is located in northwestern Massachusetts, in north central Franklin County. It lies on both sides of the Connecticut River and is the only community along the entire length of the river to do so. Northfield is bordered by Vernon, Vermont, and Hinsdale and Winchester, New Hampshire on the north; Bernardston and Gill on the west; Erving on the south; and Warwick on the east.

A.1 Natural Resources Context

In order to plan for the protection of open space and natural resources in the Town of Northfield, residents should consider the role natural resources play across the region. Two regional landscape-level natural resources important in both Northfield and in surrounding communities are abundant and contiguous forestland and watersheds. The presence and relatedness of these significant resources present both opportunities and challenges to open space and recreation planning.

A.1.1 Large Blocks of Contiguous Forestland

Forests constitute one of the most important natural resources in the Town of Northfield and in the region. Forestland conserves water supplies by sustaining the soils ability to receive precipitation and recharge ground and surface waters slowly. Woodlands and their changing foliage give residents gorgeous surroundings upon which to gaze and appreciate. Forests clean the air and provide cool air currents in warm months.

Large blocks of contiguous forestland are important regional resources for several reasons. Wildlife species that require a certain amount of deep forest cover tend to migrate out of fragmenting landscapes. New frontage lots and subdivisions can often result in a widening of human activity, an increase in the populations of plants and animals that thrive alongside humans (i.e. raccoons and squirrels) and a reduction in the species that have larger home ranges and unique habitat needs. Larger blocks of forest are more suitable for active forest management as well.

Northfield, like other towns with lands upslope from the Connecticut River Valley, still contains many areas where the forests stretch to include thousands of acres that are not separated by more than a jeep trail. The resulting feature is called contiguous forest. Much of the Northfield forest is contiguous to other forests in Erving and Warwick.

The northwestern corner of Northfield, across the Connecticut River in Satan's Kingdom contains a 5,000 to 10,000-acre block of forestland, which stretches west into Bernardston and north into Vernon, VT. The eastern half of town slopes towards the ridgeline of mountains called the Notch, Great Hemlock, Stratton, Brush, and Craig. Several blocks of contiguous forest, 1,000 to 3,000 acres in size surround a 5,000-10,000 acre block that includes the Northfield State Forest, Warwick State Forest and Erving State Forest. These other forests are closely linked to other large blocks of forest west to the Connecticut River and south to the Quabbin Reservation, a 60,000-acre area of protected lands surrounding the reservoir.

A.1.2. Watersheds

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. Two of the most important things that result from protecting forestland are maintaining the long-term integrity of wildlife habitats and

protecting water quality within the watershed's surface and ground waters. Northfield is contained within the watersheds of the Connecticut River and Millers River.

The Connecticut River Watershed is the largest river ecosystem in New England and spans four states, including Vermont, New Hampshire, Massachusetts, and Connecticut. The river itself runs through the center of Northfield as well as forming its western border in the southern half of the town. Many brooks and streams in both the eastern and western portions of Northfield flow through the town on their way to the Connecticut River. 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 45 communities before entering the state of Connecticut. The watershed is eighty percent forested, twelve percent agricultural, three percent developed, and five percent wetlands and surface waters.

The Connecticut River Watershed was designated the "Silvio O. Conte National Fish and Wildlife Refuge" by an act of Congress in 1991, the first refuge of its kind, encompassing an entire watershed ecosystem. The Connecticut River also received special attention in 1998 when it became one of only fourteen rivers in the U.S. designated as a National Heritage River. The Massachusetts Executive Office of Environmental Affairs has outlined watershed priorities for the Connecticut River which include: promoting and/or creation of riparian buffer zones along the waterways within the watershed; reducing barriers to migratory fish passages; reducing the negative effects of non-point source pollution, primarily storm run-off; and increasing the amount of water quality data available within the watershed.

The Millers River Watershed is located in north central Massachusetts and southwestern New Hampshire, and includes the southeastern corner of the Town of Northfield. Jacks Brook and Keyup Brook originate in Northfield and flow in a generally southerly direction before entering the Millers River in the town of Erving. The Millers River Watershed is bordered on the east by the Nashua River Watershed, on the west by the Connecticut River Watershed, and on the south by the Chicopee River Watershed. From its origin in New Hampshire, the Millers River flows south, then gradually west flowing into the Connecticut River. The Millers River drains a regional landscape that is 392 square miles in size, 320 of which are in Massachusetts (DEP; 1995). The total river length is fifty-one miles, forty-four of which are in Massachusetts. Although the Millers River fluctuates between sluggish and rapid flows there is an average drop of twenty-two feet per mile. This feature has made the Millers River and its main tributaries a magnet for manufacturing and hydroelectric power generation, which provided the impetus for the initiation of industrial activities in the late 1700s.

A.2 Socio-Economic Context

The Town of Northfield has been an agricultural community since at least the 1700s. Native Americans were thought to have farmed the rich soils along the Connecticut River and early European settlers continued to do so. During the mid-1800s, Northfield was ranked second in the county (Deerfield was ranked first) in the number of acres planted in broom corn and its hop crops were valued at twice that of all other such crops in the Franklin County. In 1986, fourteen

farms continued in full-time agricultural use, six of which were dairy farms. Today, there are approximately twelve farms in Northfield, none of which are dairy farms.

Northfield has also been known as a “school town” since the late 1800s with the opening of the Northfield Mount Hermon School (NMH). However, due to several factors including increasing costs, competition from other schools, and the declining demographic of high school students, NMH consolidated its Northfield and Gill campuses into the Gill campus and sold the Northfield campus to Hobby Lobby, Inc., in 2009. Hobby Lobby’s stated plan is to donate the campus to an education institution of their choosing; at this time it is unclear what effect, if any, the ultimate choice will have on the Open Space and Recreation plans and prospects for Northfield.

Between 1970 and 2010, the Town of Northfield’s population continued to grow and is projected to increase by approximately 10 percent by the year 2025. Few of Northfield’s residents work in town, which is consistent with a statewide trend towards longer commuter travel times as fewer residents find work in their town of residence. At the same time, income levels among residents are running above that of Franklin County while the town’s unemployment rate has been lower than the state and national average since at least 1995. It appears as if Northfield residents have overcome the loss of in-town employment by finding work elsewhere.

New housing starts increased significantly in Northfield during the years 1991-2008, demonstrating an increase in the level of development pressure on the town’s open spaces, particularly in the outlying areas. Thus, the community may want to act to conserve vulnerable and important natural, open space, and recreation resources in advance of development.

B. HISTORY OF THE COMMUNITY

Northfield’s lowlands, proximity to the Connecticut River, and its streams and forests, all helped shape the history of the town. Its native communities, likely associated with the Pocumtucks of the Middle Connecticut River Valley, took advantage of the large tracts of agricultural lands along the Connecticut River, fished its tributaries and hunted in the town’s lowlands and forests.

The first Colonial settlers came to Northfield ca. 1673 and inhabited the southernmost portion of Main Street. This site was selected as the first settlement as the land had already been cleared and cultivated by its former inhabitants. Permanent settlement, however, was made difficult until the end of the Indian Wars in the mid-1700s, due to the invasions by the native population. Throughout the 1700s, farming, consisting of crops and livestock, was the town’s economic base. Industrial development, in the form of sawmills and gristmills, did occur, but on a smaller scale than neighboring towns, as Northfield does not have the necessary waterpower. Roadways were constructed to help in the supply of goods and services.

The 1800s saw the farms of Northfield expand and prosper. In the early part of the century, the Connecticut River provided a means for the trading of goods. In the mid 1800s, the railroad came to Northfield connecting the town to the greater regional area. The rail line connected Northfield to Millers Falls on the eastern side of the Connecticut River. A primary rail route was also constructed on the western side of the river, connecting Northfield to Vernon, Vermont.

This more easily enabled the trade of farm crops and encouraged the growth of commercial farming. It also encouraged the development of canning and pickling factories, and the creation of the Northfield campus' Northfield Cooperative Creamery. In 1879 Dwight L. Moody founded the Northfield Seminary for Young Ladies; in 1881 he founded its male counterpart, the Mount Hermon School for Boys, located in the town of Gill. These schools subsequently influenced the character of Northfield. The Town of Northfield now also enjoyed a reputation as a "school town". Residential development in Northfield continued along Main Street, but now also spread to the outlying area of Northfield Farms and across the Connecticut River to West Northfield. Northfield's population grew significantly between 1790 and 1830, from 868 to 1,757 residents and fluctuated little until after 1870, when the population began a decline. Attributed to the founding of Dwight Moody's schools, the population of Northfield once again began to climb in 1885.

By the early 1900s, the Town of Northfield saw the loss of most of its mills and shops to the more urban towns of Greenfield, Brattleboro, Vermont and Keene, New Hampshire. Adding to the erosion of the town's commercial and industrial base, farming also began a serious decline. Small dairy farms were consolidated into larger commercial ones. This contributed to a decrease in population between 1900 and 1910 of 16.5 percent from 1,966 people to 1,642. However, apart from a decrease in population of 9 percent in the 1970s, Northfield grew steadily between 1910 and 2000, to almost three thousand residents.

Like many towns in New England, the automobile greatly contributed to the ability of residents to live in Northfield and work elsewhere. Almost 75 percent of residents over the age of 16 currently work outside town. Given Northfield's proximity to Interstate 91 and State Route 2, many Northfield residents leave town to work in other communities in Franklin County, in other regions of the state or in the neighboring states of Vermont and New Hampshire.

Important historic resources in Northfield include:

- Main Street National Historic District (National Register of Historic Places);
- Simeon Alexander House (Millers Falls Road);
- Northfield District Schoolhouse #2 (Pine Street);
- King Philips Hill;
- Historic buildings along Millers Falls Road and Warwick Road;
- Various buildings and landscapes on the Northfield Mount Hermon Campus;
- Rustic Ridge Houses;
- The Beehive, the address of the first American Youth Hostel;
- Historic cemeteries;
- Ferry sites;
- Historic bridges;
- Cellar holes in the northeast corner of town;
- The working farms of Northfield;
- Northfield State Forest;
- Warwick State Forest; and,
- Kidd's Island.

For a more complete listing of significant historic structures, sites, and landscapes, please see Appendix C.

C. POPULATION CHARACTERISTICS

In this section, Population Characteristics, Northfield’s need for open space and recreational resources are assessed based upon an analysis of demographic and employment statistics. The demographic information includes changes in total population, changes in the relative importance of different age groups in Northfield, and measures of income. The employment statistics section covers labor force, and employment by industry sector.

C.1 Demographic Information

C.1.1 Population and Population Change

Demographics are useful for forecasting the need for open space and recreational resources that may be required by residents over time. According to the U.S. Census, Northfield experienced a negative population growth rate during the 1970s. This was significantly different from the county, which grew by almost 9 percent (*see Table 3-2*). In the 1980s, Northfield’s population rebounded and grew at more than double the rate of the county and almost four times the rate of the state. In the 1990s, Northfield’s population increase slowed but remained higher than the county, but less than the state. Between 1970 and 2000, Northfield’s population increased by 320 people (*see Table 3-1*), equal to a growth rate of 12.2 percent, which was slower in contrast to Franklin County’s growth during the same time period, which was 20.8 percent, but similar to the Commonwealth of Massachusetts. Northfield has a population density of 82 people per square mile (Commonwealth of Mass. Dept. of Housing and Community Development; 2004).

Table 3-1: Population for Northfield, Franklin County and Massachusetts 1970-2010

	Population 1970 (# of people)	Population 1980 (# of people)	Population 1990 (# of people)	Population 2000 (# of people)	Population 2010 (# of people)	Population Increase 1970-2010 (# of people)
Massachusetts	5,689,377	5,737,037	6,016,425	6,349,097	6,547,629	858,252
Franklin County	59,233	64,317	70,092	71,535	71,372	12,139
Northfield	2,631	2,386	2,838	2,951	3,032	401

Sources: U.S. Census Bureau: Census of Population and Housing 1970, 1980, 1990, 2000, 2010; Town of Northfield Community Development Plan, 2003.

According to the Franklin Regional Council of Governments 2000-2020 Population Projections, developed as part of the 2003 Regional Transportation Plan, the town will once again experience an increase in population during the twenty-year period, 2000-2020. FRCOG projects the town will gain 245 residents, which would be an increase of 8.1 percent. The county’s population is expected to increase by 16.3 percent during the same time period. (*see Table 3-2 and Figure 3-1*).

Table 3-2: Population Growth and Growth Rates for 1970-2010, and Projections for 2010-2030 for Northfield, Franklin County, and Massachusetts

	Northfield	Franklin County	Massachusetts
Population Growth, 1970-1980 (# of People)	-245	5,084	47,660
Percent Population Growth, 1970-1980	-9.3%	8.6%	0.8%
Population Growth, 1980-1990 (# of People)	452	5,775	279,388
Percent Population Growth, 1980-1990	18.9%	9.0%	4.9%
Population Growth, 1990-2000 (# of People)	113	1,443	332,672
Percent Population Growth, 1990-2000	4.0%	2.1%	5.5%
Population Growth, 2000-2010 (# of People)	81	-163	198,532
Percent Population Growth, 2000-2010	2.7%	-0.2%	3.1%
Population Growth, 1970-2010 (# of People)	410	12,139	858,252
Percent Population Growth, 1970-2010	15.6%	20.5%	15.1%
Projected Population Growth, 2010-2030	208	4,828	N/A
Projected Percent Population Growth, 2010-2030	6.7%	6.8%	N/A

Sources: Growth and Estimated Growth from U.S. Census of Population and Housing; Projection data from FRCOG 2000-2035 Population Projections, developed as part of the 2011 Regional Transportation Plan.

If we assume Northfield experiences a 6.7 percent increase in population by the year 2030, 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 2030? How might these changes in population impact demand for open space and recreational resources?

Figure 3-1: Population Growth Rates for Northfield, Franklin County, and Massachusetts 1970-1980, 1980-1990, 1990-2000, 2000-2010 and Population Projections 2010-2020

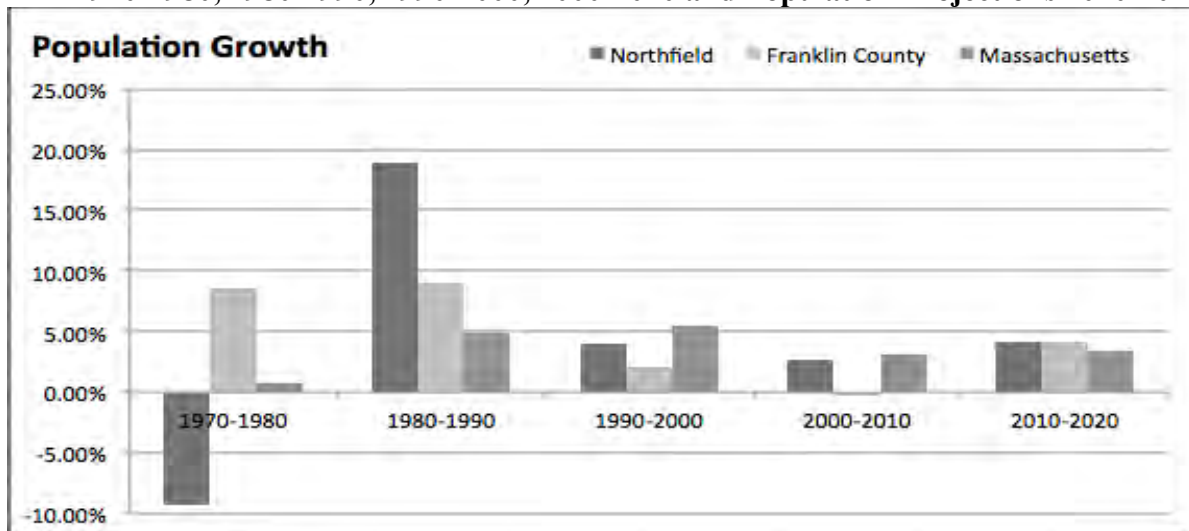


Figure 3-1 Sources: Growth and Estimated Growth from U.S. Census of Population and Housing; Projection data for town and county from FRCOG 1980-2035 Population Projections, developed as part of the 2011 Regional Transportation Plan.

Northfield has a relatively young population with a large percentage of its residents in the 18-49 (early working years) age cohorts (*see Table 3-3*). The 50-64 year age cohort experienced a significant increase over the ten-year period 2000-2010, as did the over-65 cohort.

Table 3-3: Number of People by Age Cohort Between 2000 and 2010 in Massachusetts, Franklin County, and in Northfield

Age Cohort	Massachusetts Population		Franklin County Population		Northfield Population	
	2000	2010	2000	2010	2000	2010
0-19 years	1,675,113		18,502		859	
0-17 years		1,418,923		14,068		701
20-44 years	2,394,062		24,303		915	
18-49 years		2,925,612		28,171		1064
45-64 years	1,419,760		18,550		780	
50-64 years		1,300,370		18,255		819
65+ years	860,162	902,724	10,180	10,878	397	448

Source: U.S. Census, 2000 and 2010. Note that the Census Bureau uses different age cohorts for its summary data in 2010 than it did in 2000, making exact direct comparisons of these age cohorts difficult.

If the relatively large cohort of older (45-64) working-aged residents were to continue to reside in Northfield, it could result in a significant population of individuals in the older age cohort in ten to twenty years. How will the Town of Northfield provide recreational facilities and services for all of its residents, especially the elderly, which may require accessible walking paths, 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.

Identifying the best location for the development of new open space and recreation resources will need to take into account where the concentration of population will occur and which parts of the local citizenry require specific needs. As will be seen in the fourth part of Section 3, 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 in town 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 Northfield 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 Northfield’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 and financial well being of Northfield.

C.1.2 Economic Wealth of Residents and Community

Measures of the income levels of Northfield 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 access to open space as well as assessing the town’s relative resiliency to shifts in the national

economy. A town with a high level of poverty and unemployment amongst its residents is assumed to be less able to deal with recessions and other shifts in the economy that typically tax a town's capacity to care for resident's open space and recreation needs.

Table 3-4: Median Household Income, Per Capita Income, and Percentage Below Poverty Level in 2010 for Northfield compared to Franklin County and the State

	Median Household Income	Per Capita Income	Percentage Below Poverty Level*
Northfield	\$57,448	\$30,342	6.4%
Franklin County	\$50,002	\$27,544	11.3%
Massachusetts	\$64,509	\$33,966	10.5%

Source: U.S. Census Bureau, Census of Population & Housing, 2010.

Table 3-4 describes the earning power of residents in Northfield as compared to the County and the State. Northfield households earn incomes that are 13.0 percent above the median for the County and 10.9 percent below the median for the State. The per capita income for the town (total income for all residents divided by the total population) is greater than the County, but less than the State. However, the percentage of people living below the poverty line in Northfield at 6.4 percent is significantly lower than both the County and the State. It appears that the financial well being of Northfield residents is greater than the average for households in the county, but lower than the average for the state.

Northfield's assets rest in its residents 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 like housing have costs associated with them including public schools. One reason that towns encourage economic development is to have other types of property to share the tax burden. Protected open space costs very little, provides a small amount of tax revenues, but reduces the amount of housing that can ultimately occur. This relationship is explored in more detail in subsection D. Growth and Development Patterns.

C.2 Employment Statistics

Employment statistics like labor force, 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 to fuel incoming and expanding businesses. Employment can be used as a measure of productivity that can be used to gauge, which types of industry and businesses should be encouraged in town. The town may decide to encourage business development to supply local jobs and to build taxable value, which can help pay for municipal services and facilities, including recreational parks and programming as well as protected open space.

C.2.1 Labor Force: Northfield residents that are able to work

In 2010, the Town of Northfield had a labor force of approximately 1650 (*see Table 3-5*).

Table 3-5: Labor Force and Place of Employment in Northfield

	Total Workers	Worked in Town of Residence		Worked out of Town of Residence but in County of Residence		Worked out of County of Residence but in State of Residence		Worked out of State of Residence	
Northfield 1990 Census			35%		53%		3%		9%
Northfield 2000 Census	1643	464	28%	761	46%	228	14%	190	12%
2006-2010 ACS 5-Year Estimate	1644	310	19%	830	50%	303	18%	201	12%
Franklin County 1990 Census			36%		36%		25%		3%
Franklin County 2000 Census	37053	10,228	28%	12,940	35%	12,368	33%	1,517	4%
2006-2010 ACS 5-Year Estimate	36503	10,049	28%	12,754	35%	11,872	33%	1,828	5%
Massachusetts 1990 Census			37%		36%		25%		3%
Massachusetts 2000 Census	3,102,837	970,086	31%	1,097,282	35%	934,388	30%	101,081	3%
2006-2010 ACS 5-Year Estimate	3,188,619	1,010,455	32%	1,080,126	34%	975,223	31%	122,815	4%

Source: Franklin Regional Council of Governments.

C.2.2 Employment in Northfield: People who work in town, whether they are residents or not

A majority of employers in Northfield (and in the County and State) could be described as being in the following three fields:

- Educational, Health & Social Services
- Manufacturing
- Retail Trade

The main differences between the make up of businesses in Northfield as compared to Franklin County and the State of Massachusetts are:

- Educational, Health & Social Services businesses employ a bigger share of all employees in town than the same types of businesses in the region and in the state.
- Agriculture employs more people in town than the County and State average.
- There is a smaller contingent of professional service providers in town than what could be expected given the region and state averages.
- Both Wholesale Trade and Transportation, Warehousing & Utilities are bigger employers in town than could be expected given the region and state averages.

According to the town's most recent Community Development Plan (2003), Northfield had 49 employers. The largest employers are Northfield Mount Hermon with 530-600 employees and Pioneer Valley Regional School District with 152 jobs in town. In addition, there are eight other employers that employ at least ten people: the Town of Northfield, Lane Construction, Sisson Engineering, Northfield Food Mart, Five Acres Farm Greenhouses, Whitney Trucking, First Light Power, and System, Software and Support, Inc. In addition, Northfield is home to many small businesses.

According to the 1990 and 2000 Census figures, the percentage of Northfield residents who worked in town decreased from 35 percent to 28 percent, and is projected by ACS to decrease further in 2010 to 19%. Similarly, those who commuted to jobs in other towns in the county decreased from 53% in 1990 to 46% in 2000 (*see Table 3-5*), but was projected to rise again to about 50% by 2010. The greatest increase occurred with commuters traveling to jobs in other counties (from 3 percent in 1990 to 14 percent in 2000 and projected to rise to 18% by 2010).

D. GROWTH AND DEVELOPMENT PATTERNS

D.1 Patterns and Trends

Over the past two hundred years, Northfield residents developed their community using the productivity of the area's prime farmland soils and on the opportunities presented with the advent of the railroad. In the 20th century, Northfield saw a reduction in the number of farms, in the role of agriculture as an employer, and in contrast the rise of the Northfield and Mt. Hermon Schools and other schools as a source of revenue for the town. The population grew steadily since 1910 with a slight decline in the 1970s. In the late 1980s and 1990s, Northfield experienced a reduction in the number of dairy farms due to a federal buy-out program of dairy herds to control pricing.

Northfield is attractive to people who like open spaces, forests, and the agricultural small town feel. Northfield is a bedroom community as most of its residents commute to work in and out of the county. And the town is growing in population in a manner that has resulted in a loss of farmland. Between 1985 and 1999, the predominant land use changes in the Town of Northfield were the construction of single-family homes on lots at least ½ acre in size; and, the conversion of pasture and cropland to forest and residential use. Most (if not all) of the residential development has been in the form of approval-not-required lots.

According to MassGIS computer mapping land use data, between 1985 and 1999, Northfield experienced:

- A loss of 554 acres of forest (-3%)
- A loss of 157 acres of cropland (-6%)
- A loss of 105 acres of pasture (-18%)
- An increase of 484 acres in large lot residential development (+62%)

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

D.2 Infrastructure

D.2.1 Transportation Systems

State Route 2 and Interstate 91 are two significant New England highways that are located less than ten miles from the Town of Northfield. The town also has two primary transportation routes, Route 10 and Route 63, which provide Northfield with access to these highways. Routes 10 and 63 also link the town to Turners Falls, Greenfield, and Amherst. Route 142 is another major roadway in Northfield, connecting Northfield to Brattleboro, Vermont.

There is no regular public transportation serving the Town of Northfield. The Franklin Regional Transportation Authority (FRTA) provides door-to-door transportation for seniors, aged sixty and over, and people with disabilities in the Town of Northfield within their service area.

D.2.2 Water Supply Systems

The Town of Northfield is served by two community public water systems, the Northfield Water District and the East Northfield Water Company: both systems are privately-owned not municipal entities. These systems service a total of 2,350 residents, which includes the Hobby Lobby campus. The remainder of the town's population is serviced by private wells.

The *Northfield Water District* serves approximately 900 people in the vicinity of Northfield Center. The existing well, the Strowbridge Well, is located off Strowbridge Road, along the Mill River. Water is pumped to a storage tank with a 0.35 million-gallon capacity. Water production for 2001 was 19.2 million gallons with an average daily use of 44,000 – 45,000 gallons per day. The approved daily withdrawal volume for this well is 144,000 gallons. The approved volume measures the capacity of the well and its recharge area to provide water without diminishing returns under severe conditions. Overall, 93 percent of the water went to residences and 7 percent was unaccounted for or consumed by faulty equipment. Given that the average daily water withdrawal for the Strowbridge Well is less than half the approved withdrawal, the Northfield Water District appears to have the capacity to support additional water demand.

The Northfield Water District has a 400-foot Zone I surrounding its wellhead. The District does not own the entire Zone I radius. According to the Mass. Department of Environmental Protection (DEP), the land uses that might threaten the ground water quality include pasture lands, residences, and roads. The Zone II recharge area for the well was delineated as part of the DEP's Source Water Assessment Program (SWAP). It, too, has land uses and activities, such as residential, agricultural, and light commercial, which are potential sources of contamination. The DEP ranks the Strowbridge Well's susceptibility to contamination as high given that one high threat land use, pesticide use and storage, is present within the supply protection areas.

The *East Northfield Water Company* has a surface water supply, the Grandin Reservoir, located off Louisiana Road in the northeastern corner of town. Northfield Mount Hermon School owns the reservoir and approximately 95 percent of its watershed. The Water Company serves the Northfield campus of NMH, as well as surrounding neighborhoods. The reservoir is approximately 7.1 acres in size and has a total storage capacity of 30 million gallons. The Franklin County Regional Water Supply Study (FRCOG; 2003) estimated that this water supply served a population of 1,450 year round, including 765 residents and 685 students, with an average daily use of 96,361 gallons. It has a registered withdrawal volume of 200,000 gallons per day, the amount the state allows the supplier to withdraw based on historical use records. Since the 2005 edition of the OSRP, NMH has sold the Northfield campus; the current owner, the National Christian Foundation (NCF), has not yet made known the future plans for the campus. The East Northfield Water Company has adequate capacity to support at least 700 students, and perhaps up to twice as many.

The East Northfield Water Company has an approved watershed protection plan, conducts drinking water supply education, regularly inspects the watershed to maintain a waiver from filtration, and provides for watershed management. Surface water supplies are considered particularly vulnerable to contamination and the Grandin Reservoir is no exception. The DEP considers the susceptibility of this water supply to contamination as moderate. The land uses and activities, as noted in the DEP's Source Water Assessment Report, that are potential sources of contamination include road access, potential for the presence of aquatic mammals, and forest operations such as logging (98 percent of the watershed is forested).

D.2.3 Wastewater Treatment Plan and Collection System

The center of Northfield and the NCF campus in East Northfield are both served by the municipal sewer system and treatment plant. The wastewater collection is situated along primary roadways and railroad lines in Northfield Center; it also runs through some residential yards. Currently 273 Northfield homes are hooked into the municipal sewer system, and there is municipal interest in extending the system to additional areas.

Originally Northfield's sewer system was designed to meet projected demand through the year 2000, based on population projections for the system's service area. However, currently, more than half of the system's capacity typically goes unused, and it is likely that the current plant will be sufficient until such time that NCF campus expansion requires additional capacity.

Wastewater treatment facility and demand

The Town of Northfield's sewage treatment plant was constructed in 1972, after the passage of the Federal Water Pollution Control Act. Prior to 1972, Northfield's community sewer systems consisted of four sewer lines leading to the Connecticut River. In 1972, the town built the treatment plant and constructed inceptor lines to the existing community sewers. The town has sewer lines near the NCF campus and in downtown Northfield. Over the past thirty years, there have been a number of sewer line extensions, the largest of them along East Street. Extensions have also occurred along School Street, Glen Road, and Mill Street. There is currently interest in new extensions along Dickinson Street to the Town library, along Main Street from the Post

Office south towards Northfield Elementary School, and along Main Street south to the intersection of routes 63 and 10.

Northfield's sewage treatment plant has a capacity of 275,000 gallons per day, and a current average daily usage of 95,000 gallons per day. In the past, there have been serious stresses on the treatment plant due to problems of infiltration and inflow. Infiltration involves groundwater entering the collection system via breaks within the system piping, open joint pipes, or cracks within manholes. Inflow involves the water that enters the system through direct connections such as catch basins, roof gutter leaders, and leaking manhole covers. By the early 1990s, inflow and infiltration had increased the average wastewater flow to 400,000 gallons per day, significantly above the plant's capacity. Due to upgrades and repairs, the average usage has now dropped dramatically, to 120,000 gallons per day. Moreover, it is expected that additional planned upgrades and repairs on lines on the NCF campus could drop the average usage even further.

Potential development constraints

The geographic boundaries of the current sewer system pose a constraint on future development, especially large-scale uses. In the absence of sewer service, developed land uses must rely on septic systems for their wastewater treatment needs. The 1977 Master Plan indicates that the reliance on septic systems could pose a problem in the most developed areas of Northfield, such as East Northfield and Northfield Center. A review of soil maps for these areas as part of the Master Plan showed that the soils are incapable of absorbing large quantities of waste. Since then, the Sewer Commission and the Board of Health have both agreed that it is in the town's best interest to expand the sewer system to serve already developed areas, as much as is financially and geographically possible. There is some potential to expand the sewer system in Northfield Center and in East Northfield near the NCF campus, and as mentioned above, some of these expansions are already in the works.

The potential for Northfield to accommodate large-scale commercial or light industrial land uses may be restricted by the town's limited sewer infrastructure. Many commercial and light industrial uses require sewer and water infrastructure to comply with environmental regulations and provide adequate protection for natural resources. Access to sewer infrastructure can be particularly critical with respect to industrial uses to prevent hazardous materials from entering the groundwater. The DEP usually requires industrial firms to obtain an industrial wastewater discharge permit and to hook up to a wastewater treatment facility.

Extending sewer lines outside of the currently developed areas, to proposed locations for commercial or light development may not be feasible due to the high costs involved. When the Town of Orange extended sewer service three-quarters of a mile to the Randall Pond Industrial Park, the extension itself cost \$330,000, and there were then additional expenditures in excess of \$200,000 for laying down the sewer lines within the industrial park. Orange was fortunately able to receive funding through the Federal Economic Development Administration (EDA) to help subsidize the development of its industrial park, including the sewer line extensions. Northfield similarly may be able to tap into EDA or other Federal or State funding sources to help subsidize this type of project.

Northfield's roadway network, community water system, and wastewater treatment plant and collection system could have a great impact on future development patterns. Water and sewer lines could be used to provide for concentrations of buildings with commercial, civic, and residential uses in village center areas. Sewer could help certain industrial uses to become established. If planned, Northfield's infrastructure could be used to direct development to areas that make the most sense given the town's priorities and the location of prime farmland soils and environmentally sensitive areas. On the other hand, sewer and water line expansion can result in a spreading of development, potentially losing its effectiveness as a growth management tool.

D.3 Long-term Development Patterns

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

D.3.1 Land Use Controls

The Town of Northfield currently has two principal zoning districts: Residential-Agricultural (RA) and Residential-Agricultural-Forested (RAF). The Town also has three overlay districts: the Flood Plain District, the Water Supply Protection District which restrict uses in the overlay areas to protect these important resources, and the solar photovoltaic overlay district which provides by-right solar installations as required by the Green Communities Act. In addition, the town has a flexible development measure that includes provisions for multiple family dwellings (Northfield Zoning Bylaws, section 9.01) and by-right Open Space Residential Design (Northfield Zoning Bylaws, Section 11.07) which allows smaller lot sizes in exchange for at least 50% of the land being set aside for open space. The uses allowed in the RA and RAF districts by right and by special permit are identical. The primary difference between the two districts is the minimum allowed lot size and frontage, with the RAF district being more restrictive.

The RA district runs north south along the Connecticut River (*see the Current Zoning Map*). It includes Northfield Center, Route 63, Route 142, and everything in-between. The RAF includes the sections of Town away from the Connecticut River that have steeper slopes and less development (*see Zoning Map at the end of this section*).

Both the RA and RAF districts allow the following uses by right: single-family dwellings, two-family dwellings, day care facilities for six or less children or adults, agriculture, forestry, religious uses, education uses, and home businesses with no more than one full-time employee. Most other commercial and industrial uses are allowed in both the RA and RAF districts by special permit. The uses allowed by special permit include both small commercial uses, such as a gift shop or professional office, and large industrial uses, such as manufacturing or a transportation facility (quoted from the Northfield Zoning Bylaws).

Both districts allow single-family homes and two-family dwellings by right (Northfield Zoning Bylaws, Section 6.02). They also allow, by special permit, for the conversion of a single-family or two-family dwelling to a three to four-family dwelling (Northfield Zoning Bylaws, Section 6.02).

All residential development must adhere to the Town’s requirements for setbacks and lot sizes.

Table 3-6: Northfield Zoning District Dimensional Requirements

Zoning District	Minimum Lot Size	Minimum Frontage	Minimum Depth	Front Yard Setback	Side Yard Setback
Residential-Agricultural (RA) – not served by sewer	50,000 sq.ft.	150 ft.	200 ft.	25 ft.	25 ft.
Residential-Agricultural-Forested (RAF)	100,000 sq.ft.	300 ft.	250 ft.	25 ft.	25 ft.
RA Lots Served by Municipal Sewer	35,000 sq.ft.	150 ft.	200 ft.	25 ft.	25 ft.

Source: Protective Regulations By-law for the Town of Northfield, Massachusetts; May 2012.

Residential development allowed only by special permit must also meet additional requirements as specified in Articles VIII and IX of the Northfield Zoning Bylaws. Northfield’s Zoning Bylaws offer flexibility for future housing development. They permit the construction of new-single family and two-family structures by right, and also provide a process for the building of multi-family units and other alternative residential units.

Overlay Districts: Flood Plain, Water Supply Protection, Solar Photovoltaic

There are three overlay districts: Flood Plain Overlay District, the Water Supply Protection Overlay District and the Solar Photovoltaic Overlay District. The overall purpose of the Floodplain Overlay District is to decrease the impacts that can be associated with flooding including disruption of utility networks, pollution or contamination of surface and ground waters, loss of life and property, and the costs of response and cleanup. All development within the overlay district are prohibited unless plans can be shown by a registered professional engineer or architect that they will not result in any increase in flood levels during a 100-year flood.

The Water Supply Protection Overlay District allows no new uses within the Zone 1 Wellhead Protection Area. Within Zones 2-7, uses are prohibited that involve hazardous wastes and materials, waste disposal and storage, trucking, transportation, and other business uses that involve degreasers and petroleum products, commercial and industrial uses that treat process wastewater using on-site systems, commercial mining of land, underground fuel storage, and uses covering more than 25 percent of any given lot with impervious surfaces that has an average slope of less than 25 percent, and, more than 15 percent of any given lot with an average slope of greater than 25 percent (*see Zoning Map at the end of this section*).

The Solar Photovoltaic Overlay District allows large-scale ground-mounted photovoltaic solar installations to be constructed by-right on up to five acres, as required by the Massachusetts Green Communities Act.

Open Space Residential Design

The Open Space Residential Design measure allows for the by-right development (after site plan review by the Planning Board) of parcels no less than 10 acres in size, in a manner that results in a reduction in frontage and minimum lot size requirements and the conveyance of at least 50

percent of the lot, excluding wetlands, to a home association to be used as common open space. Additional incentives include allowing increased housing density in return for (a) more reserved open space and/or (b) providing grid-connected photovoltaic solar generation facilities on each unit. This provision has recently replaced an older, similar, provision that required a special permit and did not have the more-open-space and solar incentives.

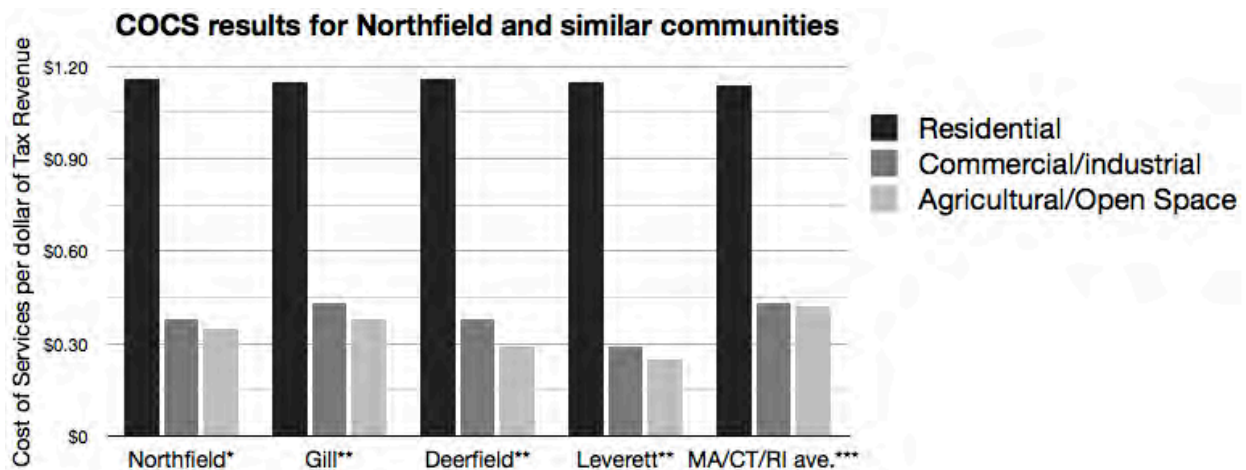
D.3.2 Cost of Community Services

It is important to understand the measurable fiscal impacts of different land uses. For instance, open space (e.g. farmland/forest), residential, and commercial /industrial development each contribute differently in the amount of property tax revenues generated and they often require different levels of municipal services.

In 1991, the American Farmland Trust (AFT) conducted a Cost of Community Services (COCS) analysis for several towns in Franklin County. Though Northfield was not one of those towns, in 2008 the Northfield Open Space Committee did such an analysis, using the AFT and University of Wisconsin COCS models. (Objective A2 in Section 9 of the original OSRP for Northfield.) A COCS analysis is a process by which the relationship of tax revenues to municipal costs is explored for a particular point in time. The results of the 1991 AFT study and the 2008 Northfield COCS analysis showed that residential uses required more in services than they provided in tax revenues and therefore that residential use is subsidized with the tax revenues generated by other land uses like open space and commercial and industrial property.

Figure 3-2 shows the COCS results for Northfield, similar communities in the area, and the southern New England (MA, CT, and RI) average. These results consistently show that 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.

Figure 3-2. Cost of Community Services (COCS)

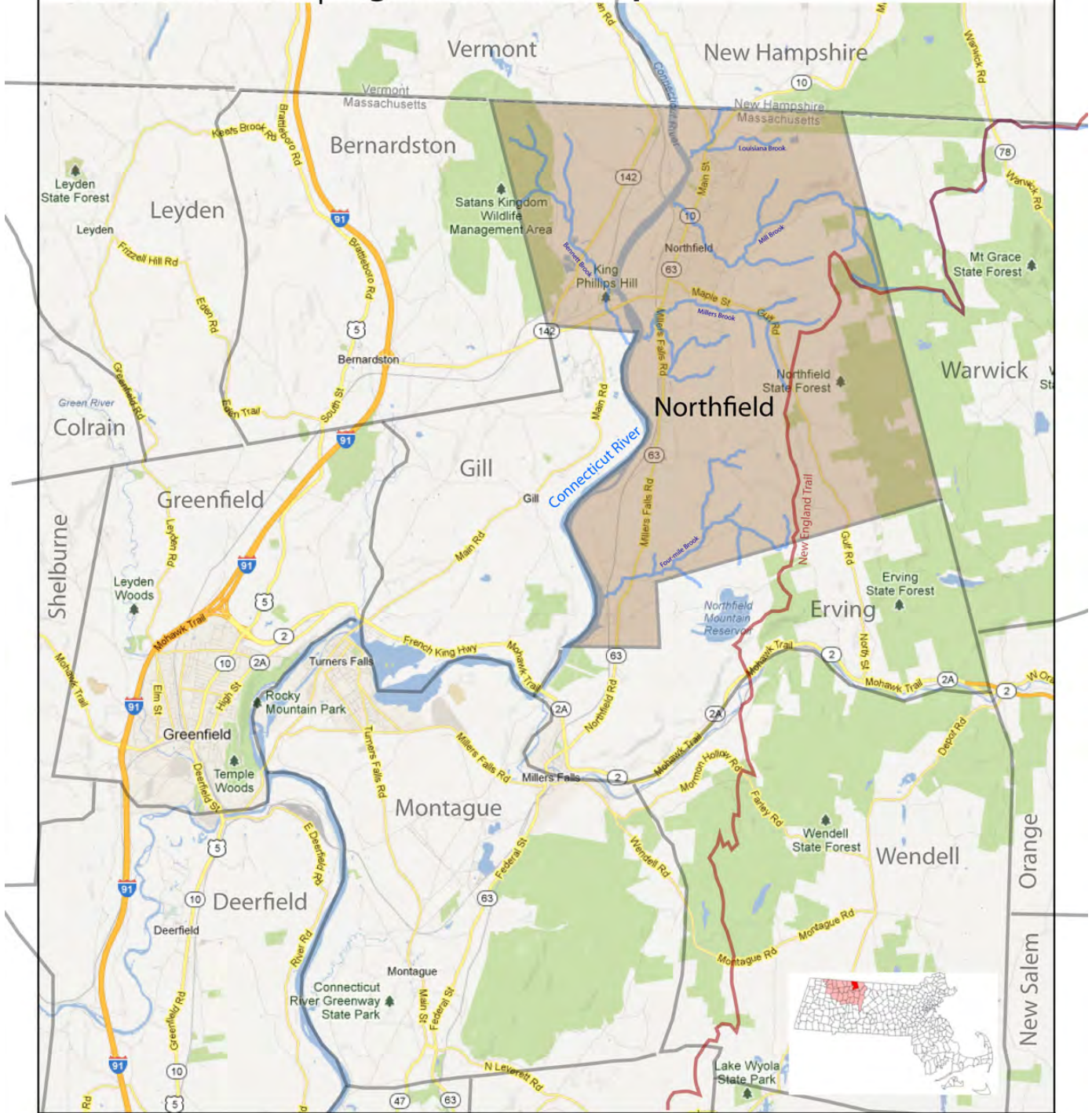


Sources: * Northfield Open Space Committee, 2008
 ** American Farmland Trust; 1999
 *** www.snefci.org

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. It is just as critical for communities to consider the impact of commercial and industrial development on quality of life. The best types of commercial and industrial development to encourage in Northfield might have some of the following characteristics: locally owned and operated; in the Services sector; use of 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.

By continuing to pursue strategies that involve active land conservation, zoning measures that direct development while protecting natural resources, other important environmental values, and sustainable economic development, Northfield may be able to sustain and enhance both the community’s wealth and its agricultural and rural village character.

Town of Northfield | Regional Context Map



Northfield Regional Context Highlights

- Located in northeastern Franklin County
- Borders both Vermont and New Hampshire
- Major access routes: I-91 and MA-2
- On both sides of the Connecticut River
- Nearest MA town for shopping: Greenfield

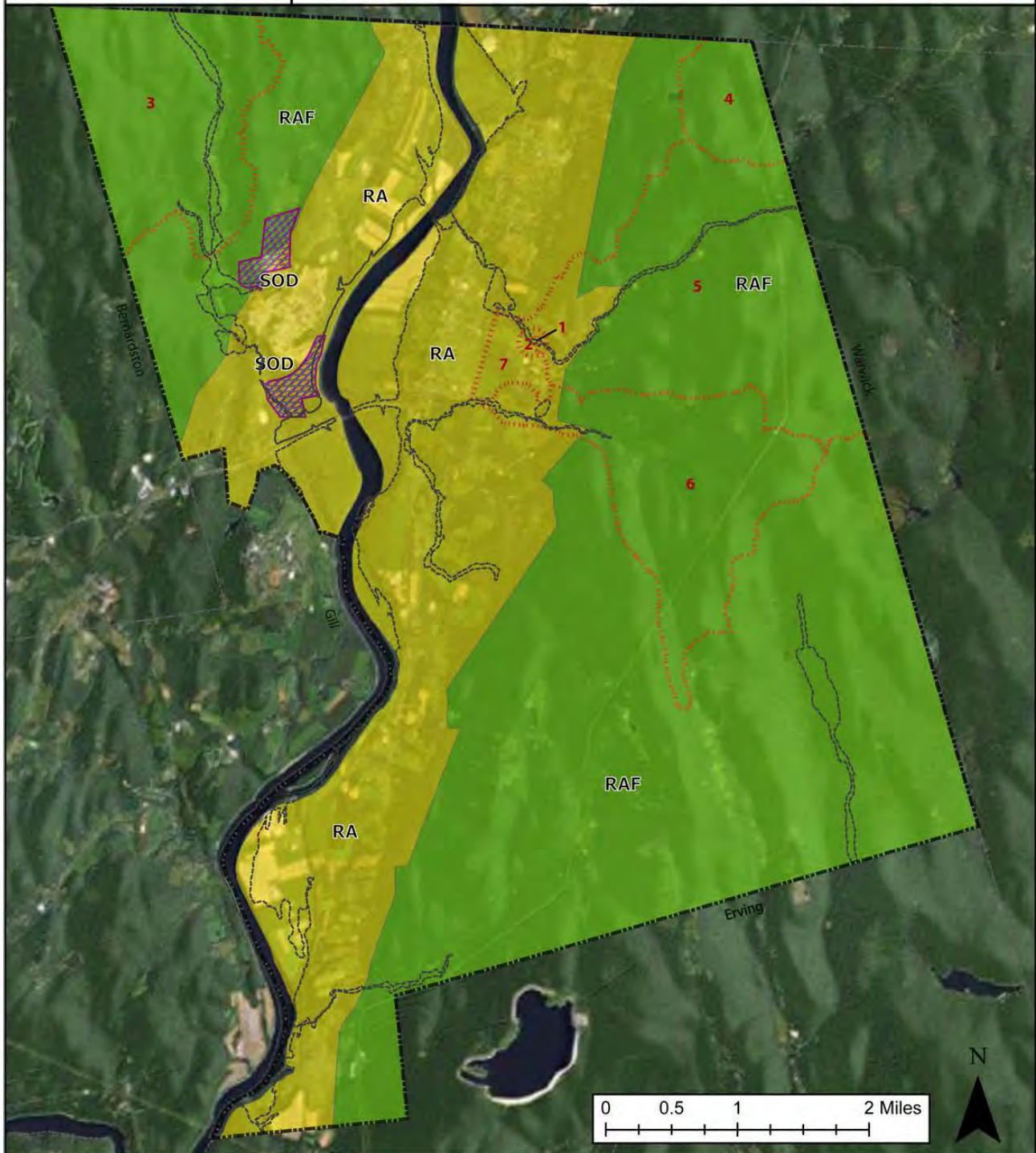
Major CT River Tributaries

- Bennett Brook
- Four Mile Brook
- Louisiana Brook
- Mill Brook
- Millers Brook

- State Forests
- New England Trail

Data Source:
Northfield Open Space Committee, March 2013

Town of Northfield | **ZONING**



Legend

- Residential Agricultural (RA)
- Residential Agricultural & Forestry (RAF)
- Solar Overlay District (SOD)
- Water Supply Protection Districts
- 1 Water Supply Zone Number
- Floodplain Overlay District (100 Year Floodplain)



Data Sources

Map produced by the North Quabbin Regional Landscape Partnership, in collaboration with the Northfield Open Space Committee. Datalayers obtained through MassGIS, the Town of Northfield, and Franklin Regional Council of Governments.
November 2012

Town of Northfield | Soils & Slope



Legend

- | | | | |
|---|----------------------------------|---|-----------------------------------|
|  | Prime Farmland |  | Prime 1 Forest Soil (Most Prime)* |
|  | Farmland of Statewide Importance |  | Prime 2 Forest Soil |
|  | Slope > 25% | | |

* Based on NRCS soil productivity data for White Pine and Red Oak, January 2013

Data Sources

Map produced by the North Quabbin Regional Landscape Partnership, in collaboration with the Northfield Open Space Committee. Data on farmland soils and slope obtained through MassGIS and the NRCS.

Map Produced - April 2013

SECTION

4

ENVIRONMENTAL INVENTORY AND ANALYSIS

Residents have cherished Northfield’s scenic landscapes for generations. This revised Open Space and Recreation Plan is intended to help residents protect the town’s scenic value and natural resources in the face of increased development pressures, while recognizing that people need places to live, learn, work and play. These needs require infrastructure: homes, roads, power, water, wastewater systems, etc. Infrastructure, in turn, depends upon and impacts critical natural systems like the water cycle. One way to understand the impact of development on natural resources is to study the *ecosystems* of the town and the region.

An ecosystem is a concept that describes how a group of 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 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, and recharge water to the ground, 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. Northfield residents need to understand the impact of their actions and land use decisions on the environment and their quality of life.

The information provided in this section explores the biological and physical components of the town’s ecosystems. These components include air, surface and ground water, soils, vegetation, fisheries and wildlife. *Topography, Geology, and Soils* provides a general understanding of the ways different soil characteristics can impact land use values and patterns. *Landscape Character* provides an overall scenic context. *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. Northfield’s forest, farmland and wetland vegetation types are documented including rare, threatened, and endangered species. In *Fisheries and Wildlife*, wildlife, habitat, special corridors, and rare, threatened, and endangered species are discussed. Northfield’s *Scenic Resources and Unique Environments* are identified and described. Finally,

Environmental Challenges addresses current and potential problems that may influence open space or recreation planning.

The information presented in this Open Space and Recreation Plan seeks to help town officials, other volunteers, and landowners make informed land use decisions within a context of ecosystem integrity and high quality recreational experiences for all residents. All of the landscape features described and assessed in this section are found on parcels of land owned by both private and public landowners. Bodies of water, interesting scenic views, historical cemeteries, wildlife habitat areas, and hiking trails may be on private lands. It is the intention of this planning effort to respect the needs, desires, and privacy of landowners and to encourage access to public recreational lands and to plan for the long-term sustainability of all of Northfield's aquatic and terrestrial ecosystems.

A. TOPOGRAPHY, GEOLOGY, AND SOILS

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

A.1 Topography

The topography of the Town of Northfield is one of sharp contrast. Along the Connecticut River, which bisects the northern half of town and forms the western border of the southern half, the valley is quite broad, consisting of floodplain and glacial lake bottom. These lowlands were once the site of prehistoric Lake Hitchcock, a glacial lake that inundated the Connecticut River Valley from southern Vermont to central Connecticut. Much of Northfield's prime farmland soils can be found here. At a higher level above the river are additional alluvial deposits consisting of sand, gravel, hardpan, and some ledge outcroppings. The Connecticut River's tributaries, formed at the end of the Ice Age, created this level. To the east and west of these terraces, the topography gradually begins to rise to that of forested hills, which range in elevation from 500 feet to just over 1,500 feet. The highest elevations occur in eastern Northfield with Crag Mountain, located near the town's southern border, dominating the landscape at 1,503 feet. Other notable peaks in eastern Northfield include the Upper Bald Hills (1,345 feet), Notch Mountain (1,319 feet), First Bald Mountain (1,276 feet), and Great Hemlock (1,255 feet).

A.2 Geology

The Town of Northfield as we know it today is the result of millions of years of geologic history: great upheavals of the earth's crust and volcanics, and the sculpting power of moving water, ice and wind. This distinctive physical base has determined the distribution of the town's water bodies, its soils and vegetation and its settlement patterns, both prior to and since colonial times. Understanding Northfield's current landscape requires a brief journey back in time and a review of some basic geological concepts.

The earth's crust is a system of plates whose movements and collisions shape the surface. As the plates collide, the earth's crust is compressed and forced upward to form great mountain ranges. In the northeastern United States, the plates move in an east-west direction, thus the mountains formed by their collisions run north to south.

The pressure of mountain building folded the earth, created faults, and produced the layers of metamorphosed rock typically found in New England. Collision stress also melted large areas of rock, which cooled and hardened into the granites that are found in some of the hill towns in Massachusetts today. Preceding the collisions, lines of volcanoes sometimes formed, and Franklin County shows evidence of this in bands of dark rock schist metamorphosed from lava flows and volcanic ash.

Hundreds of millions of years ago, a great continent, known as Pangaea, formed through the collisions of plates. Pangaea began to break apart almost 200 million years ago, and continues to do so as the continents drift away from each other today. This "continental drift" caused earthquakes and formed large rift valleys, the largest of which became the Atlantic Ocean. The Connecticut Valley was one of many smaller rifts to develop. Streams flowing into the river from higher areas brought alluvium, including gravels, sand and silt. At the time, the area that is now the Town of Northfield was located south of the equator. The Dinosaur era had begun, and the footprints of these giant reptiles are still visible in the rock formed from sediments deposited on the valley floor millions of years ago.

By the close of the Dinosaur age, the entire eastern United States, including Northfield, was part of a large featureless plain, known as the peneplain. It had been leveled through erosion, with the exception of a few higher, resistant areas. Today, these granite mountaintops, called monadnocks, are still the high points in this region. Local examples include Mt. Wachusett, Mt. Greylock, and Mt. Monadnock in New Hampshire.

As the peneplain eroded, the less resistant rock eroded to form low-lying areas, while bands of schist remained to form upland ridges. By this time, the Connecticut Valley had been filled with sediment, while streams that would become the Deerfield, Westfield, and Farmington Rivers continued to meander eastward. The westward-flowing streams would become more significant later on.

A long period of relative quiet in geologic terms followed the Dinosaur era. Then, as the Rocky Mountains were forming in the west eight million years ago, the eastern peneplain shifted upward a thousand feet. As a result of the new, steeper topography, stream flow accelerated, carving deep valleys into the plain. Today, the visible remnants of the peneplain are the area's schist-bearing hilltops, all at about the same 1,000-foot elevation.

Mountain building, flowing water, and wind had roughly shaped the land; now the great glacial advances would shape the remaining peneplain into its current topography. Approximately two million years ago, accumulated snow and ice in glaciers to the far north began advancing under their own weight. A series of glaciations or "ice ages" followed, eroding mountains and displacing huge amounts of rock and sediment. The final advance, known as the Wisconsin Glacial Period, completely covered New England before it began to recede about 13,000 years

ago. This last glacier scoured and polished the land into its final form, leaving layers of debris and landforms that are still distinguishable.

The glacier picked up, mixed, disintegrated, transported and deposited material in its retreat. Material deposited by the ice is known as *glacial till*. Material transported by water, separated by size and deposited in layers is called *stratified drift* (Natural Resource Inventory for Franklin County, University of Massachusetts Cooperative Extension; May 1976). The glacier left gravel and sand deposits in the lowlands and along stream terraces. Where deposits were left along hillsides, they formed kame terraces and eskers. Kames are short hills, ridges, or mounds of stratified drift, and eskers are long narrow ridges or mounds of sand, gravel, and boulders.

During the end of the last ice age, a great inland lake formed in the Connecticut River Valley. Fed by streams melting from the receding glacier, Lake Hitchcock covered an area approximately 150 miles long and twelve miles wide, stretching from St. Johnsbury, Vermont to Rocky Hill, Connecticut. Streams deposited sand and gravel in deltas as they entered the lake; smaller silts and clays were carried into deeper waters.

A.3 Soils

Soil is the layer of minerals and organic material that covers the rock of the earth's crust. All soils have characteristics that make them more or less appropriate for different land uses. Scientists classify soils by these characteristics, including topography; physical properties including soil structure, particle size, stoniness and depth of bedrock; drainage or permeability to water, depth to the water table and susceptibility to flooding; behavior or engineering properties, and biological characteristics such as presence of organic matter and fertility (Natural Resource Inventory for Franklin County, University of Massachusetts Cooperative Extension; May 1976). Soils are classified and grouped into associations that are commonly found together.

As Northfield plans for the long-term use of its land, residents should ask: 1) which soils constrain development given current technologies? 2) Which soils are particularly suited for recreational opportunities and wildlife habitat? and 3) Which soils are best for agriculture? The answers to these questions can help lay a foundation for open space and recreation planning in Northfield. The following sub-section provides a description of the soils in Northfield based on their impact on agriculture, recreation opportunities, and wildlife habitat.

Which soils constrain development given current technologies?

Three soil associations found in the Town of Northfield have the potential to constrain development. They include:

- The silty Hadley-Winooski-Limerick soils are found in the floodplains of the Connecticut River in Northfield. Due to their location, they are subject to flooding and can have a high water table for most of the year.
- The Hollis-Charlton soils, found on the slopes of rolling to steep wooded hills, are located in West Northfield. They have a shallow depth to bedrock and there is the presence of hardpan in places. Ledge can also be present.

- The Shapleigh-Essex-Gloucester association, found in the uplands of eastern Northfield, presents constraints to development primarily due to the shallow depth to bedrock, however, steepness of slopes (15 percent to greater than 25 percent) can also be problematic.

Which soils are particularly suited for recreational opportunities and wildlife habitat?

Different recreational uses are constrained by different soil and topographical characteristics. Sports fields require well-drained soils and level topography, whereas lands with slopes greater than 25 percent are attractive to wildlife and to outdoor recreation enthusiasts such as hikers, mountain bikers, and snowshoers.

The soils of Northfield that are able to support certain recreation activities are the Hollis-Charlton association in West Northfield and the Shapleigh-Essex-Gloucester association in the hills of eastern Northfield. The Hollis-Charlton association is generally found in rolling to steeply wooded hills greater than 400 feet in elevation. These soils formed in stony, sandy glacial till. The Hollis soils, found mostly on the steeper slopes, are somewhat excessively drained and shallow. The Charlton soils are on the upper slopes and hilltops, and are deep and well drained. The Shapleigh-Essex-Gloucester association is found on forested, rolling hills above 500 feet in elevation. The soils formed in sandy, gray glacial till, are stony with many large boulders. The Shapleigh soils are shallow and are found on the steeper slopes with many rock ledges and outcrops. The Essex and Gloucester soils are similar. They are both well drained and are found on the upper parts of the hills. They differ in that the Essex soils have a hard layer at approximately twenty-four inches in depth.

Which are the best soils for agriculture?

The Natural Resources Conservation Service (NRCS), formerly known as the Soil Conservation Service of the U.S. Department of Agriculture is responsible for classification of soils according to their suitability for agriculture. NRCS maintains detailed information on soils and maps of where they are located.

NRCS defines prime farmland as the land with the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops and that is available for these uses (USDA, NRCS, National Soil Survey Handbook; 2001). Prime soils produce the highest yields with the fewest inputs, and farming in these areas results in the least damage to the environment. Unique farmland is land other than prime farmland used for the production of high-value food and fiber crops. Unique farmland has a special combination of soil quality, location, growing season and moisture supply. These agricultural soils are a finite resource. If the soil is removed, or the land is converted to another use, the capacity for food and fiber production is lost.

Prime farmland soils have contributed to the town's economy throughout its history and continue to be in use throughout the town today. The soils that constitute Northfield's prime and unique agricultural land include the Hadley-Winooski-Limerick association and the Hinckley-Windsor-Merrimac soils. The Hadley-Winooski-Limerick association is found on the floodplains along the entire length of the Connecticut River in both the eastern and western portions of Northfield.

The soils are generally silty and free of stones. The Hadley soils are well drained and are located on small knolls and terraces. The Winooski soils are moderately well drained and are found in the more level areas, whereas the Limerick soils are located in depressions and are poorly drained. Due to their high nutrient content, these soils are considered the most productive soils for farming in Northfield and the remainder of the Connecticut River Valley in Franklin County. The Hinckley-Windsor-Merrimac association is found on the level to rolling terraces parallel to the Connecticut River. The Hinckley soils, which dominate this association, are droughty and have formed in deep sandy and gravelly deposits. Gravel can be found within a foot and a half of the surface and sometimes on the surface itself. The Windsor soils are droughty and located on deep sand deposits. The Merrimac soils are similar to the Hinckley soils. They are somewhat droughty, but the subsoil is sandy loam with the gravel layer found more deeply, approximately two feet from the surface. The Hinckley-Windsor-Merrimac soils are best suited for dairying and several types of cash crops and are also considered important recharge areas for groundwater.

B. LANDSCAPE CHARACTER

The diverse landscape character of the Town of Northfield distinguishes it from surrounding communities. The town is one of open farmland, forested hills, numerous streams, wetlands and wildlife. The Connecticut River, a dominant feature within the town, runs through the central portion of northern Northfield and defines the western boundary of the southern portion. Much of the town's prime agricultural lands, which historically have afforded residents the opportunity for farming, can be found within the Connecticut River floodplain. Occupying approximately two-thirds of the town, the forested uplands of eastern Northfield and the northwest sector are another outstanding feature in the Town of Northfield.

C. WATER RESOURCES

C.1 Watersheds

Northfield is rich in water resources, including brooks, streams, ponds, vernal pools, wetlands, and aquifers (*see the Water Resources Map at the end of this Section*). As described in Section 3, land in the town drains into two watersheds, the Connecticut River Watershed and one of its sub-watersheds, the Millers River Watershed. This section focuses on waters within the Town of Northfield, but it is important to keep in mind improvements in water quality in the rivers, brooks and streams in town have an impact beyond town borders.

C.1.1 Connecticut River Watershed

Most of the Town of Northfield lies in the Connecticut River Watershed. The Connecticut River has a "Class B" water quality 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 primary contact recreational activities such as fishing and swimming. The water should also be suitable for irrigation and other agricultural uses. The

classification of rivers and streams in Massachusetts does not necessarily mean that the river meets that classification; rather, classifications represent the State's goal for each river.

According to the Massachusetts 2010 Integrated List of Waters (<http://www.mass.gov/dep/water/resources/10list6.pdf>), the Connecticut River from the New Hampshire/Vermont state line down to the Turners Falls dam is impaired by polychlorinated biphenyls (PCBs) in fish tissue, other flow regime alterations, and alteration in stream side or littoral vegetative covers. The “Connecticut River Basin 2003 Water Quality Assessment Report” published by the Massachusetts Department of Environmental Protection in 2008 cites the 2006 Integrated List as identifying the segment between the NH/VT/MA state line to the Route 10 bridge as being impaired for pathogens. However, regular bacteria sampling at two sites in Northfield conducted in 2008 and 2009 by the Franklin Regional Council of Governments in partnership with UMASS and Pioneer Valley Planning Commission indicated that the Connecticut River met Class B standards for pathogens during dry weather and so this segment was delisted as being impaired for pathogens.

The Connecticut River is impaired by polychlorinated biphenyls (PCBs) along its total length and by fecal coliform from its confluence with the Deerfield River to the Montague town line. A report published in January 1998 by the New England Interstate Water Pollution Control Commission (NEIWPCC) listed bioaccumulation and toxicity as water quality issues for the entire length of the Connecticut River in Massachusetts. Bioaccumulation refers to the concentration of toxins in organisms at higher levels in the food chain. The report specifically identified PCBs in fish. As most recently as 2007, the Massachusetts Department of Public Health, Bureau of Environmental Health Assessment issued the following fish consumption advisory: “(All towns between Northfield and Longmeadow)... Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from the Connecticut River and the general public should not consume channel catfish, white catfish, American eel, or yellow perch because of elevated levels of PCB.” (2003 CT River Water Quality Assessment Report, page 9).

Although wastewater treatment facilities constructed throughout the watershed have been treating major pollution discharges for more than twenty years, the Connecticut River is still affected by pollution from combined sewer overflows, PCBs, chlorine heavy metals, erosion, landfill leachate, storm water runoff and acid rain. Long Island Sound has a “dead zone” from too much nitrogen being discharged into the Sound, and over the next several years, Massachusetts may be required to make additional efforts to reduce nitrogen inputs into the Connecticut River and its tributaries. These pollutants come from both point sources, like wastewater treatment plants and manufacturing plants, and non-point sources, including failed residential septic systems, improperly managed manure pits and stormwater runoff carrying herbicides.

According to the Connecticut River Five-Year Action Plan 2002-2007 (<http://www.mass.gov/eea/docs/eea/water/wap-connecticut-2003.pdf>) developed by the Mass. Executive Office of Environmental Affairs, the Town of Northfield lies in the most rural portion (the Northern Reach) of the Connecticut River Watershed in Massachusetts. Important characteristics of this part of the watershed include agricultural lands, large tracts of forestland, and the presence of

two hydroelectric facilities, including the Northfield Mountain pump storage facility owned by GDF Suez/First Light Power Resources. The Plan lists the following objectives for the Northern Reach:

- Increase awareness of the importance of riparian buffers along the mainstem of the Connecticut River and its tributaries;
- Reduce human-influenced erosion along the mainstem and its tributaries;
- Restore vegetative riparian buffers where appropriate;
- Protect water quality through the implementation of growth management strategies;
- Obtain additional water quality data;
- Reduce non-point source pollution with a particular focus on the mainstem and four priority tributaries including Bennett Brook and Fourmile Brook in Northfield;
- Assist communities with the protection of drinking water resources;
- Improve fish passage;
- Encourage the protection of important wildlife habitat;
- Complete an updated inventory of existing boat access points;
- Implement an education program for boaters; and
- Assist with the development of a public access point on the Fall River in Bernardston.

The hydropower licenses for the Vernon Dam, Turners Falls Dam, and Northfield Mountain all expire in 2018. The re-licensing process will begin approximately in the fall of 2012, and recreation, open space, water quality, flow, erosion, and fisheries resources will all be discussed, studied, and a new license will incorporate new requirements.

Surface Water Resources in the Connecticut River Watershed

In the eastern portion of Northfield:

Pauchaug Brook

Pauchaug Brook is located in northeastern Northfield. It originates in Winchester, New Hampshire just north of Warwick, Massachusetts. The brook supplies Wanamaker Lake on its generally westerly flow to its confluence with the Connecticut River, slightly north of the Pauchaug Meadow boat access ramp. The lower portion is located within the Pauchaug Meadow Wildlife Management Area. The brook is stocked with trout by the Mass. Division of Fisheries and Wildlife each spring.

Louisiana Brook

Louisiana Brook originates in the area of Louisiana and Notch Mountains in northeastern Northfield. The brook is dammed near its headwaters to create the Grandin Reservoir, which is a community water supply serving the former Northfield campus of the Northfield Mount Hermon School and surrounding neighborhoods. The brook flows in a westerly direction from the reservoir to its confluence with Pauchaug Brook just below Wanamaker Lake.

Mill Brook, wetlands and pond

Mill Brook originates in Bass Swamp in the town of Warwick. It initially flows southwesterly along Warwick Road and makes a turn to the northwest as it approaches Northfield Village, reaching the Connecticut River in a series of cascades west of Main St. at Mill Road. The brook creates a large area of wetlands east of Main St. Mill Brook is stocked with trout annually.

Minot Brook

Minot Brook is a tributary of Mill Brook and originates in Northfield State Forest in the eastern section of town. It flows westerly to its confluence with Mill Brook, northeast of the intersection of Warwick and Strowbridge Roads.

Millers Brook

Millers Brook is located in a beautiful ravine and originates in the area of Pratt Hollow, Stratton Mountain, and the Upper Bald Hills in eastern Northfield. It flows generally west southwesterly to its confluence with the Connecticut River in the area of Beers Plain.

Roaring Brook

Roaring Brook is a tributary of Millers Brook and originates in the area of Brush Mountain, Roman T Hill and Beers Mountain. Roaring Brook flows west northwesterly to its confluence with Millers Brook near Route 63. There are several falls along Roaring Brook, two of which are notable, Sheep Falls and Salmon Falls. Salmon Falls was the site of a former grist mill and Sheep Falls was so named as the falls drop into a small pool that was once used for washing sheep prior to shearing. Roaring Brook is stocked with trout each spring.

Merriam Brook

Merriam Brook originates in the area of South Mountain and flows westerly to its confluence with the Connecticut River at the Munns Ferry campground.

Pine Meadow Brook

Pine Meadow Brook is a small stream that originates in the area of South Mountain. It flows into the Connecticut River near the southern end of Pine Meadow.

Fisher Brook

Fisher Brook is a tributary of Fourmile Brook. It originates in the area of Beers and South Mountains and flows southwesterly to its confluence with Fourmile Brook.

Fourmile Brook

Fourmile Brook originates atop Northfield Mountain near the town's border with the town of Erving. It flows generally westerly to its confluence with the Connecticut River in the southwestern corner of Northfield. Fourmile Brook is stocked annually with trout by the Massachusetts Division of Fisheries and Wildlife.

Wanamaker Lake

Wanamaker Lake used to be located along Pauchaug Brook in northeastern Northfield. The dam to the lake failed in 1997.

Unnamed Pond and Swamp near Center Cemetery

This swamp and the two-acre pond are located in Great Meadow near the Center Cemetery.

Perry Ponds

These are two ponds located on the grounds of the Northfield campus of NMH.

There are numerous small ponds located throughout Northfield.

In West Northfield:

Bottom Brook

Bottom Brook originates in the uplands of West Northfield near the town's border with Vernon, Vermont. The brook flows generally southeasterly to its confluence with the Connecticut River at Moose Plain just north of the railroad bridge.

Mallory Brook

Mallory Brook originates in uplands just north of West Road and flows southeasterly to its confluence with the Connecticut River at the southern tip of Second Moose Plain.

East Wait Brook

East Wait Brook is a series of wetland areas connected by short sections of stream. The brook originates in wetlands in the northwest corner of West Northfield near the border of Vermont and drains into the wetlands area of Hell's Kitchen west of Lily Pond.

West Wait Brook

West Wait Brook originates in the northwestern corner of Northfield. It flows southeasterly through Northfield State Forest and drains into the wetlands area of Hell's Kitchen.

Bennett Brook

Bennett Brook flows out of the southern Sawyers Pond and travels southeasterly to its confluence with the Connecticut River at the southern end of Bennett Meadow.

Hell's Kitchen

Hell's Kitchen is a 40-acre wetland located off Vernon Road listed in the National Wetland Inventory. East and West Wait Brooks drain into the wetland and in turn, the wetland drains into the northern Sawyer Pond. Hell's Kitchen is part of the Satan's Kingdom Wildlife Management Area owned by the Massachusetts Department of Fish and Game.

Sawyer Ponds

Sawyer Ponds (privately-owned) are located in West Northfield at the southern end of Hell's Kitchen. The Hell's Kitchen swamp drains into the northern Sawyer Pond and Bennett Brook flows out of the southern pond. The southern pond is twelve acres in size, and the northern pond is nine acres in size.

Lily Pond

Lily Pond is located to the northeast of Hell's Kitchen.

Streeter Pond

Streeter Pond is a two to three acre shallow pond located on Route 142 in West Northfield.

C.1.2 Millers River Watershed (sub-watershed of the Connecticut River)

The Town of Northfield is located in the western portion of the Millers River Watershed. The watershed is located in north central Massachusetts and southwestern New Hampshire. In Massachusetts, it is bordered on the east by the Nashua River Watershed, on the west by the Connecticut River Watershed, and on the south by the Chicopee River Watershed and in the north by the Ashuelot. The headwaters for the Millers River are located in southern New Hampshire as well as in the towns of Winchendon and Ashburnham, Mass. Fifty-one miles in length, forty-four of which are in Massachusetts, the Millers River flows south, then gradually west to its confluence with the Connecticut River in the town of Erving. The Millers River drains a regional landscape that is 392 square miles in size, 320 of which are in Massachusetts. Although the Millers River fluctuates between sluggish and rapid flows, there is an average drop of twenty-two feet per mile. This feature made the Millers River and its main tributaries a magnet for manufacturing and hydroelectric power generation, which provided the impetus for initiation of industrial activities in neighboring towns in the late 1700s.

Many town centers are located along the Millers River, or on one of its main tributaries. The presence of industry, dense residential development, and the use of the river as a means of wastewater disposal combined to produce serious pollution problems in the past. Many of the point sources of pollution have been regulated and as a result, the Millers River is much cleaner today than in years past. However, the continued presence of dangerous levels of mercury and poly-chlorinated biphenyls (PCB's), buried in the stream sediments of the Millers River, means that the river's classification as swimmable/fishable, has still not been achieved. Fish flesh has been found to contain these chemicals at levels that have motivated the Massachusetts Department of Public Health to initiate public health warnings against consuming fish caught in the Millers River. The extent of the PCB contamination has been studied by the U.S. Geological Survey (USGS) and given the results, the Mass. Department of Environmental Protection has been able to move forward in the identification of a responsible party (DEP website; 2004).

The watershed priorities for the Millers River Watershed according to the Executive Office of Environmental Affairs include:

- Complete the hydrologic assessments to determine hydrological impacts and implement a recommended action plan;
- Continue to improve water quality by implementing a Non-Point Source Pollution Education campaign;
- Continue water quality monitoring through DEP's Strategic Monitoring and Assessment for River Basin Teams (SMART) Monitoring Program;
- Support continuing efforts to solve and mitigate PCB contamination of the Millers and Otter Rivers; and

- Continue efforts to preserve open space and promote sustainable growth by conducting a watershed-wide Regional Open Space Plan (DEP website; 2004)
- The Millers River Watershed Council (MRWC), an associate of the Millers River Environmental Council, was formed in the 1970's to restore and maintain clean water, lobby for cleanup of pollution points, encourage conservation and assist in developing the river as a recreation resource. The MRWC conducts biweekly sampling of the river at five locations on the Millers River in Athol and Orange. Results so far are below the Massachusetts required levels.

In the Millers River Watershed Action Plan prepared by the Millers River Watershed Council and the Franklin Regional Council of Governments, the action plan issues and concerns include the following:

- Restore and improve natural flow regimes and aquatic habitat;
- Preserve and restore biodiversity and wildlife habitat;
- Support environmentally sustainable growth in the watershed;
- Promote, protect, and enhance watershed open space and recreational values;
- Expand public outreach and educational activities in the watershed;
- Protect and improve water quality in the watershed; and
- Strengthen grassroots support for the watershed

Surface Water Resources in the Millers River Watershed

Keyup Brook

Keyup Brook originates in the area of Great Swamp in the portion of Northfield State Forest located in the southeastern corner of town. Keyup Brook flows southerly and is joined by Jack's Brook before flowing into the Millers River in the town of Erving.

Jacks Brook

Jacks Brook originates in the area of the First Bald Hills in the southeastern corner of Northfield. It is a tributary of Keyup Brook, which flows into the Millers River in the town of Erving.

Great Swamp

Great Swamp is located in the portion of Northfield State Forest located in the southeastern corner of town. Great Swamp is the headwaters for Keyup Brook and is listed in the National Wetland Inventory.

C.2 Class A Waters

In the Town of Northfield, the Grandin Reservoir and its tributaries have been designated as Class A water sources by the Massachusetts Department of Environmental Protection. As such, these waters can be used as public water supplies. The Grandin Reservoir is used by the East Northfield Water Company and serves the campus buildings formerly owned by NMH as well as nearby neighborhoods. Class A water sources are also considered excellent habitat for fish, other aquatic life and wildlife. They have aesthetic value and are suitable for recreation purposes

compatible with their designation as drinking water supplies. These waters are designated for protection as Outstanding Resource Waters under Massachusetts 314 CMR 4.04 (Mass. DEP website; 2004).

C.3 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 “one hundred 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.

The 100- and 500-year floodplains are mapped by the National Flood Insurance Program (NFIP) after a study of waterways. The 100-year floodplain is used for regulatory purposes. According to the NFIP maps effective in 1980, one hundred-year floodplains in Northfield occur along:

- The lowland areas along the entire length of the Connecticut River in Northfield including Pauchaug Meadow, Great Meadow, Little Meadow, Pine Meadow in eastern Northfield and Moose Plain, Second Moose Plain and Bennett Meadow in West Northfield;
- Pauchaug Brook from Wanamaker Lake to its confluence with the Connecticut River;
- Louisiana Brook from Route 10 to approximately one eighth mile upstream;
- The entire length of Mill Brook;
- Millers Brook from its confluence with the Connecticut River upstream to approximately one quarter mile past the intersection of Gulf and Alexander Hill Roads;
- Nearly the entire length of Roaring Brook;
- Fourmile Brook from its confluence with the Connecticut River to a point approximately 1.5 miles upstream;
- The entire length of Keyup Brook;
- East Wait Brook and associated wetlands, Sawyer Ponds, Lily Pond; and
- Bennett Brook.

C.4 Wetlands

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.

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; some towns also have their own, local wetlands regulations.

Many of Northfield’s wetlands are mapped by the National Wetlands Inventory (NWI) (*see the Water Resources Map at the end of this section*).

Vernal Pools

Vernal pools are temporary bodies of fresh water that provide critical breeding habitat for many vertebrate and invertebrate wildlife species. They are defined as “basin depressions where water is confined and persists for at least two months during the spring and early summer of most years, and where reproducing populations of fish do not survive.” Vernal pools may be very shallow, holding only 5 or 6 inches of water, or they may be quite deep. They range in size from fewer than 100 square feet to several acres (Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries & Wildlife, *Massachusetts Aerial Photo Survey of Potential Vernal Pools*, Spring 2012). Vernal pools are found across the landscape, anywhere that small woodland depressions, swales or kettle holes collect spring runoff or intercept seasonal high groundwater, and along rivers in the floodplain. Many species of amphibians and vertebrates are completely dependent on vernal pools to reproduce. Loss of vernal pools can endanger entire populations of these species.

The state’s Natural Heritage and Endangered Species Program (NHESP) has predicted the location of vernal pools statewide based on interpretation of aerial photographs. NHESP believes that its method correctly predicts the existence of vernal pools in 80 to 90 percent of cases. They acknowledge, however, that the method probably misses smaller pools. The NHESP has identified approximately eighty potential vernal pools throughout Northfield with several clusters especially in the northwestern part of town. According to NHESP, clusters

indicate particularly good habitat for species. Also, with clusters, there are alternate habitats if something happens to one pool, and slightly different conditions in each may provide different habitats for species dependent upon the pools. There is more information about vernal pools in Appendix D.

In addition to identifying potential vernal pools, NHESP certifies the existence of actual vernal pools when evidence is submitted to document their location and the presence of breeding amphibians that depend on vernal pools to survive. Certified vernal pools are protected by the Massachusetts Wetlands Protection Act and by additional state and federal regulations. In Northfield, there are four Certified Vernal Pools.

C.5 Potential Aquifers and Recharge Areas

Aquifers are composed of water-bearing soil and minerals, which may be either unconsolidated (soil-like) deposits or consolidated rocks. Consolidated rocks, also known as bedrock, consist of rock and mineral particles that have been welded together by heat and pressure or chemical reaction. Water flows through fractures, pores and other openings. Unconsolidated deposits consist of material from the disintegrated consolidated rocks. Water flows through openings between particles.

As water travels through the cracks and openings in rock and soil, it passes through a region called the “unsaturated zone,” which is characterized by the presence of both air and water in the spaces between soil particles. Water in this zone cannot be pumped. Below this layer, water fills all spaces in the “saturated zone”. The water in this layer is referred to as “groundwater”. The upper surface of the groundwater is called the “water table” (Masters, Gilbert. *Introduction to Environmental Engineering and Science, Second Edition*; 1998).

The route groundwater takes and the rate at which it moves through an aquifer is determined by the properties of the aquifer materials and the aquifer’s width and depth. This information helps determine how best to extract the water for use, as well as determining how contaminants, which originate on the surface, will flow in the aquifer.

Aquifers are generally classified as either unconfined or confined (EPA and Purdue U.; 1998). The top of an unconfined aquifer is identified by the water table. Above the water table, in the unsaturated zone, interconnected pore spaces are open to the atmosphere. Precipitation recharges the groundwater by soaking into the ground and percolating down to the water table. Confined aquifers are sandwiched between two impermeable layers (Masters; 1998). Almost all the public wells in Massachusetts, including those in Northfield, and many private wells tap unconfined aquifers (Mass. Audubon Society; 1985). Wells that rely on confined aquifers are referred to as “artesian wells.”

According to MassGIS and US Geological Service (USGS) documents, Northfield has one large area considered to be medium-yield aquifer, defined as an aquifer with the potential to provide a pumping volume 25 to 1,000 gallons per minute. This aquifer extends along both sides of the Connecticut River in Northfield, with the exception of a small area between East Northfield Road and Elm Ave. (*see Water Resources Map at the end of this section*).

The areas that contribute to public water supply wells are known as recharge areas. The Massachusetts Department of Environmental Protection strictly regulates an area within a radius of 100 to 400 feet of public water supply wells, known as the “Zone I,” and land uses in this area are restricted to water supply related activities only. Primary recharge areas are determined by hydrological studies involving pump tests and wells that monitor the level of groundwater in proximity to the public water supply well. The Northfield Water District’s well has a Zone I radius of 400 feet around the wellhead. The District does not own the entire Zone I radius and as such, is considered to be non-conforming by the state. The Massachusetts drinking water regulations (310 CMR 22.00) require public water suppliers to own the Zone I or control the Zone by conservation restriction, and that only water supply activities be allowed. Since many water supplies were developed prior to the regulations, many are non-conforming. The Source Water Assessment and Protection (SWAP) Report prepared by the Mass. Department of Environmental Protection indicates that within the Northfield Water District Zone I, there are activities which include pasturelands, residences and roads. These uses are considered potential sources of contamination.

The Northfield Water District also has a delineated Zone II recharge area. A Zone II is that area of an aquifer that contributes to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at approved yield with no recharge from precipitation). The Zone II is located west of the confluence of the Minot Brook and Mill Brook. Threats to the District’s Zone II recharge area contributing to a designation of “high” threat of contamination include residential use, roadways, potential hazardous materials storage and use, presence of an oil contamination site as noted by DEP, and agricultural uses. The Northfield Water District’s Zone II recharge area is 137.6 acres in size and roughly bounded by Birnam Road, Old Turnpike Road, Round Hill and Minot Brook, with Warwick Road roughly bisecting the area.

C.6 Surface Water Reservoirs

The Grandin Reservoir is located off Louisiana Road in northeastern Northfield. It is owned by the Northfield Mount Hermon School and currently serves the former Northfield campus as well as nearby neighborhoods. It has a storage capacity of 30 million gallons, an estimated safe yield of 200,000 gallons, and an area of approximately seven acres. The reservoir and 95 percent of its watershed is currently owned by NMH. The Source Water Assessment and Protection Report is available from MA Department of Environmental Protection. The East Northfield Water Company completed an updated watershed protection plan in 2011. The water is chlorinated after it is pumped from the reservoir.

The Grandin Reservoir has three protection zones, Zone A, Zone B and Zone C. Zone A, the most critical area for protections, is that area 400 feet from the edge of the reservoir and 200 feet from the edge of the tributaries draining into the reservoir. Zone B is that area one-half mile from the edge of the reservoir and does not go beyond the outer edge of the watershed. Zone C is the remaining area in the watershed not designated as Zone A or B. The Grandin Reservoir’s Zones A and C are densely forested. NMH worked with DEP to do some forestry cutting in

Zone A to re-establish smaller growth which provides added filtering for water entering the reservoir. Currently, additional forestry cutting is happening in Zone B.

The Massachusetts Department of Environmental Protection considers the threat of contamination to the Grandin Reservoir as moderate. Although the potential sources of contamination, which include access roads, the possibility of aquatic mammals, and forest operations, are considered to be of low threat, its vulnerability as a surface water supply increases its susceptibility to contamination.

C.7 Potential Sources of Public and Private Drinking Water Supply Contamination

Potential sources of contamination of public and private wells include septic systems, sub-surface fuel tanks, manure piles, improper use, storage and disposal of hazardous materials, herbicide runoff from farmland, utility rights-of-way, state highway vegetation control, and road runoff.

D. VEGETATION

Information in this section and in Section E: Fisheries and Wildlife incorporates conservation mapping from the Natural Heritage and Endangered Species Program (NH&ESP) of the Massachusetts Division of Wildlife and Fisheries. This conservation mapping program is called BioMap2, an update of an earlier mapping. BioMap2 combines innovative GIS capabilities along with thirty years of data, new improved data, and increased biological expertise. Developed with the assistance of The Nature Conservancy, BioMap2 is a conservation blueprint based on the habitat needs of the state's rare species and additional wildlife Species of Special Concern.

NH&ESP developed BioMap2 “to protect the state's biodiversity in the context of projected effects of climate change,” (NH&ESP). It uses the Nature Conservancy's assessment of large unfragmented ecosystems and landscapes, crucial habitats that allow wildlife to move as the climate changes

BioMap2 uses defines specific areas. Core Habitat refers to key areas that are critical for long-term survival of rare species and other Species of Conservation Concern, natural communities and intact ecosystems. A Critical Natural Landscape is defined as a large, natural, unfragmented landscape block that provides habitat, maintains connectivity, helps to provide resilience to disturbances and provide buffers around some core habitats (NH&ESP). See Core Habitats and Critical Natural Landscape maps at the end of this section.

Links to more information about BioMap2 are available in Appendix D.

Plants are a critical component of ecosystems in Northfield. Plants 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 (NHESP; 2001). 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.

Forests make up approximately 70 percent of the Northfield's total land area and are one of the town's most important renewable natural resources. The town's forests are diverse, including unusual communities such as Northern hardwoods and conifers; major river and high-terrace floodplain forests; and black ash and black gum swamps. This section describes vegetated areas in town and their ecological and economic significance.

In 2011 the town established a 150 acre Town Forest on the western slope of Brush Mt. with help from Mount Grace Land Conservation Trust with funding through the Forest Legacy Program. The Town Forest has a Forest Resource Management Plan and is working on a stewardship outreach plan with the assistance of AmeriCorps staff under the direction of Mount Grace Land Conservation Trust.

D.1 Forests

The predominant forest type in Northfield is the transition hardwoods-white pine forest (USDA; 1992). Within this forest type, northern hardwoods such as yellow and paper birch (*Betula alleghaniensis* and *Betula papyrifera*), beech (*Fagus grandifolia*), and sugar and red maple (*Acer saccharum* and *Acer rubrum*) are the major species. On the dryer sites, oaks and hickories can be found with red oak (*Quercus rubra*) being the most abundant deciduous species. Hemlock (*Tsuga canadensis*) occurs in the moist cool valleys, north and east slopes, and sides of ravines in Northfield. White pine (*Pinus strobus*) is characteristic of the well-drained sandy sites. The transition hardwood-white pine forest type commonly occurs up to an elevation of 1,500 ft. above sea level in upland central Massachusetts and southern New Hampshire, northward through the Connecticut Valley.

D.2 Unusual Natural Communities

The Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife has noted the Town of Northfield as having a number of uncommon ecologically significant natural communities within its borders, which support a number of the state-listed rare and endangered species. Additional information is available in Appendix D. These communities include:

Northern Hardwood – Hemlock – White Pine Forest

According to the NHESP, Northfield has an excellent example of a Northern Hardwoods – Hemlock – White Pine Forest located approximately in the area of the Northfield Mountain and stretching into the town of Erving. This forest type can be found in dry to moist, moderately acidic soils on north facing slopes and ravines. The community type can range from hemlock

(*Tsuga canadensis*) in pure stands to a deciduous forest with scattered hemlocks. Other species found in this forest type include various combinations of hemlock (*Tsuga canadensis*), sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), black cherry (*Prunus serotina*), red oak (*Quercus rubra*) and white pine (*Pinus strobus*). Also, there can be scattered paper birch (*Betula papyrifera*), aspen (*Populus tremuloides*), red maple (*Acer rubrum*) and yellow birch (*Betula alleghaniensis*). The shrub layer, which is usually open, often contains hobblebush (*Viburnum lantanoides*), red-berried elderberry (*Sambucus racemosa* ssp. *pubens*), fly honeysuckle (*Lonicera canadensis*), and striped maple (*Acer pennsylvanicum*). The herbaceous layer is sparse but may contain intermediate woodfern (*Dryopteris intermedia*), Christmas fern (*Polystichum acrostichoides*), clubmosses (*Lycopodium* ssp.), Canada mayflower (*Maianthemum canadense*), white wood aster (*Aster divaricatus*), and wild sarsparilla (*Aralia nudicaulis*). Rand's goldenrod (*Soldago glutinosa* ssp. *Randi*) is an endangered plant species and the water shrew (*Sorex palustris*) is an animal species of special concern that can be found within this forest type.

Major-River Floodplain Forest

Major-River Floodplain forests occur along large rivers such as the Connecticut River. In Northfield, major-river floodplain forests can be found in two areas, on Kidd Island and in the area of the boat ramp along the Connecticut River near Pauchaug Brook in northern Northfield. The soils found within this environment are predominantly sandy loams without a surface organic layer. Flooding occurs annually and is usually severe. The “island variant” occurs on elevated sections of riverine islands and riverbanks where there are high levels of disturbance from intense flooding and ice scour. The dominant species of this floodplain forest is the silver maple (*Acer saccharinum*), covering the majority of the overstory with lesser amounts of cottonwood (*Populus deltoides*). American elm (*Ulmus americana*) and/or slippery elm (*Ulmus rubra*) can be found in the subcanopy. Shrubs are lacking and the herbaceous layer primarily consists of stinging nettles (*Laportea canadensis*). Ostrich fern (*Matteuccia struthiopteris*) also occurs and whitegrass (*Leersia virginica*) is found in small amounts. The “island variant” has similar species, but cottonwood, sycamore (*Platanus occidentalis*) and American ash (*Fraxinus americana*) are also present in the canopy. Box elder (*Acer negundo*), staghorn sumac (*Rhus typhina*), bittersweet (*Celastrus orbiculata*), riverbank grape (*Vitis riparia*) and Virginia creeper (*Parthenocissus quinquefolia*) are also present. Floodplain forests are insect-rich habitats that attract many species of songbirds. Raptors such as bald eagles and red-shouldered hawks also use riverbank trees as perch sites. Wood ducks and hooded mergansers are found along the shady edges of the riverbanks as are Eastern comma butterflies and several species of dragonflies. Floodplain forests also provide sheltered riverside corridors for deer and migratory songbirds. Many state protected rare animal species use the floodplain forest as an important component of their habitat.

High-Terrace Floodplain Forest

The high-terrace floodplain forests can also be found in Northfield at the downstream end of Kidd Island. Typically, they occur on raised banks adjacent to rivers and streams, on steep banks along high gradient rivers particularly in western Massachusetts, on high alluvial terraces and on raised areas within major-river and small-river floodplain forests. The high-terrace floodplain forest is not subjected to annual spring flooding as it is above the flood zone.

The high-terrace floodplain forest in Massachusetts has a mixture of hardwoods generally associated with floodplains. These include red and silver maple (*Acer rubrum* and *saccharinum*) as well as sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), black cherry (*Prunus serotina*), American elm (*Ulmus americana*), and basswood (*Tilia americana*). Ironwood (*Carpinus caroliniana*) is present in the sub-canopy and is a good indicator of this community. Within the shrub layer one can find arrowwood (*Viburnum dentatum*), nannyberry (*Viburnum lentago*) and winterberry (*Ilex verticillata*). The herbaceous layer is a mixture of forest ferns and upland herbs characteristic of floodplain forests. Rare plants associated with high-terrace floodplain forest include the black maple (*Acer nigrum*), narrow-leaved spring beauty (*Claytonia virginica*), and barren strawberry (*Waldsteinia fragarioides*). Rare animal species include the Jefferson salamander (*Ambystoma jeffersonianum*), blue-spotted salamander (*Abstoma laterale*), spotted turtle (*Clemmys guttata*), the wood turtle (*Clemmys insculpta*), Blanding's turtle (*Emydoidea blandingii*), and the four-toed salamander (*Hemidactylum scutatum*).

Black Gum Swamps

The Black Gum Swamp is a community type not usually found in Massachusetts. In Northfield, there are two examples in the northwestern corner of the town. Black gum swamps are deciduous swamp forests characterized by black gum (*Nyssa sylvatica*), but red maple (*Acer rubrum*) can also occur. These swamps are found in saddles or depressions near the tops of hills and are surrounded by upland forests. Two black gum swamps are located adjacent to the Monadnock~Metacomet Trail (officially, the New England National Scenic Trail) between Crag Mountain and Gulf Road. The soils are accumulations of muck or peat. Black gum swamps are characterized by hummocks and hollows that are seasonally flooded. These swamps occur below 1,000 feet in elevation, have relatively small watersheds, limited drainage, and are usually isolated from perennial streams. White pine, hemlock, black ash (*Fraxinus nigra*) and red spruce (*Picea rubens*) can also be found in the canopy. The subcanopy includes a mixture of the canopy species as well as yellow birch. Shrubs generally characteristic of black gum swamps are winterberry (*Ilex verticillata* or *I. Laevigata*) and highbush blueberry (*Vaccinium corymbosum*). Cinnamon fern (*Osmunda cinnamomea*) is the most abundant species in the herbaceous layer. Black gum swamps are similar to vernal pools in that they provide important habitat diversity for wildlife, including amphibian breeding sites.

Black Ash Swamps

Also uncommon in Massachusetts are black ash swamps, deciduous swamp forests consisting of a high diversity of tree species including black ash (*Fraxinus nigra*) and red maple (*Acer rubrum*). Found in a wide variety of settings, black ash swamps usually occur with significant groundwater seepage. They can be found in depressions at or near the headwaters of streams and occasionally on sloping edges of river floodplains or as within areas of red maple swamps. An area of black ash swamp can be found in the northwestern Northfield.

Besides black ash (*Fraxinus nigra*), red maple (*Acer rubrum*) can also be found in the canopy of black ash swamps. White pine, hemlock and yellow birch may also be present. The subcanopy includes American elm (*Ulmus americana*). The shrub layer is quite diverse, but the most characteristic shrub is winterberry (*Ilex verticillata*). The herbaceous layer is also diverse with cinnamon fern and skunk cabbage (*Symplocarpus foetidus*) the most abundant. The high

coverage of ferns in the black ash swamp is one of its more striking characteristics. Besides the cinnamon fern, royal fern (*Osmunda regalis* var. *spectabilis*), marsh fern (*Thelypteris palustris*), and sensitive fern (*Onoclea sensibilis*) can be found.

Level Bogs

Level bogs are wetland communities with accumulations of incompletely decomposed organic material (peat) that develop along ponds, at the headwater of streams, or in isolated valleys without inlet or outlet streams. With no streamflow and isolation from the water table, level bogs are the most acidic and nutrient poor of peatland communities. Examples of level bogs are limited in Massachusetts and as such, have been designated Priority Natural Communities for Protection. In Northfield, a portion of a level bog is associated with Steven's Swamp, which can be found in the eastern section of town in Northfield State Forest along the town's border with Warwick.

A level bog consists of a mixture of tall and short ericaceous shrubs, which dominate the landscape. Leatherleaf (*Chamaedaphne calyculata*) is dominant, but other ericaceous shrubs such as rhodora (*Rhododendron canadense*), sheep laurel (*Kalmia angustifolia*), bog laurel (*Kalmia polifolia*), bog rosemary (*Andromeda polifolia* var. *glaucophylla*), Labrador tea (*Ledum groelandicum*), and low-growing large and small cranberry (*Vaccinium macrocarpon* and *V. oxycoccus*). Stunted coniferous trees, mainly tamarack (*Larix laricina*) and black spruce (*Picea mariana*), occur throughout the level bog. A mixture of bog plants also grow on the Sphagnum surface and include carnivorous pitcher plants (*Sarracenia purpurea*), and sundews (*Drosera rotundifolia* and *D. intermedia*).

Four rare plant species occur in level bogs: pod-grass (*Scheuchzeria palustris*), dwarf mistletoe (*Arceuthobium pusillum*), mud sedge (*Carex limosa*) and northern yellow-eyed grass (*Xyris montana*). Pod-grass and dwarf mistletoe are protected under the Massachusetts Endangered Species Act. Several rare animal species also occur in level bogs. Of these, three species are considered endangered: the spatterdock damper (*Aeshna mutata*), ebony boghaunter (*Williamsonia fletcheri*), and ringed boghaunter (*Williamsonia lintneri*).

D.3 Main Street Vegetation

Before the hurricane of 1938 Northfield's historic Main Street was famous for the many graceful elm trees that lined the street. These elm trees were so large that they seemed to meet high over the center of the street. But the hurricane left a barren, dusty landscape with the elms flattened across the street. In 1815 a young lawyer had planted these hundreds of elm tree seedlings along the street. In several decades, the elms grew to grace the dusty street, providing shade and a green visual frame to the colonial homes. Since then, the few remaining elms, similar to all the elms in northeast, died from Dutch Elm Disease.

Since the loss of the elms, the variety of trees that line Main Street have suffered years of neglect due to the lack of a certified arborist to serve as tree warden. Utility line crewmen dealt with branches that threatened utility lines, and Massachusetts Highway Department reacted to crisis situations, but the tree situation continued to degrade. The narrow, crumbling asphalt sidewalk made walking a hazard.

In 2005 the engineering firm Dufresne-Henry along with the Massachusetts Highway Department developed plans for sidewalk reconstruction and a ‘streetscape’ in the Main Street area. Dufresne Henry in association with Warren Spinner of Shade Tree Associates from Essex Junction, VT., inventoried all the trees in the project area. Of the 220 trees in the inventory, the report recommended that thirty seven be removed immediately. Other suggested maintenance included crown cleaning, cabling, fertilizing, and young tree training, and a suggested maintenance schedule for the next few years. The Main Street Revitalization Project also included sidewalk reconstruction and parking plans.

Because this early engineering had been completed, the streetscape project was eligible for funds from the American Recovery and Revitalization program, and in 2008 work began to replace the sidewalks, remove the trees, and plant new trees and shrubs.

The new, wide sidewalks on both sides of the street make walking a pleasure for town residents. In some places the sidewalks curve around large trees that did not need to be removed.

The new trees - maples, oak, pear, ash, ginko, etc – are flourishing. The cherry trees, planted years before the project, provide masses of pink blossoms each spring. And the variety of trees means that an insect or virus, such as the Dutch Elm Disease, will not decimate the entire planting.

[Note: Northfield center, though a small village, is long and narrow. Main Street really is the MAIN street in town and runs down the center of this long strip. The houses are set far back from the street to effectively provide a long narrow commons along with the buggy paths. Thus the importance of the streetscape described above.]

D.4 Agricultural Land

In 1999, agricultural land in Northfield, which includes cropland, pastureland, orchards and nurseries, comprised 13.6 percent of the town's total land area. The U.S. Census of Agriculture does not provide municipal-level data for the amount of land in farms. Northfield’s agricultural land is located primarily along the Connecticut River, and along the Route 63 corridor in the eastern section of town. There are currently no dairy farms in operation in the Town of Northfield.

In 2010 the Northfield Agricultural Commission produced a map and inventory of all farms and farm stands in Northfield ranging from one-acre operations to farms of several hundred acres. The farms include cropland, tree farms, vegetables, and animals such as sheep, goats, and beef. There are 26 farms and farm stands that sell directly to the public. In addition, there are 70 farms that do not sell directly to the public.

D.5 Rare, Threatened and Endangered Plant Species

The Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife has designated several “Priority Habitat” areas in the Town of

Northfield. A Priority Habitat is an area where plant and animal populations protected by the Massachusetts Endangered Species Act Regulations (321 CMR 10.00) may occur. These areas include:

- Along the banks of the Connecticut River up to approximately one quarter mile inland;
- Along the banks of Millers Brook from its headwaters to approximately the intersection of Alexander Hill Road and Gulf Road, including tributaries along Alexander Hill Road and Gulf Road;
- Pine Meadow Brook from its confluence with the Connecticut River to approximately one half mile upstream; and
- Along the banks of the Sawyer *Ponds*.

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

Scientific Name	Common Name	State Status	Most recent year
<i>Botrychium angustisegmentum</i>	Narrow Triangle Grape-fern	Plant Watch list	
<i>Botrychium matricariifolium</i>	Daisy-leaf Moonwort	Plant Watch list	
<i>Mimulus alatus</i>	Winged monkey-flower	Endangered	2007
<i>Eleocharis intermedia</i>	Intermediate Spike-sedge	Threatened	2009
<i>Eleocharis ovata</i>	Ovate spike sedge	Endangered	2009
<i>Eleocharis diandra</i>	Wright’s spike-rush	Endangered	2009
<i>Ophioglossum pusillum</i>	Adder’s tongue fern	Threatened	1961
<i>Eragrotis frankii</i>	Frank’s lovegrass	Special Concern	1984
<i>Utricularia minor</i>	Lesser Bladderwort	Plant Watch list	

Source: Natural Heritage and Endangered Species Program, Mass. Department of Fish and Game, 2012.

NHESP has identified 256 native plant species as rare in the Commonwealth, and nine of these rare plants have been documented in the Town of Northfield (*see Table 4-1*). These plants occur in some of the Core Habitats identified above. Plants (and animals) listed as *endangered* are at risk of extinction (total disappearance) or extirpation (disappearance of a distinct interbreeding population in a particular area). *Threatened* species are likely to become endangered in the foreseeable future. Species of special concern have been documented to have suffered a decline that could result in its becoming threatened, or occur in very small numbers and/or have very specialized habitat, the loss of which could result in their becoming threatened (NHESP and The Nature Conservancy, *Our Irreplaceable Heritage: Protecting Biodiversity in Massachusetts*; 1998). Plants on the unofficial Watch List are not regulated.

E. FISHERIES AND WILDLIFE

Northfield’s forests, rivers, wetlands and open farmland provide habitat for a variety of common and rare wildlife species. This section discusses wildlife species and their habitats from the perspective of natural communities, individual species, and potential patterns of wildlife distribution and movement across the landscape.

The BioMap2 Project has identified areas throughout the state that are critical to supporting the maximum number of terrestrial and wetland plant and animal species, and natural communities. It uses Estimated Habitats and other documentation to identify the areas most in need of protection in order to protect the native biodiversity of the Commonwealth. BioMap2 focuses primarily on state-listed rare species and exemplary natural communities and was developed to promote strategic land protection of those areas that would provide suitable habitat over the long term. BioMap2 shows those areas designated as Core Habitats and Critical Natural Landscapes. The Core Habitat areas, identified through field surveys, include the most viable habitat for rare plants and rare animals and exemplary natural communities. The Critical Natural Landscapes, determined through analyses using Geographic Information Systems (GIS) mapping programs, include buffer areas around the Core Habitats, large undeveloped patches of vegetation, large “roadless” areas, and undeveloped watersheds. *(See Core Habitats map at the end of this section.)*

In the Town of Northfield, there are several Core Habitat areas:

- An area in the northwestern most corner of town, including a small portion of Northfield State Forest *(Protected from development)*;
- An area containing Hell’s Kitchen, Lily Pond, and Sawyer Ponds and stretching west to the town’s border with Bernardston *(Not protected from development)*;
- An area at the southwestern end of Bennett Meadow *(Not protected from development)*;
- Along the Connecticut River from Little Meadow to the town’s border with Erving *(About half is protected from development)*;
- The area of the confluence of Pauchaug Brook and the Connecticut River *(Protected from development)*;
- Along the first 1.5 miles of Millers Brook as well as its tributaries *(Not protected from development)*;
- An area east of Collier Cemetery, surrounding an unnamed intermittent stream which drains into Moss Brook in Warwick and connects to a larger Core Habitat area also in that town *(Not protected from development)*; and
- An area located in the southeastern most corner of town that continues into the town of Erving and includes Northfield Mountain *(Not protected from development)*.

Of the many large areas of contiguous forest in Northfield, there are several considered by the NHESP to contain Critical Natural Landscapes that buffer or link lands to the Core Habitat areas (see Critical Natural Landscapes map at the end of this section):

- The eastern forest block, the largest Critical Natural Landscape in Northfield, contains forests along the town’s entire border with Warwick west to Louisiana Mountain, Strowbridge Hill, Garnet Rock, Birnam Road, Northfield Reservoir, Round Hill, Gulf Road, Orange Road and Keyup Brook. Two of the largest parcels of Northfield State Forest lie within this forest block.

- The northwestern block of Critical Natural Landscape from the town's border with Vermont south to Little Meadow and west to the town of Bernardston. This block contains two Northfield State Forest parcels and a portion of Satan's Kingdom.
- The southern block beginning near Beers Mountain and Roman Hill, including South Mountain, and Four Mile Brook and its tributaries. This Critical Natural Landscape stretches into the town of Erving and includes a Core Habitat located in the southeastern most corner of town that continues into the town of Erving and includes Northfield Mountain.
- A Critical Natural Landscape along the Connecticut River from the town's border with Vermont and New Hampshire south to the Schell Bridge.

Large blocks of contiguous forestland such as these are important regional resources for several reasons. First they represent an area with a low degree of fragmentation. Wildlife species that require a certain amount of deep forest cover separate from people's daily activities tend to migrate out of fragmenting landscapes. New frontage lots and subdivisions can often result in a widening of human activity, an increase in the populations of plants and animals that thrive alongside humans (i.e. raccoons and squirrels) and a reduction in the species that have larger home ranges and unique habitat needs. When these large blocks of forest are protected from development they help to protect and provide clean water, air, and healthy wildlife populations. In addition, areas of unfragmented forest are more suitable for active forest management.

E.1 General Description and Inventory of Wildlife and Wildlife Habitats

The Town of Northfield contains a significant amount of upland and floodplain habitat. The forests in Northfield consist of large unbroken tracts, allowing for good species movement within the town and the surrounding region.

Individuals of the following species of wildlife are commonly observed in the Transition Hardwood-White Pine forest type, as is found in Northfield, as members of migrating, wintering, or breeding populations. The lists are based on information presented in *New England Wildlife: Management of Forested Habitats* by R.M. DeGraaf et. al., published in 1992, which correlates wildlife with the major forest type in the area. The species are listed by category (amphibians, reptiles, birds, or mammals), then by type of habitat and by size of home range. It is by no means a complete inventory of all species that may be found in Northfield. Those species that have been observed in Northfield by residents in 2005 are marked with an asterisk.

E.1.1 Amphibians

These species are found in forest, wetland, and open upland habitats and require a home range 1-10 acres in size:

Red-spotted Newt*, Four-toed Salamander*, Jefferson Salamander, Eastern American Toad*, Northern Spring Peeper*, Bullfrog*, Green Frog*, Wood Frog*, Northern Dusky Salamander, Northern Spring Salamander*, Northern Two-lined Salamander*, Redback Salamander*, Gray Tree Frog*, and Pickerel Frog*

This species is found in forest habitats and requires a home range 11-50 acres in size:

Spotted Salamander*

E.1.2 Reptiles

These species are found in forest, wetland, and open upland habitats and require a home range 1-10 acres in size:

Wood Turtle*, Spotted Turtle, Eastern Painted Turtle*, Eastern Box Turtle*, Eastern Garter Snake*, Eastern Hognose Snake*, Bog Turtle*, Map Turtle*

This species is found in forest, wetland, and open upland habitats and requires a home range 11-50 acres in size:

Common Snapping Turtle*

These species are found in forest, wetland, and open upland habitats and requires a home range >50 acres in size:

Black Rat Snake*, Eastern Milk Snake*

E.1.3 Birds (All of the bird species listed have been observed at least once in Northfield)

These species are found in forest /nonforested habitats and require a home range 1-10 acres in size:

Common Goldeneye, Hooded Merganser, Red Breasted Merganser, Ruby-throated Hummingbird, Yellow-bellied Sapsucker, Downy Woodpecker, Hairy Woodpecker, Northern Flicker, Eastern Wood-Pewee, Yellow-bellied Flycatcher, Alder Flycatcher, Willow Flycatcher, Least Flycatcher, Eastern Phoebe, Black-capped Chickadee, Tufted Titmouse, House Wren, Carolina Wren*, Winter Wren, Golden Crowned Kinglet, Ruby Crowned Kinglet, Blue-gray Gnatcatcher, Eastern Bluebird, Bobolink, Veery, Hermit Thrush, Wood Thrush, American Robin, Brown Thrasher, Cedar Waxwing, Solitary Vireo, Yellow-throated Vireo, Warbling Vireo, Philadelphia Vireo, Red-eyed Vireo, Blue-winged Warbler, Tennessee Warbler, Nashville Warbler, Northern Parula, Yellow Warbler, Chestnut-sided Warbler, Black-throated Blue Warbler, Yellow-rumped Warbler, Black-throated Green Warbler, Blackburnian Warbler, Lawrence's Warbler, Prairie Warbler, Blackpoll Warbler, Black-and-White Warbler, American Redstart, Ovenbird, Northern Waterthrush, Song Sparrow, White-crowned Sparrow, Lincoln Sparrow, White-throated Sparrow, Dark-eyed Junco, Common Grackle, Brown-headed Cowbird, Northern Oriole, Rufous-sided Towhee, Purple Finch, House Finch, Scarlet Tanager, Northern Cardinal, Rose-breasted Grosbeak, Indigo Bunting, Great Crested Flycatcher, Tree Swallow, Blue Jay, Mourning Warbler, Common Yellowthroat, Wilson's Warbler, Canada Warbler, Chipping Sparrow, Fox Sparrow, Field Sparrow, Grasshopper Sparrow, Henslow's Sparrow, American Goldfinch, Gray Catbird, Great Blue Heron, Green-backed Heron, Wood Duck, American Black Duck, Green-winged Teal, Mallard, Northern Pintail, Blue-winged Teal, American Wigeon, Ring-necked Duck, Evening Grosbeak, American Redstart, Red Crossbill, White-winged Crossbill, European Starling, Sora, Killdeer, Spotted Sandpiper, Common Snipe, Northern

Mockingbird, Pied-billed Grebe, American Bittern, Mourning Dove, Pine Siskin, Louisiana Waterthrush, Virginia Rail, Eastern Kingbird

These species are found in forest/nonforested habitats and require a home range 11-50 acres in size:

Ring-necked Pheasant, Ruffed Grouse, Upland Sandpiper, Black-billed Cuckoo, Yellow-billed Cuckoo, Common Nighthawk, Whip-poor-will, Northern Rough-winged Swallow, Bank Swallow, Barn Swallow, Red-breasted Nuthatch, White-breasted Nuthatch, Brown Creeper, Swainson's Thrush, American Woodcock, Pine Grosbeak, Horned Lark

These species are found in forest/nonforested habitats and require a home range >50 acres in size:

Turkey Vulture, Bald Eagle, Sharp-shinned Hawk, Cooper's Hawk, Northern Goshawk, Red-shouldered Hawk, Broad-winged Hawk, Red-tailed Hawk, American Kestrel, Peregrine Falcon, Wild Turkey, Great Horned Owl, Barred Owl, Northern Saw-whet Owl, Pileated Woodpecker, American Crow, Common Raven, Chimney Swift, Belted Kingfisher, Northern Harrier

These species are found in forest/nonforested habitats with unknown home ranges:

American Tree Sparrow, Bohemian Waxwing, Northern Shrike, Common Redpoll, Red Bellied Woodpecker, Olive-back Flycatcher, Savannah Sparrow, Cattle Egret, Snowy Egret, Snow Bunting, American Pipit

E.1.4 Mammals

These species are found in forest habitats and require a home range 1-10 acres in size:

Eastern Cottontail*, Snowshoe Hare, Eastern Chipmunk*, Gray Squirrel*, Red Squirrel*, Beaver*, Deer Mouse*, White-footed Mouse*, Meadow Vole*, Star-nosed mole*, Pygmy Shrew*, Least Shrew*, Eastern Mole*, Muskrat*

These species are found in forest habitats and require a home range 11-50 acres in size:

Virginia Opossum*, Porcupine*, Ermine, Long-tailed Weasel

These species are found in forest habitats and require a home range >50 acres in size:

Woodchuck*, Coyote*, Red Fox*, Grey Fox*, Black Bear*, Raccoon*, Fisher*, Mink*, Striped Skunk*, River Otter*, Bobcat*, White-tailed Deer*, Moose*

These species are found in forest/nonforested habitats with unknown home ranges:

Little Brown Myotis*, Silver Haired Bat, Eastern Pipistrelle, Big Brown Bat*

E.2 Rare, Threatened and Endangered Wildlife Species

NHESP has mapped several "Priority Habitats of Rare Species" and "Estimated Habitats of Rare Wildlife" in the Town of Northfield. The Estimated Habitats of Rare Wildlife are located in the same areas as noted for the Priority Habitats earlier in this section. These habitats provide for wildlife species that are endangered, threatened and of special concern. Northfield's rare, threatened and endangered wildlife species are listed in Table 4-2.

Table 4-2: Rare, Threatened and Endangered Wildlife Species found in Northfield

Taxonomic Group	Scientific Name	Common Name	State Status	Most Recent Observation
Beetle	<i>Cicindela purpurea</i>	Purple Tiger Beetle	SC	1898
Bird	<i>Botaurus lentiginosus</i>	American Bittern	E	2007
Bird	<i>Circus cyaneus</i>	Northern Harrier	T	1932
Bird	<i>Haliaeetus leucocephalus</i>	Bald Eagle	E*	2011
Dragonfly/Damselfly	<i>Enallagma laterale</i>	New England Bluet	Delisted	2002
Dragonfly/Damselfly	<i>Gomphus borealis</i>	Beaverpond Clubtail	Delisted	2002
Dragonfly/Damselfly	<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail	E	2008
Dragonfly/Damselfly	<i>Gomphus fraternus</i>	Midland Clubtail	E	2005
Dragonfly/Damselfly	<i>Gomphus vastus</i>	Cobra Clubtail	SC	2008
Dragonfly/Damselfly	<i>Gomphus ventricosus</i>	Skillet Clubtail	SC	2008
Dragonfly/Damselfly	<i>Neurocordulia yamaskanensis</i>	Stygian Shadowdragon	SC	2010
Dragonfly/Damselfly	<i>Rhionaeschna mutata</i>	Spatterdock Darner	SC	2002
Dragonfly/Damselfly	<i>Ophiogomphus asperses</i>	Brook Snaketail	SC	2007
Dragonfly/Damselfly	<i>Stylurus amnicola</i>	Riverine Clubtail	E	2010
Dragonfly/Damselfly	<i>Stylurus scudderi</i>	Zebra Clubtail	Delisted	2003
Dragonfly/Damselfly	<i>Stylurus spiniceps</i>	Arrow Clubtail	Delisted	2010
Fish	<i>Hybognathus regius</i>	Eastern Silvery Minnow	SC	1980
Mussel	<i>Alasmidonta heterodon</i>	Dwarf Wedgemussel	E**	1948
Mussel	<i>Alasmidonta undulata</i>	Triangle Floater	Delisted	2004
Mussel	<i>Lampsilis cariosa</i>	Yellow Lampmussel	E	1935
Mussel	<i>Strophitus undulatus</i>	Creeper	SC	1997
Reptile	<i>Glyptemys insculpta</i>	Wood Turtle	SC	2006
Amphibian	<i>Gyrinophilus porphyriticus</i>	Spring salamander	Delisted	1995

Source: Natural Heritage and Endangered Species Program, Mass. Department of Fish and Game, 2012. *Also listed on Federal Endangered Species List as Endangered. **Also listed on Federal Endangered Species list as Threatened.

E.3 Conserving Northfield’s Biodiversity

There are two concepts that can be used to help explain Northfield’s options for pursuing the conservation of the town’s biodiversity: Island Biogeography and landscape ecology.

The theory of Island Biogeography is based on observations that biodiversity is greater on large islands than on small ones, and greater on islands that are close to the mainland. The concept of islands surrounded by water has been applied to the idea of “islands” of protected open space surrounded by developed areas. Based on this theory, ecologists predict that increasing the size of a protected area increases its biodiversity (MacArthur and Wilson; 1967). Therefore, connecting two protected areas via a protected corridor to create one large area should also increase natural biodiversity (Wilson and Willis; 1975).

Another model for wildlife habitat protection aggregates similar land uses while allowing other uses in discrete areas (Forman; 1997). This model is reflected in Northfield's current land use patterns. In the northwest and in the east, are large areas of mostly contiguous forest that may be best managed as wildlife habitat, forest products, and water supply recharge areas. Housing is located at the edges of these forest areas though roads bisect them in areas. The best farmland in town is aggregated along the floodplains of the Connecticut River while most of the population is centered either in the villages or along roadway corridors.

Individual animals move within a landscape. When and where wildlife and fish species move is not well understood by wildlife biologists. However, we do know 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 browse or food. As the land within Northfield 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 conflicts between the needs of wildlife and residents will become more common.

In 2011 the Landscape Ecology Program at university of Massachusetts Amherst completed a comprehensive assessment of ecological integrity using a computer software program called Conservation Assessment and Prioritization System (CAPS). The results show large blocks of unfragmented habitat similar to those identified by the Natural Heritage and Endangered Species as crucial for supporting critical habitat. (See CAPS map at the end of this section.)

Many species of wildlife in Northfield 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.

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.

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. 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 proximity to each other. With this in mind, the protection of all habitat types is vital for maintaining and enhancing biodiversity in Northfield.

How will the Town of Northfield determine the most appropriate conservation strategies for wildlife habitat? There are three general paths to follow in conserving the health of wildlife populations. One is to protect the habitat of specific species that are rare, threatened, or

endangered. It is thought that other species will also benefit from this strategy. A second path is to conserve landscape-level resources such as contiguous forest or riparian areas. This helps to protect the habitats of a large number of species, but it might not meet the needs of all rare and endangered species. The third method is a combination of the first two. Maintaining the biodiversity of Northfield over the long term will likely require the protection of both unique habitats for specific species and networks of habitat across the landscape. Conservation strategies for the town to consider include monitoring of species locations, numbers, and movements; the protection of core habitat areas as identified by the NHESP BioMap2 (*see Core Habitat map at the end of this Section*); the continued protection and linkage of large blocks of contiguous forestland; the retention of early successional habitats like fields and grasslands; and the protection of vernal pools, wetlands, and riparian corridors that sustain the greatest diversity of life in Northfield.

F. SCENIC RESOURCES AND UNIQUE ENVIRONMENTS

The characteristics that allow a stranger to distinguish Northfield 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 Northfield residents would agree represent the essence of Northfield's character.

In many ways the history of Northfield--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 Northfield 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 location relative to other landscape features. The purpose of inventorying scenic resources and unique natural environments in Northfield is to provide a basis for setting resource protection priorities. To this end, this section includes information about the different values associated with each scenic resource and natural environment, and indicates areas where multiple values are represented in one landscape (*see Table 4-3*). Those landscapes that contain, for example, scenic, wildlife, and cultural values may be given higher priority for protection than a landscape that contains only one value.

These documented resources include historic landscapes and special places. This inventory is based on a formal survey done in 1992 for the Franklin County Rural Historic Landscape Preservation Plan Report. This document distinguishes between types of landscapes, identifies in general terms the locations of rural historic landscapes in each town, and provides examples of different preservation strategies. The methodology for identifying significant historical landscapes was based on National Park Service criteria including area of significance, period of significance and historical integrity. NPS classifies landscapes into four different categories: landscapes that reflect major patterns of a region's history (e.g. agricultural landscapes), landscapes that are associated with historically significant individuals (e.g. institutional grounds and buildings), landscapes that are important due to their design or physical characteristics (e.g.

an 18th century Colonial Period Connecticut Valley rural farm), and landscapes that yield or have the potential of yielding significant information on pre-history or history (e.g. a native American encampment site). (See *Scenic Resources and Unique Environments map at the end of this Section.*)

In 2007 the Trust for Public Land selected Northfield to conduct a conservation visioning process to identify and prioritize lands for conservation. With help from more than fifty residents at a public forum, the steering committee identified priority areas for conservation and nominated “special places” including landscapes and historic areas. Table 4-3 includes the results from that visioning process along with resources identified in the 2005 Open Space and Recreation Plan. (See *Conservation Priorities at the end of this section.*)

Table 4-3: Significant Scenic/Ecological/ Recreational/and Historic Landscapes/Environments in Northfield

Scenic Resources	Ecological/ Geological Resources	Recreational Value	Historical Value
<i>Stream Corridors</i>			
Connecticut River	Class B water quality designation; Priority Habitat; Estimated Habitat	Fishing and boating.	
Pauchaug Brook	Lower portion is part of Pauchaug Brook WMA; Core Habitat; Critical Natural Landscape	Fishing; Trout stocked annually	
Louisiana Brook	Public drinking water supply – Grandin Reservoir; Class A water quality; Outstanding Resource Water designation		
Mill Brook	Cascades	Fishing; Trout stocked annually	Site of colonial mills Indian encampments & salmon runs
Minot Brook			
Millers Brook	Priority Habitat; Estimated Habitat		
Roaring Brook	Sheep Falls; Salmon Falls	Fishing; Trout stocked annually	Site of former grist mill, pool for washing sheep before shearing, and Capt. Richard Beers battle with Indians
Merriam Brook			
Pine Meadow Brook	Priority Habitat; Estimated Habitat		
Fisher Brook			
Fourmile Brook		Fishing; Trout stocked annually	
Bottom Brook			
Mallory Brook			
East Wait Brook	Portions of brook included in Satan’s Kingdom WMA		

West Wait Brook	Portions of brook included in Satan's Kingdom WMA		
Bennett Brook	Lower portion is part of the Bennett Meadow WMA		
Jack's Brook			
Keyup Brook	Permanently protected as part of Northfield State Forest		Site of old mills and colonial settlement
<i>Ponds and Lakes</i>			
Wanamaker Lake	Waterfall at north end	Former ice skating and swimming pond	Ice harvesting
Sawyer Ponds	Priority Habitat; Estimated Habitat	The southern pond is listed as suitable for secondary contact recreation by Mass. DEP; Scenic view	
Lily Pond			
Streeter Pond		Scenic view	
Schell Pond	Part of large wetland area	Fishing; hiking; birding	Site of historic chateau
<i>Wetland Areas</i>			
Hell's Kitchen	Permanently protected as part of Satan's Kingdom Wildlife Management Area	Hiking; birding	
Mill Brook Swamp and Pond	Priority Habitat; Critical Natural Landscape	Scenic view; birding	Site of historic chateau
Pond and Swamp near Center Cemetery		Famous birding site	
Great Swamp & Keyup Brook	Permanently protected as part of Northfield State Forest. Core Habitat	Hiking; cross country skiing	Early settlement site
<i>Recreation Areas</i>			
Northfield Mountain Recreation Area		Hiking; Cross-country skiing; Mountain biking; Horseback riding; Recreational and Environmental programs	
Riverview Picnic Area		Picnicking and access to the Connecticut River	
Munn's Ferry Boat Camping Area		Camping area on the Connecticut River; Accessible by boat only	Historic Ferry Landing
Kidd's Island, Connecticut River	Major-River Floodplain Forest; High Terrace Floodplain Forest	Camping and picnicking; Accessible by boat only	Historic Recreational Landscape
Brush Mt. Conservation Area	Snake habitat, Condensation garden Wildlife habitat; Critical Natural Landscape	Trail head for New England National Scenic Trail Snowshoeing, X country skiing	Original homestead of Calvin Swan 1799-1865, abolitionist, sawmill owner
Northfield Town Forest	Potential vernal pool Wildlife habitat; Critical Natural Landscape	Hiking, Cross country skiing, snowshoeing	Historic Recreational Landscape
Northfield State Forest	Level Bog located in eastern Northfield section	Hiking; fishing; seasonal hunting; cross-country skiing; snowmobiling	Historic Recreation/Conservation Landscape; Cellar holes

Warwick State Forest (1.5 Acres in southeastern Northfield)	Wildlife Habitat		Historic Recreation/Conservation Landscape
Bennett Meadow Wildlife Management Area	Wildlife Habitat	Wildlife viewing; seasonal hunting; stocked with pheasant	Early settlements; Indian remains
Pauchaug Brook Wildlife Management Area	Major-River Floodplain Forest	Wildlife viewing; seasonal hunting	Indian camps during French & Indian War; Indian corn fields
Pauchaug Brook Public Access Boat Ramp		Access to Connecticut River	Indian encampments
Satan's Kingdom Wildlife Management Area		Hiking; wildlife viewing; seasonal hunting	
Metacomet-Monadnock Trail (New England National Scenic Trail)		Long distance hiking; Scenic views; Nature study	
Crag Mountain & Trail	“rouche moutanee” Glacially carved ridge	Hiking; Scenic views; Picnics	Lookout Post
Hobo Waterfall Formerly Cascades	Unusual rock formations	Hiking trail from Old Wendell Road	Site of ice cutting (above falls)
King Phillip’s Hill	Geologic interest	Hiking; Picnicking	Site of King Phillip’s lookout during French & Indian War
Minot Brook Trail		Hiking; nature study	
Strowbridge Hill Area		Hiking; cross-country skiing; snowmobiling	
Schell Nature Trail	Significant birding site	Hiking; nature study cross-country skiing; snow shoeing; birding	Early settlement
Camp Northfield and Northfield campus of Northfield Mount Hermon School		Church-sponsored religious camp	Historic Recreational Landscape
Northfield Elementary School Grounds		Playground; baseball field; soccer field; basketball court	
Kiwanis Park		Picnicking; hiking; pavilion	
West Northfield Park		General playground; sports field; picnic area; pavilion	
Northfield Golf Course		Nine hole course open for semi-public operation; cross-country skiing	Historic course
Northfield Connector of Franklin County Bikeway		Bikeway consisting of shared roadway with links to Northfield Mountain Recreation Center, down- town Northfield and NMH	
<i>Historical Agricultural Landscapes</i>			
Along Routes 63 and 10			Historic Agricultural Landscape
Along Route 142, West Northfield Area			Historic Agricultural Landscape

Caldwell Road			Historic Agricultural Landscape
East Northfield Road			Historic Agricultural Landscape
Great Meadow Road			Historic Agricultural Landscape
Coller Cemetery area			Historic settlement area
South Mountain Road			Historic Agricultural Landscape
Old Wendell Road near Erving line			Historic Agricultural Landscape
Pine Meadow Road			Historic Agricultural Landscape
River Road			Historic Agricultural Landscape
Upper Northfield Farms Road			Historic Agricultural Landscape
Along Connecticut River			Historic Agricultural Landscape
Cow Plain, between Pine Meadow Road and Millers Falls Road			Believed to have been used as an agricultural site by Native Americans.
Historical Burial Grounds			
Graves of Dwight L. Moody and Emma G.R. Moody			High
South Mountain Cemetery			High
Center Cemetery (Mood Cemetery)			High
Coller Cemetery			High
Northfield Farms Cemetery			High
St. Mary's Cemetery			High
Burial Place, Captain Beers			High
Historical Community Development/ Conservation/ Science/ Industrial Landscape			
Main Street National Historic District		Walking; Franklin County Bikeway	Historic Community Landscape; National Register of Historic Places (Approx. two miles in length, the District contains 148 historically significant properties and structures.)
King Philips Hill		Scenic views Hiking; Birding	Historic Community Development Landscape; National Register of Historic Places

<i>Historical Transportation Landscape</i>			
Schell Bridge		Potential pedestrian crossing Connecticut River	Historic Transportation Landscape; Rare design
East Northfield Road Railroad Bridge			
Central Vernon Railroad Bridge			
Route 63 Bridge			
Birnam Road Bridge			
<i>Other Historical Sites</i>			
Simeon Alexander House			National Register of Historic Places
Northfield District Schoolhouse #2			National Register of Historic Places
Pratt Hollow			
Indian Council Fires off Rt. 63 in junkyard			Historic Indian Site
<i>Unusual Geologic Features</i>			
Ice House Cave	Yes		
Rattlesnake Den	Yes		
Garnet Rock	Yes		
<i>Scenic Views</i>			
Pauchaug Brook and Wanamaker Lake			
Crag Mountain		On the New England National Scenic Trail	Views of western Mass
Mill Brook at confluence with Connecticut River		Wildlife	River views
Northfield mountain ridges from east on Rt. 10			
Gulf Rd. driving north			
Hogback Mountain		Hiking; Views; wildlife	
Notch Mountain		Hiking; Views: wildlife	
St. Mary's Road to East St.			
East Road to St. Mary's Road			
<i>Scenic Roads</i>			
Rt. 63 - Connecticut River Scenic Farm Byway		State designated Scenic Byway; Scenic viewsheds	
Vernon Road			
Warwick Road			

Pine Meadow Road			
Fourmile Brook Road			
So. Mountain Road			
Old Wendell Road			
Gulf Road			
Rt. 142			

Source: Franklin County Rural Landscape Preservation Plan Report, Franklin County Commission, 1992; Town of Northfield Community Development Plan, 2003; NHESP, Correspondence, 2004, 2012; Trust for Public Land, Conservation Vision, 2008.

G. ENVIRONMENTAL PROBLEMS

One of the values of an open space and recreation planning process is that there is an opportunity to explore the perceptions and experiences residents have regarding their environment. Environment can be defined to include all of the areas of town that people know and come into contact with; special places held in high regard; and, the general construct or idea of the environment, and all that that contains, including the air, water, soil, vegetation, and plants and animals, as well as the quality of those resources and the values associated with them.

Northfield Open Space Planning Committee members identified four main types of environmental problems in town: Need for reinforcement of existing regulations through education; Negative impacts of development in the town and region; Need for protection of the community drinking water supplies in town; and, Erosion along the Connecticut River.

G.1 Need for Reinforcement of Existing Regulations Through Education

G.1.1 Illegal Use of Off-Road-Vehicles

Northfield residents are concerned about the impacts on the environment and on their quality of life caused by people not following regulations intended to maintain trails, parks, rivers and recreational facilities. For example, the Massachusetts Department of Conservation and Recreation regulates Motorized Off-Road Vehicle (ORV) use, permitting them within eight State Forest management areas, none of which are found in Franklin County. Unfortunately, residents report that All-Terrain-Vehicles (ATVs) have been observed on trails within the Northfield State Forest, in the large forested tract east of Birnam Road, and in the Town Forest. ATVs are known to cause damage to trails and rare species habitats and the noise associated with their engines reduces the sense of quiet that residents have come to appreciate about Northfield. The Connecticut River boat launch is another area that is misused with people driving their vehicles onto the beach.

G.1.2 Unregistered Vehicles and illegal storage of vehicles

For both residents and visitors, the presence of litter and trash in and around town reflects poorly on Northfield. In addition, abandoned cars can present an eyesore. The town needs to better

enforce its existing regulations that deal with unregistered vehicles and with Zoning Board of Appeals conditions to permits.

The solution to all of these problems lies not in further regulation but in education. The first step may be to foster a general awareness of the problems of trail misuse and noise pollution associated with illegal motorized vehicle use. A concerted educational outreach effort by the Select Board, the Open Space Committee, and the Zoning Board of Appeals could produce a consistent message for residents and visitors regarding the proper use of open space and recreational resources. By raising residents' knowledge of the issues, more people could be on the watch for illegal or inappropriate behavior, and could then report any problems to the Environmental Police or other authorities.

G. 1.3 Illegal littering and dumping

Littering continues to be a problem along main thoroughfares as well as illegal dumping in secluded areas despite efforts by the Board of Health to hold bulky waste collection. The Town of Northfield is on record supporting the Massachusetts legislature effort to expand the bottle bill to include water bottles and waxed drink boxes. Locally, groups sponsor annual cleanup efforts but more public outreach and enforcement of litter laws is needed to change behavior.

G.2 Negative Impacts of Development in the Town and Region

There are several impacts of development in town and in the region that are considered by many residents to be a central reason for any open space planning process: habitat fragmentation, increases in traffic on the highways in town by trucks and passenger vehicles; and the lost use of prime farmland soils.

G.2.1 Northfield's Forested Wildlife Habitats are Vulnerable to Development

Northfield's Open Space and Recreation Plan identifies eight Core Habitat areas and large blocks of forest that contain rare species habitats and that are unprotected from development. Approval-not-required lots, or those that are developed with frontage on existing public ways, represents the dominant pattern of development in Northfield today, especially along West Road, South Mountain Road and Old Wendell Road. Although this form of development tends to widen the influence of road corridors, the fragmentation quality of this linear pattern of home construction is much less than subdivisions, which are being developed in towns to the south and the east. To reduce the future impact of subdivisions, the town could amend their zoning bylaw to increase incentives for use of their cluster development measure; participate in local and regional land conservation efforts; and, educate landowners about their land preservation and estate planning options.

G.2.2 Traffic Issues on Routes 63, 10, and 142

Routes 63, 10, and 142 carry large truck and passenger vehicle traffic north and south. People traveling to southern New Hampshire from eastern Franklin County invariably travel through Northfield. Were these roads on the fringe of town, their impacts would not require as much

attention. However, these roads bisect the community and represent significant linkages for residents to and from different portions of town. Route 63/10 is Northfield's Main Street. Although the noise pollution accompanying the traffic may not be easily rectified except through perhaps tree and shrub plantings within the district, the speed at which the vehicles move through the center of town could be addressed through traffic control mechanisms similar in style to those applied in downtown Greenfield. There, bricks and tree plantings jut in towards the main thoroughfare resulting in vehicles creeping over pedestrian crossways. A recent Main Street sidewalk project included tree plantings and the delineation of parking places at the center of town. Signs forbidding trucks to use "compression release" engine brakes would significantly reduce noise.

G.2.3 Northfield's High Quality Farmland Soils Are Vulnerable to Development

Prime farmland soils yield more food and feed crops per acre with less inputs resulting in less damage to the environment than other soils. These prime soils are located mostly along the Connecticut River in Northfield. Once these soils are developed, they might provide for productive back yard gardens at best. Typically, farms and farmland are viewed as a feature of a town's landscape valued for their scenic and economic contributions to the community. What is often missing from that assessment may prove over time to be the most critical: the land's capacity to grow food. The Town of Northfield contains some of the best food producing soils in the world. As these soils become developed, that capacity is lost, as is a part of the town's and the region's food producing self-reliance. The town may want to consider all of the ways it could help to conserve these soils over time: support of farm businesses, use the town's right-of-first refusal with Chapter 61A farmlands, set aside match funds each year to help attract APR funds for farmers that want to protect their land, etc.

G.3 Protection of Drinking Water Supplies Against Contamination

Northfield's drinking water supplies are vulnerable to contamination. Grandin Reservoir can be accessed via one road and several ATV trails. It is unknown at this time what types of regulations are imposed on traffic on these roads. The Northfield Water District's groundwater supply is perhaps even more vulnerable to contamination because the potential sources of pollution include impacts of everyday activities: lawn fertilizers, fungicides, and other pesticides, septic problems, motor oil and hydraulic fluid spills, etc. Because the well and its recharge area are located within the eastern part of Northfield Center, farmland, a road, and residences are found within the Zone I wellhead protection area, an eleven-acre circle of land designed to protect a source from contamination. Again, the solution to this problem may be education directed in a focused way to all of the residents located in the Zone I and II, as well as others in Northfield Center. Buried railroad ties east of Rt. 142 might contaminate the extensive aquifer beneath them. There is also concern that the mineral, gravel & sand removal in W. Northfield is removing the soil and rock filter for groundwater supplies in general.

G.4 Environmental Challenges

G.4.1 Erosion on the Connecticut River

The following technical description was developed by the Natural Resources Program of the Franklin Regional Council of Governments Planning Department for the Final Project Report for the Connecticut River Watershed Restoration Phase II.

The Northfield Mountain Pumped Storage Project, completed in 1970, is located about five miles upstream of the Turners Falls dam. The concept behind the Pumped Storage Project is simple. This facility only provides power when it is needed; for example, during periods of peak demand. Water is pumped from the lower reservoir (the Connecticut River) to the upper reservoir (elevation 1,000 feet) that is located atop Northfield Mountain. The 300-acre upper reservoir holds 5.5 billion gallons of water. During periods of peak demand, water is released to the lower reservoir via the turbines to generate electricity. The power generating/pumping facility is located completely underground and consists of four 250 thousand kilowatt reversible pump turbines. Each of these turbines can pump a maximum of 22,500 gallons per second of river water up to the upper reservoir. To generate electricity, each turbine can discharge water from the upper reservoir back to the river at a maximum rate of 33,700 gallons per second.

During the construction of the Pumped Storage Project, the dam at Turners Falls was raised to accommodate a power generating facility to elevation 185.5 feet. A 2,500-acre lower reservoir, known as the Turners Falls Power Pool, was created behind the dam. The Turners Falls Power Pool is a 22-mile long reach of the Connecticut River between the Turners Falls Dam and the Vernon Dam in Vernon, Vermont. The hydrodynamics of the Turners Falls Power Pool are primarily controlled by the three hydroelectric generating facilities: Turners Falls, Vernon, and the Northfield Mountain Pumped Storage Project. The joint operations of the Turners Falls facility and the Northfield Mountain Pumped Storage Project have resulted in larger and faster pool fluctuations, which have significantly changed the daily regime of this reach of the Connecticut River. Typical pool fluctuations average 3.5 feet per day. Much higher pool fluctuations, on the order of 9-10.5 feet, may occur over the course of the weekly pump/release cycle.

The banks of non-cohesive, alluvial sand and silt, which dominate the Turners Falls Power Pool section of the Connecticut River, typically exceed twenty (20) feet in height. Erosive forces have destabilized many sections of bank resulting in slumping and mass wasting of large sections of bank and the loss of trees and other riparian vegetation on the top of the banks. Over the years, several studies have been undertaken to inventory and assess erosion sites, identify the possible causes of the erosion, and propose various bank stabilization techniques for the Turners Falls Power Pool. In 1979, the Army Corps of Engineers (ACOE) issued a "Report on: Connecticut River Streambank Erosion Study, Massachusetts, New Hampshire and Vermont." This document presented the results of a detailed study of the numerous variables that contribute to bank erosion in the 141-mile reach of the river from Turners Falls Dam to the headwaters of the Wilder Hydro Pool in Haverhill, New Hampshire and Wells River, Vermont. One of the six index sites evaluated by the ACOE was located in the Turners Falls Power Pool approximately eight miles upstream of the Turners Falls Dam.

The ACOE's analysis found that the natural shear stress exerted on a bank by flowing water can be increased by as much as 60 percent by such factors as flood stage variations, pool fluctuations, boat and wind waves, gravitational forces, etc. Further, they reported that causes of bank erosion, in descending order of importance were: shear stress (velocity), pool fluctuations, boat waves, gravitational forces, seepage forces, natural stage variations, wind waves, ice, flood variations, and freeze-thaw cycles. In July 1991, the ACOE released the results of a follow-up study on the erosion in the Turners Falls Power Pool. This study concluded that bank erosion in the Power Pool had increased almost threefold since the 1979 study and approximately one-third of the bank in the Power Pool was actively eroding.

In the spring of 1994, the Franklin County Commission (now the Franklin Regional Council of Governments) convened the stakeholders to encourage a cooperative approach to assessing and mitigating the erosion in the Turners Falls Power Pool. The Connecticut River Streambank Erosion Committee (CRSEC) was formed and its membership is comprised of local officials, state and federal agencies, non-profit environmental groups, landowners, and utility representatives. This time, the stakeholders reached consensus and the utility prepared a Draft Environmental Impact Report that described a bank project that would stabilize several thousand feet of eroding riverbank using bioengineering techniques. The necessary environmental permits were secured and the utility committed \$1.2 million over six years toward what would be called Phase I of the bank stabilization work.

The Franklin Regional Council of Governments (FRCOG) was awarded \$142,000 from the Massachusetts Department of Environmental Protection's s.319 Non-point Source Competitive Grant Program in order to monitor, document and report on three of the sites to be restored under Phase I, to staff the CRSEC, and to provide partial funding for construction of one of the sites. The purpose of Phase I was to demonstrate the feasibility and effectiveness of using various bioengineering techniques, an innovative, "soft" alternative to rip-rap, gabions, and other traditional "hard" engineering solutions. Bioengineering techniques incorporate woody and/or herbaceous plants and plant materials to construct a living system of bank protection. Using bioengineering to stabilize eroding banks has many advantages when compared to traditional armored bank treatments, including: the restoration and enhancement of wildlife habitat, the restoration of aesthetic resource values and the compatibility of the treatment with on-site environmental resources. The use of vegetation to stabilize banks also provides a buffer that can reduce the pollutant and sediment loading associated with overland runoff and flood flows. The June 1999 report prepared by the Franklin Regional Council of Governments for the s.319 grant describes the work completed at three Phase I sites. A total of 2,250 linear feet of eroding riverbank were stabilized.

Following the completion of work at the three sites monitored under the s.319 grant, the CRSEC and Northeast Utilities (NU), now GDF Suez/FirstLight Power, continued their bank stabilization work. Two additional sites, approximately 3,180 linear feet in total length, were stabilized between 1998 and 2000 using bioengineering techniques. In April 2000, the FRCOG was awarded a second s.319 grant for Phase II of the Connecticut River bioengineering restoration work. This project, like the Phase I project, was a cooperative effort between the Franklin Regional Council of Governments, the members of the FRCOG's Connecticut River

Streambank Erosion Committee, and FirstLight Power. The project used four bank treatment plans and differed significantly from Phase I work. In the fall of 2009 Phase III was initiated using new biodiversity techniques. Phase III was funded by a targeted watershed grant from Department of Environmental Protection and funds provided by FirstLight Power.

The remaining issue regarding erosion along the banks of the Turners Falls Power Pool is that erosion is occurring at a faster rate than the completion of the river bank bioengineering restoration work. The full restorative work, paid for by FirstLight Power, takes time to do correctly. There have been some discussions as to the best strategies for stemming the erosion by faster, less expensive means in advance of the full bioengineering method.

G.4.2 Chronic Flooding and Sedimentation

The Connecticut River running through Northfield is largely a controlled basin (Turners Falls Pool) used to provide a reservoir of water for energy production at the Northfield Energy Pump Station. In this sense it is not functioning as a natural body of water. The water levels rise and fall depending on the water usage at the Pump Station. This has some negative environmental effects on wildlife and is often a deterrent to recreational use of the river as well but is a situation managed and determined by the utility company, FirstLight Power Resources. The most heavily used recreational boat launch is Pauchaug State Boat Ramp on the northeast end of town and sedimentation is a problem there requiring fairly frequent dredging.

Streambank erosion along the Connecticut River is a chronic concern for landowners and farmers, however. The huge ongoing extraction and rapid replacement of water needed for power generation does lead to erosion. This problem is being addressed in a dialogue with the utility company and the Federal Energy Regulatory Commission under the aegis of the Connecticut River Streambank Erosion Committee.

Since the 1936 and 1938 floods along the Connecticut River a system of upriver dams and catch basins has largely succeeded in controlling the most serious natural floods but the flood plains in the area are occasionally impacted by seasonal flooding episodes and building is regulated in those areas. The flood plains constitute rich agricultural fields which are being actively farmed in some cases and it is the goal of the OSRP to maintain as preserve this land for cultivation whenever possible through use of Agricultural Preservation Restrictions (APR's).

Four Mile Brook Road parallels Four Mile Brook and has been a concern for Mass DEP and the town of Northfield for some time as a possible cause of sediment run off into the river. Grant funds were acquired to do a thorough study of the road and its impact on the brook. Best Management Practices (BMP's) were used in the implementation of a recent road improvement project along Four Mile Brook Road installing adequate roadway/slope storm water management for erosion and sediment control.

G.4.3 Hazardous Waste Sites and Landfills

Aquifers lining both eastern and western shores of the Connecticut River contain significant fresh water resources and require vigilant environmental protection. The town does not own its own drinking water resources and relies on informed and responsible private management of a

town well and the Grandin Reservoir. Ground and surface water protection and oversight are, therefore, stated priorities of the OSRP.

Currently, there are two “open” hazardous waste sites listed by Mass Department of Environmental Protection (DEP). Both are former gas stations on the Main Street in town, S&W Texaco (190 Main St) and Rice Oil (24Main St) where there was seeping/dumping of oil and gas.

There are several “closed with use limitation” hazardous waste sites in the DEP list, including one related to the sand and gravel mining being done in West Northfield and one involving discarded creosote soaked railway ties. This latter site is now closed as per the following notice: Mitchell Aggregate LLC Rail Road Tie Disposal Site, Mt. Hermon Station Road. The DEP conducted an audit of this site on August 18, 2011. There were no violations noted in relation to the Activity and Use Limitation (AUL) and no further action was required for compliance. Legal Counsel was consulted recently and advised that this notification to Mitchell constituted a determination that the site is in compliance with state requirements and is no longer an environmental risk.

The DEP Bureau of Waste Prevention, Solid Waste Program does not list any other Active Landfills in Northfield (see Facility Master File, June 2012).

G.4.4 Forestry Issues

Public Lands

There is a substantial amount of public forest land in Northfield, including parcels in the eastern region of town in the Bald Hills Region, and in the northwestern part of town called Satans Kingdom. Most of the State Forest in Northfield has been zoned as woodlands, meaning that timber-harvesting activities can be conducted on these properties. Although harvesting is possible, the state conducts very little harvesting at this time due to political pressures and a lack of staffing. Over time, the quality of forest products on these lands will degrade without good stewardship, and conducting management activities to produce forest products will become more difficult.

Private Lands

It can be difficult for a private landowner to justify maintaining ownership of forestland due to increasing costs of owning land. Maintaining roads and boundaries, keeping up-to-date management plans, and paying property taxes can create a situation where landowners may consider options such as selling or developing their land. Chapter 61 and the Forest Stewardship Program can help to alleviate some of these issues by reducing property taxes and sometimes providing cost-sharing funds for property improvement and maintenance. By providing incentives to landowners, more private forest lands will be maintained as such, helping to protect the open space that gives Northfield its rural character.

Another issue is a lack of local markets for forest products. More and more, timber that is harvested in this region is put on trucks and hauled to Canada to be milled into lumber. This is due to the fact that there are fewer local mills in the area. The lack of markets causes wood

products to return less revenue to the landowner. This can result in landowners deciding not to harvest timber, and eventually may cause landowners to sell their land.

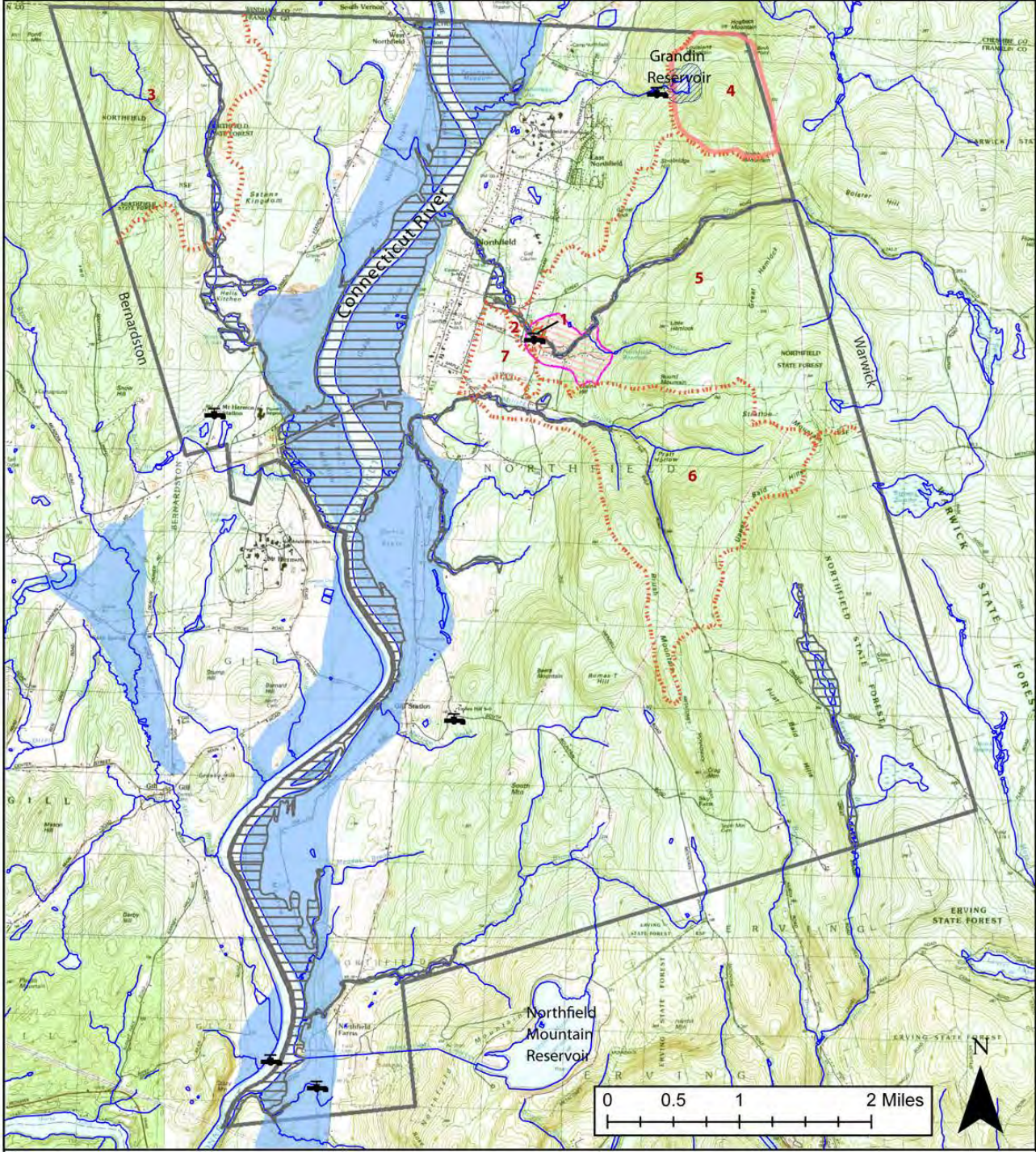
G.4.5 Environmental Equity

Since Northfield currently has no public parks the main public recreation facilities in the town are the trails and town forest. These are in rural areas and thus roughly equally accessible to all residents - a means of transportation, usually car, is needed to access these resources.

Envisioned in this OSRP is the creation of a comprehensive community park; this would likely be located near the town center (village) and thus quite convenient for about half of the town's population, comprising all economic groups.

Though Northfield has extensive frontage on both sides of the Connecticut River, there currently are no riverbank trails. There is considerable interest in developing such trails, and should that happen these would be convenient for almost all residents of the town.

Town of Northfield | WATER RESOURCES



Legend

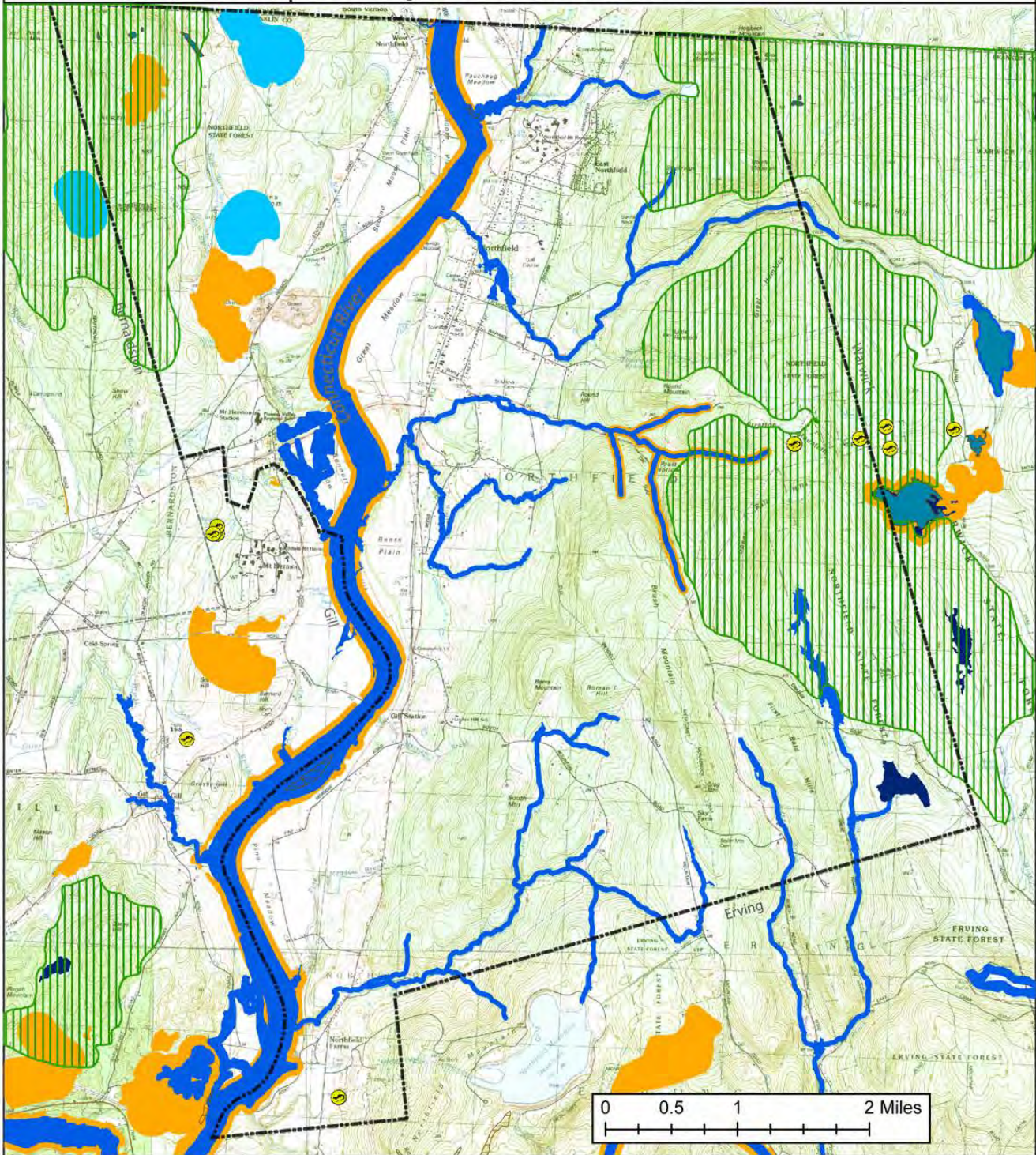
-  Streams and Water Bodies
-  Medium Yield Aquifer
-  100 Year Floodplain
-  Approved Zone II Water Supply Area
-  Water Supply Protection Districts
-  1 Water Supply Zone Number
-  Public Water Supply Source
-  "Zone C" Surface Water Protection Area

Data Sources

Map produced by the North Quabbin Regional Landscape Partnership, in collaboration with the Northfield Open Space Committee. Data obtained primarily through MassGIS and the Town of Northfield.

Map Produced - November 2012

Town of Northfield | "BioMap 2": Core Habitat



"BioMap 2" Core Habitat Components

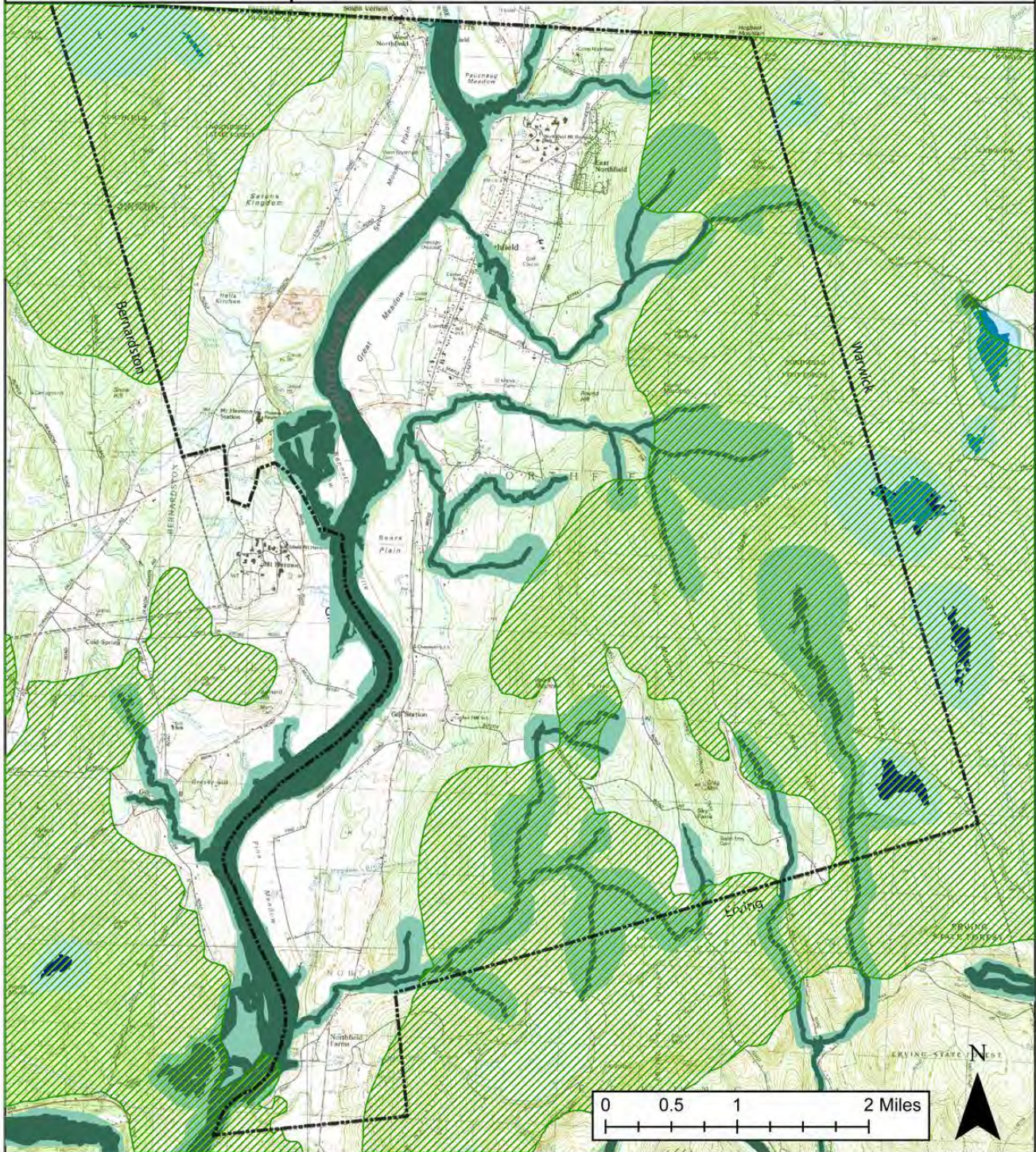
- Aquatic Core
- Vernal Pool Core
- Wetland Areas
- Forest Core
- Species of Conservation Concern
- S NHESP Certified Vernal Pools

Data Sources

Map produced by the North Quabbin Regional Landscape Partnership, in collaboration with the Northfield Open Space Committee. BioMap2 is a product of the Mass. Dept. of Fish & Game and the Natural Heritage Endangered Species Program (data last updated Nov. 2010).

Map Produced - November 2012

Town of Northfield | "BioMap 2": Critical Natural Landscapes



"BioMap 2" Critical Natural Landscape Components

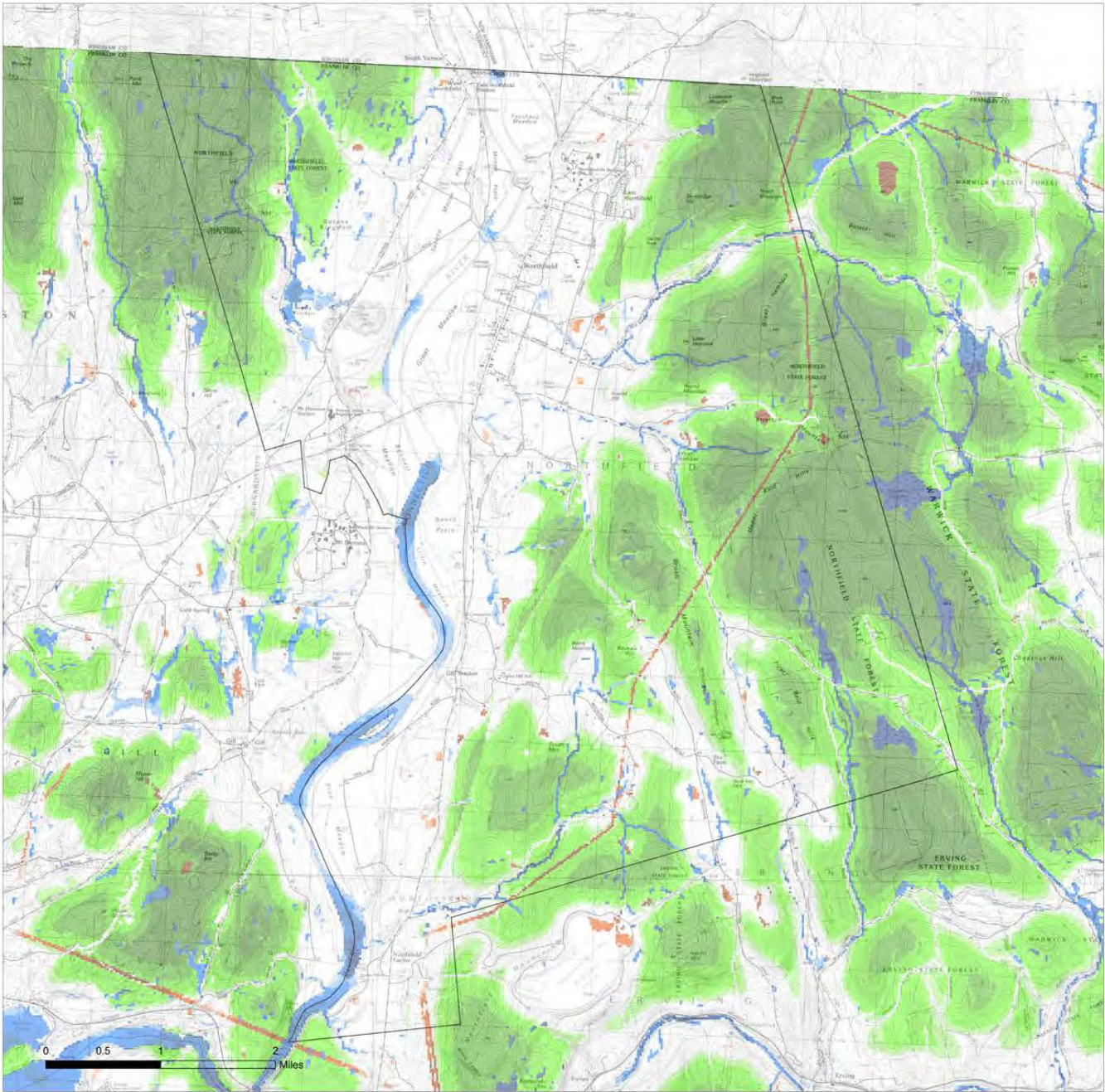
- Aquatic Core
 - Upland Buffers of Aquatic Core
 - Wetland Core
 - Upland Buffers of Wetlands Core
 - Landscape Blocks (high quality intact and predominately natural vegetation)
- Critical Natural Landscape identifies large landscape areas that are better able to support ecological processes, disturbances, and wide-ranging species. Critical Natural Landscape and Core Habitat overlap in many areas.*

Data Sources

Map produced by the North Quabbin Regional Landscape Partnership, in collaboration with the Northfield Open Space Committee. BioMap2 is a product of the Mass. Dept. of Fish & Game and the Natural Heritage Endangered Species Program (data last updated Nov. 2010).

Map Produced - November 2012

CAPS Index of Ecological Integrity (IEI) Town of NORTHFIELD, MA



Updated November 2011

IEI, Index of Ecological Integrity
Top 50% of the Landscape

	Forests
	Shrublands
	Coastal Upland
	Freshwater Wetland & Aquatic
	Coastal Wetland & Aquatic

50-60 60-70 70-80 80-90 90-100% IEI

**UMass
Extension**
CENTER FOR AGRICULTURE

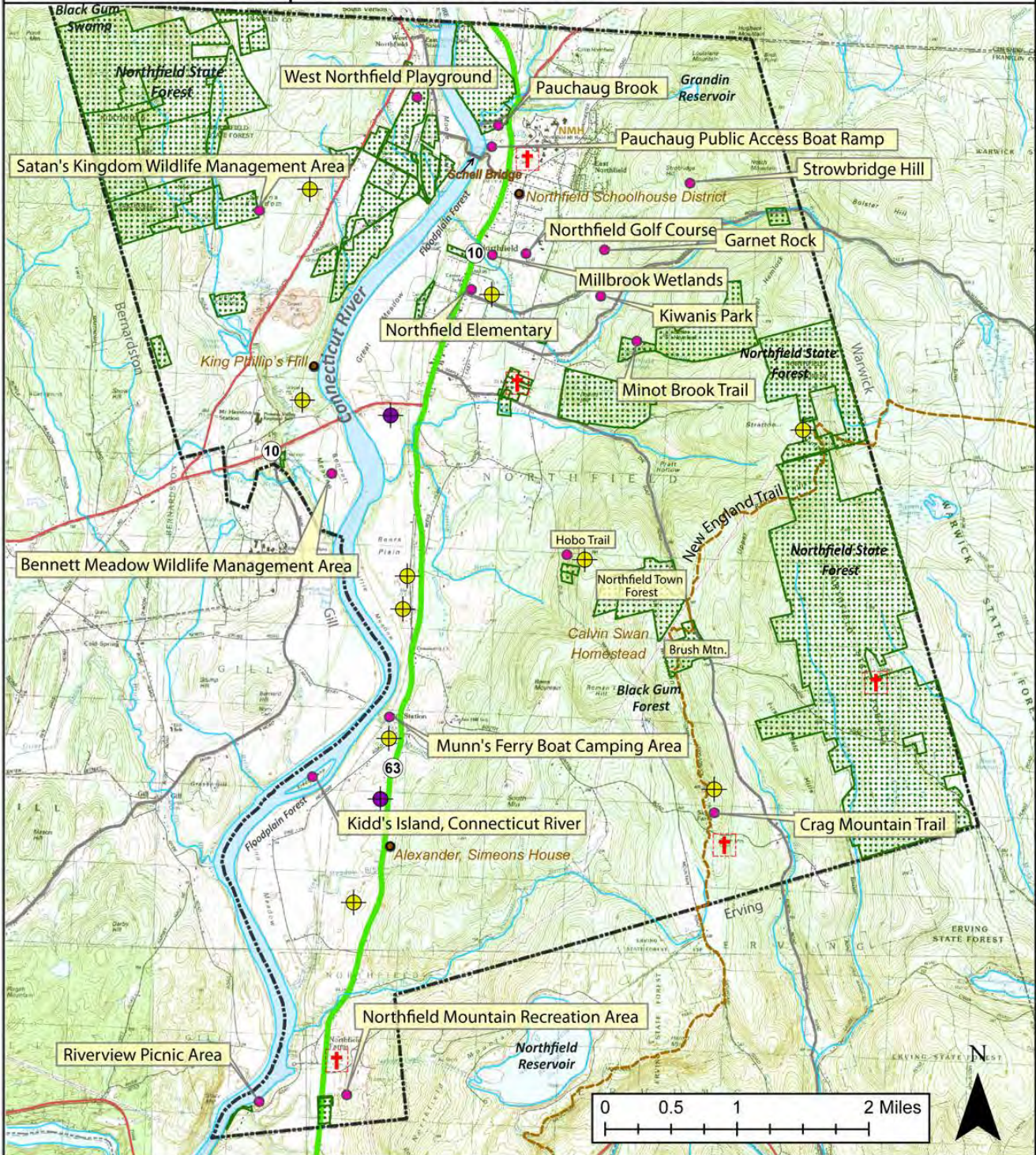
The IEI, or Index of Ecological Integrity, delineates the relative wildlife habitat and biodiversity value of any point on the landscape based on landscape ecology principles and expert opinion. The IEI is calculated by the Conservation Assessment and Prioritization System (CAPS) computer program developed at the University of Massachusetts, Amherst. Depicted on this map are those areas representing 50% of the landscape with the highest IEI values; the darker the color the higher the integrity value. For more information see: <http://www.masscaps.org>.

Coastal beaches and rocky intertidal shores are included as Coastal Wetland and Aquatic.

These maps were funded by grants from The Nature Conservancy and the Federal Highway Administration via a grant administered by the Massachusetts Department of Transportation, the Massachusetts Department of Environmental Protection and the U.S. Environmental Protection Agency under section 104 (b) (3) of the U.S. Clean Water Act. Data sources include the Office of Geographic and Environmental Information (MassGIS).

Prepared in cooperation with the Massachusetts Department of Transportation Office of Transportation Planning, and the United States Department of Transportation, Federal Highway Administration. The contents of this report reflect the views of the author(s), who is (are) responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the Massachusetts Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

Town of Northfield | SCENIC RESOURCES + UNIQUE ENVIRONMENTS



Legend

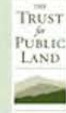
- Recreational Resources
- State Designated Scenic Byway
- Scenic Byway Viewsheds
- ⊙ Locally Identified Scenic Viewsheds
- National Register of Historic Places
- † Historical Burial Grounds
- New England Trail (M+M)

Data Sources

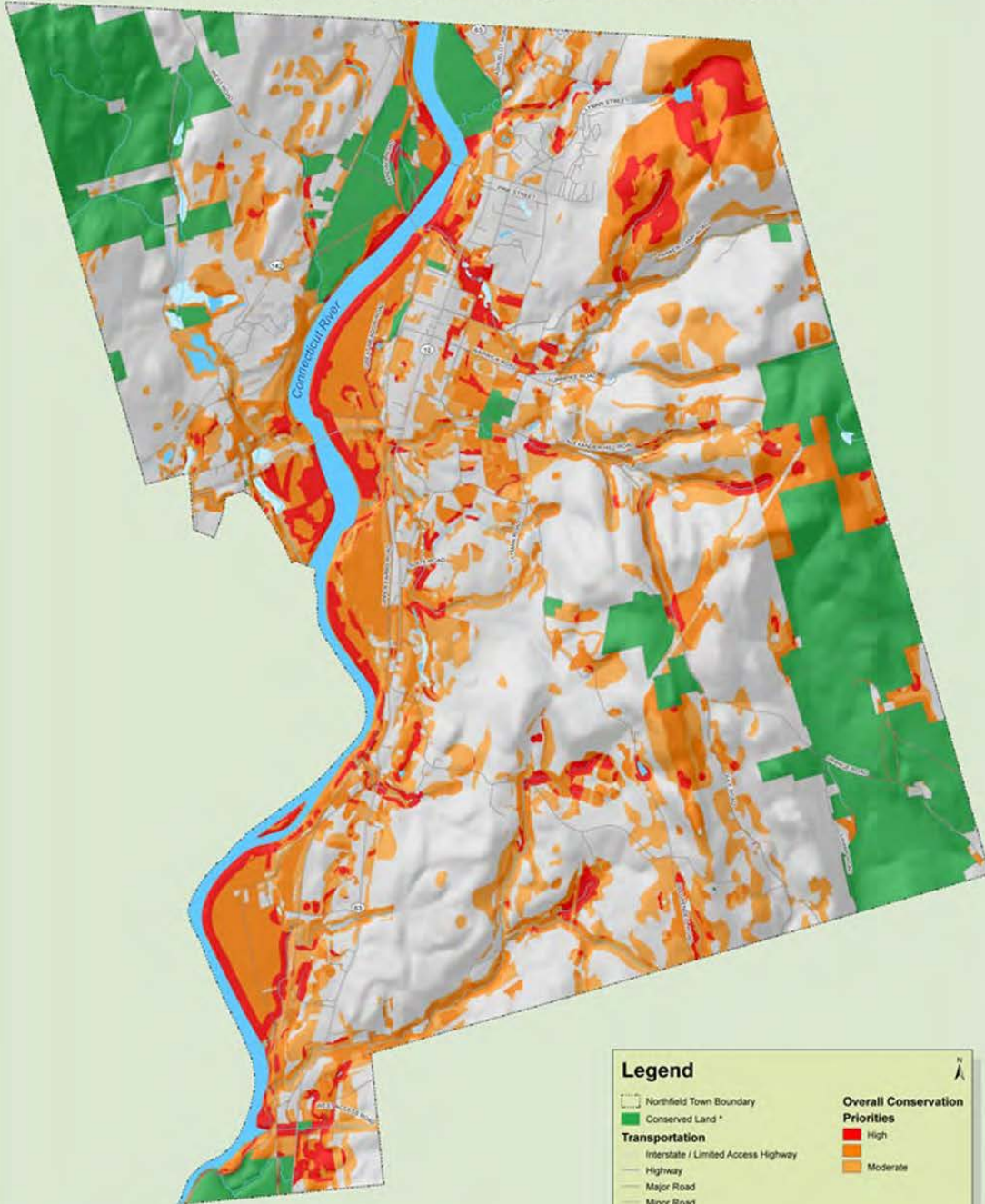
Map produced by the North Quabbin Regional Landscape Partnership, in collaboration with the Northfield Open Space Committee. Datalayers obtained primarily through MassGIS.

November 2012

Northfield, Massachusetts Greenprint Overall Conservation Priorities



This map shows the results from the Northfield, Massachusetts Greenprint overall conservation priorities model. Areas in red have a high conservation priority, while areas in orange have a moderate conservation priority.



Legend

- Northfield Town Boundary
- Conserved Land *
- Transportation**
 - Interstate / Limited Access Highway
 - Highway
 - Major Road
 - Minor Road
 - Railroad
- Hydrology**
 - Waterbodies
 - Marsh
 - Stream
 - Intermittent Stream
- Overall Conservation Priorities**
 - High
 - Moderate

0 0.25 0.5 1 mile

Special Thanks to the following data providers:
MassGIS and Franklin Regional Council of Governments
Map created by The Trust for Public Land
and updated 7/2016
Created in ArcGIS 9.2.6
Map Projection: NAD 1983 State
Plane Massachusetts Albers (EPS:3201)
TFL, The Trust for Public Land, and The Trust for Public Land
logos are trademarks of The Trust for Public Land.
Copyright © 2002 The Trust for Public Land
www.tfl.org
Information on this map is provided for purposes of
discussion and visualization only.

Protect Farm Land	24%
Protect Historic and Rural Character	19%
Protect Habitat	17%
Protect Water Quality and Quantity	15%
Nominated Sites	13%
Protect Recreation Areas	12%

* Conserved Land data obtained from FRCOG and MASSGIS Open Space layer includes both public land and conservation restrictions on private land.

SECTION 5

INVENTORY OF LANDS OF CONSERVATION AND RECREATION INTEREST

Open space in the Town of Northfield consists of farms, forests, park, and recreation areas under both public and private ownership and management. This section provides a summary of all lands that provide open space, wildlife habitat, agricultural and forest products, watershed protection, scenic landscapes and recreational opportunities that have some level of protection from development.

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, 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 “protected”, it is intended to remain undeveloped in perpetuity. This level of protection is ensured in one of two ways: ownership by a state conservation agency, a not-for-profit conservation land trust, or the local Conservation Commission, or attachment of a conservation restriction or similar legal mechanism to the deed.

Land is considered “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.

A conservation restriction 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. The APR program purchases the development rights and attaches a restriction to the deed, which legally bars development, keeping land "permanently" available for agriculture.

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 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 Northfield.

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 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 Select Board or at 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.

Parcels enrolled in Massachusetts Chapter 61 tax abatement programs are considered "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.

Since Northfield published the 2005 Open Space and Recreation Plan, the Open Space Committee has led the efforts to increase acres both in permanently protected open space and those acres with limited protection. With the help of Mount Grace Land Conservation Trust, we have supported four additional Conservation Restrictions. With the help of Franklin Land Trust, the town now has three additional farms protected with Agricultural Preservation Restrictions; one more APR is almost completed. The amount of land in Chapter 61 programs has increased from 3,272 acres to 4,848 acres. Although the percentage of protected land is small, residents of Northfield are now much more aware of the importance of protected open space and of the various ways to preserve open space. (See Protected Land and Chapter 61 Land at the end of this section.)

Summary of Open Space

Approximately 41.1 percent of the total land area in Northfield is comprised of open space with some level of protection from development. The total land area of the town is 22,633.62 acres. The portion of the total land area 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,” limited, and temporary.

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

PRIVATELY OWNED OPEN SPACE	Acres	% Of Total Land Area in Northfield
Farmland		
<i>Protected by Agricultural Preservation Restriction</i>	430.68	1.9%
<i>Temporarily Protected Farmland under Ch. 61A</i>	2098.47	9.1%
Forestland		
<i>Protected by Conservation Restriction</i>	385.85	1.75%
<i>Temporarily Protected Forestland</i>		
Chapter 61	2489.41	11.0%
Chapter 61B	262.31	1.2%
Louisiana Brook Watershed Land with Limited Protection & Owned by Northfield Mount Hermon School in Northfield	<u>258.00</u>	<u>1.1%</u>
TOTAL PRIVATELY OWNED OPEN SPACE WITH SOME LEVEL OF PROTECTION	5892.57	26.03%

PUBLICLY OWNED AND QUASI-PUBLICLY OWNED OPEN SPACE		
Forestland		
<i>Protected by State Conservation Agencies</i>		
Department of Conservation and Recreation – Division of State Parks and Recreation	2,098.600	9.3%
Department of Fish and Game	883.9	3.9%
<i>Protected by Northfield Conservation Commission</i>		
	206.5	0.9%
Land with Limited Protection		
Water District Land with Limited Protection	173.6	0.8%
Town owned Land with Limited Protection	26.8	0.2%
Other Protected Land		
Cemeteries	22.3	0.1%
TOTAL PUBLICLY OWNED OPEN SPACE WITH SOME LEVEL OF PROTECTION	3411.90	15%
TOTAL OPEN SPACE WITH SOME LEVEL OF PROTECTION	9304.46	41.1%

Source: Northfield Assessors Records and Maps, 2012.

A. PRIVATELY OWNED PROTECTED AND CHAPTER 61 LAND

Approximately 63 percent of the undeveloped land with some degree of protection in Northfield is privately owned. Most of this land is owned by private individuals and is either forested or in use for agriculture. There are many advantages to private ownership of open space. Privately owned undeveloped land contributes to the town's tax base. When used for farming or forestry, land also generates revenue, jobs, food, and forest products. Some landowners allow access to their property for recreational purposes. Most take pride in their land, which favors good stewardship. Finally, owning land gives people a sense of place. This is particularly true of residents whose families have owned land in Northfield for generations. Land ownership encourages a sense of community and helps contribute to community stability over time.

One disadvantage of private ownership of undeveloped land, which is valued by residents for the public benefits it provides, is that most privately owned land can easily be converted to other uses. According to Table 5-1, only 13 percent of 5892.57 acres of privately owned lands with conservation or recreation interests in Northfield have been protected from development. The remainder (87 percent) is temporarily classified as land in forestry, agriculture, or recreation uses and are therefore considered to be vulnerable to development. Some landowners acquire land specifically for the purposes of development, but others are forced to sell their property due to circumstances beyond their control. Aging, the death of a parent or spouse, financial needs of family and rising costs or declining profits of farming and forestry are common reasons why landowners decide to put their property on the market. The high value of land for residential development is both a powerful incentive to sell property and a formidable obstacle to people who might otherwise want to buy it for other purposes.

This section provides a detailed inventory of privately owned land in the Town of Northfield and discusses the value of this land for conservation and recreation. Privately owned land provides many public benefits, but it is important to respect the property rights of landowners. While many landowners choose to keep their property in farms and forests, and some allow public access, it is important that residents respect the rights of those who make different choices.

A.1 Privately Owned Agricultural Land

Farmland, including farm woodlots, constitutes approximately 42 percent of the total amount of privately owned open space in Northfield with some level of protection from development, 26 percent of all undeveloped land and 11 percent of the town’s total land base. Tables 5-2 and 5-3 display information on those farms in Northfield that have achieved a level of protection from development, including their ownership, management, and acreage.

Approximately 17.2 percent of Northfield’s farm acreage with some level of protection includes land protected by the Agricultural Preservation Restriction (APR) Program. These restrictions are overseen by the Massachusetts Department of Agricultural Resources. Information on permanently protected APR farmland in Northfield is included in Table 5-2.

Table 5-2: Privately Owned Agricultural Land Protected from Development in Northfield

Owner/Manager	Location	Assessor’s Map	Assessor’s Block/Lot	Acres	Value
Moose Plain Realty	Mt. Hermon Station Rd.	11	A7	14.6	Prime Farmland Soils
	Rear Mt. Hermon Station Rd.	11	B1.1	53.2	Prime Farmland Soils
	River Rd.	11	B3	28.0	Prime Farmland Soils
	Mt. Hermon Station Rd.	12	A8	16.4	Prime Farmland Soils
	River Rd.	16	B1	29.0	Prime Farmland Soils
	River Rd.	16	B2	<u>12.0</u>	Prime Farmland Soils
	Total			153.2	
Roberts, William & Joyce	Mt. Hermon Station Rd.	16	A8	5.90	Prime Farmland Soils
Split River Farm	Pine Meadow Rd.	73	B2	56.40	Prime Farmland Soils
	Millers Falls Rd.	73	C2	4.50	Prime Farmland Soils
	Millers Falls Rd.	73	C5	0.327	Prime Farmland Soils

	Millers Falls Rd.	73	A2.1	<u>0.131</u>	Prime Farmland Soils
	Total			60.917	
Smiarowski Farm, Teddy	Millers Falls Rd.	73	C4	12.8	Prime Farmland Soils
Parsons, Richard	Caldwell Rd.	11	C1.2	12.1	
Nourse Realty LLC	Caldwell Rd.	11	C 4	17.58	Prime Farmland Soils (PFS)
	Caldwell Rd	11	C 5	5.75	PFS
	Caldwell Rd	11	E 4	8.80	PFS
	Caldwell Rd.	16	B 3	1.00	PFS
	Caldwell Rd.	16	B 4	18 less 2.25 non-productive	PFS
	Caldwell Rd.	16	B 5.1	39 less 6.25 listed as 16 A 5	PFS
	Caldwell Rd.	16	C 2	30	PFS
	Caldwell Rd.	24	A 1	11	PFS
	Caldwell Rd.	24	A 2	23.08	PFS
	Caldwell Rd.	24	A 4	<u>12</u>	PFS
	Total			97.71	
Johnston, Robert	Maple St.	31	A 10	20.58	PFS
	Maple St.	31	B 6	<u>7.5</u>	PFS
	Total			27.63	
TOTAL PRIVATELY OWNED AGRICULTURAL LAND (Protected)				370.257	

Source: Northfield Assessor's Records and Maps, 2012

An additional farmer is completing the process of placing an APR on about 87 acres.

Chapter 61A

Land enrolled in Chapter 61A is considered to be “temporarily protected.” Approximately 82.7 percent of Northfield’s undeveloped farmland, including parcels with prime farmland soils, falls

into this category (*see Table 5-3*). As of the spring of 2012, landowners had enrolled 2066.30 acres of land enrolled in Chapter 61A. In some cases, farmland enrolled in Chapter 61A abuts “protected” land. Conversion of even a small percentage of this land to residential use could affect the viability of farming on the remainder. Location of new homes in proximity to active agricultural operations often results in conflict between new residents and farmers over the noise, dust, and odors that are part of normal agricultural practices. Increased commuter traffic on roads in agricultural areas also makes it difficult for farmers to move their equipment between fields.

Table 5-3: Privately Owned Agricultural Land Enrolled in Chapter 61A in Northfield

Land used for agriculture Ch. 61A			
Location	Assessors		Acres
	Map		
Land used for sod or tobacco			
PINE MEADOW RD	53 E1 1		44.00
PINE MEADOW RD	54 A18 1		6.00
PINE MEADOW RD	55 A1.2 1		1.20
Summary of land used for sod or tobacco:			51.20
Land used for truck crops and vegetables			
REAR MT HERMON STATION RD	11 B1.1 1		53.20
RIVER RD	11 B3 1		28.00
RIVER RD	16 B1 1		29.00
RIVER RD	16 B2 1		12.00
CALDWELL RD	16 C2 1		30.00
REAR MEADOW RD	16 D2 1		15.44
GREAT MEADOW RD	16 D4 1		22.75
GREAT MEADOW RD	16 D5 1		7.00
CALDWELL RD	24 A2 1		23.08
MEADOW ST	24 B1 1		12.60
MEADOW ST	24 B10 1		3.75
MEADOW ST	24 B11 1		4.00
MEADOW ST	24 B12 1		4.10
MEADOW ST	24 B13 1		26.50
MEADOW ST	24 B2 1		11.00
MEADOW ST	24 B3 1		3.00
MEADOW ST	24 B4 1		4.68
MEADOW ST	24 B5 1		8.60
MEADOW ST	24 B6 1		5.00
MEADOW ST	24 B7 1		4.80
MEADOW ST	24 B8 1		8.75
MEADOW ST	24 B9 1		3.50
MEADOW ST	24 C1 1		13.00
GREAT MEADOW RD	24 D6 1		3.00

GREAT MEADOW RD	30 A1 1		5.00
GREAT MEADOW RD	30 A2 1		4.40
GREAT MEADOW RD	30 A3 1		2.98
GREAT MEADOW RD	30 A4 1		14.00
SAGE HOLLOW RD	30 A5 1		8.50
SAGE HOLLOW RD	30 A6 1		2.94
SAGE HOLLOW RD	30 A7 1		5.90
REAR ROUTE 10	30 B1 1		5.00
ROUTE 10	30 B2 1		7.50
ROUTE 10	30 B4 1		0.18
ROUTE 10	30 B5 1		1.90
ROUTE 10	30 B6 1		0.20
SAGE HOLLOW RD	30 C1 1		1.34
SAGE HOLLOW RD	30 C2 1		1.56
GREAT MEADOW RD	30 C3 1		4.20
GREAT MEADOW RD	30 C5 1		7.28
GREAT MEADOW RD	30 C7 1		2.50
GREAT MEADOW RD	30 D1 1		1.50
GREAT MEADOW RD	30 E1 1		5.90
GREAT MEADOW RD	30 E4 1		1.50
ROUTE 10	30 J1 1		16.20
ROUTE 10	30 J2 1		25.80
CAPT BEERS PLAIN RD	38 B22 1		25.00
ROUTE 10	39 B2 1		23.00
REAR MILLERS FALLS RD	39 B3 1		8.00
REAR MILLERS FALLS RD	39 B6 1		15.00
PINE MEADOW RD	55 A4 1		7.30
PINE MEADOW RD	55 A5 1		9.00
PINE MEADOW RD	55 A7 1		5.00
PINE MEADOW RD	73 A2.1 1		0.13
PINE MEADOW RD	73 B2 1		56.40
MILLERS FALLS RD	73 C2 1		4.06
MILLERS FALLS RD	73 C4 1		12.85
MILLERS FALLS RD	73 C5 1		0.33
Summary of land used for truck crops/vegetables			629.09
Land used for field crops			
MT HERMON STATION RD	11 A7 1		14.58
CALDWELL RD	11 C1.2 1		12.10
CALDWELL RD	11 C4 1		17.58
CALDWELL RD	11 C5 1		5.75
CALDWELL RD	11 E4 1		3.00
CALDWELL RD	11 E5 1		8.80
MT HERMON STATION RD	12 A8 1		16.43
REAR WEST RD	15 A1.2 1		65.56
MT HERMON STATION RD	16 A8 1		4.54
MT HERMON STATION RD	16 A9.2 1		4.11

CALDWELL RD	16 B4 1		18.00
CALDWELL RD	16 B5.1 1		33.00
REAR PARKER AV	24A A13 1		4.00
REAR MAIN ST	24A A16 1		4.50
REAR PARKER AV	24A A19 1		2.00
GREAT MEADOW RD	30 C4 1		5.30
REAR MAIN ST	30 E2 1		2.27
REAR MAIN ST	30 E3 1		3.38
UPPER FARMS RD	39 B10 1		50.00
REAR UPPER FARMS RD	39 B11 1		27.00
REAR MILLERS FALLS RD	39 B7 1		11.02
UPPER FARMS RD	41 A1 1		44.00
REAR UPPER FARMS RD	41 A5 1		11.50
CAPT BEERS PLAIN RD	42 A21 1		4.66
MUNNS FERRY RD	52 A5 1		5.71
PINE MEADOW RD	53 D1 1		17.51
MILLERS FALLS RD	53 D10 1		19.22
PINE MEADOW RD	54 B3 1		17.00
PINE MEADOW RD	54 B4 1		7.50
PINE MEADOW RD	54 B5 1		6.50
PINE MEADOW RD	55 B1 1		73.61
PINE MEADOW RD	55 B2.1 1		5.25
SO MOUNTAIN RD	58 A5 1		41.30
Summary of land used for field crops			566.68
Land used for necessary related land-farm roads, ponds			
REAR UPPER FARMS RD	41 A6 1		15.00
MILLERS FALLS RD	41 D1 1		6.00
REAR CAPT BEERS PLAIN RD	42 A20 1		15.00
CAPT BEERS PLAIN RD	42 A25 1		14.00
Summary of related land-farm roads, ponds			50.00
Land used for productive woodland 717A			
REAR PRATT HOLLOW RD	33 A10 1		7.00
STRATTON MTN	33 A5 1		79.00
PRATT HOLLOW RD	33 A8 1		17.00
REAR PRATT HOLLOW RD	33 A9 1		12.00
CAPT BEERS PLAIN RD	38 B22.1 1		5.00
LYMAN RD	42 A16 1		8.50
REAR LYMAN RD	42 A18 1		12.80
LYMAN RD	42 A19 1		11.00
Summary of land for productive woodland 717A			152.30
Land used for productive woodland 717B			
ST MARYS ST	31 B7 1		23.10
MAPLE ST	31 B8 1		7.00
OLD WENDELL RD	43 A11 1		65.00

MILLERS FALLS RD	43 A7.1 1		182.50
OLD WENDELL RD	51 A1 1		24.00
SO MOUNTAIN RD	57 B6 1		12.50
MILLERS FALLS RD	70 A7 1		10.00
MILLERS FALLS RD	71 A1 1		85.54
Summary of land for productive woodland 717B			409.64
Land used for pasture 718A,B,C			
MAPLE ST	31 A15 1		4.02
MAPLE ST	38 B6 1		7.48
SO MOUNTAIN RD	51 A6 1		12.00
PINE MEADOW RD	54 A14.1 1		14.80
PINE MEADOW RD	54 A16 1		37.00
SO MOUNTAIN RD	57 B7 1		27.00
WARWICK RD	23 D8 1		10.50
PRATT HOLLOW RD	33 A2 1		20.00
Summary of land used for pasture 718A,B,C			132.80
Land used for nurseries			
SAGE HOLLOW RD	30 A8 1		5.00
SAGE HOLLOW RD	30 A9 1		7.90
GREAT MEADOW RD	30 C6 1		1.00
Summary of land used for nurseries			13.90
Non-productive land			
REAR CAPT BEERS PLAIN RD	42 A27 1		11.00
PINE MEADOW RD	54 B6 1		6.16
MILLERS FALLS RD	55 D4 1		9.00
REAR OLD VERNON RD	13 A5 1		9.22
CALDWELL RD	24 A1 1		11.00
REAR CALDWELL RD	24 A4 1		12.00
MILLERS FALLS RD	52 C1 1		14.03
PINE MEADOW RD	55 C1 1		11.00
PINE MEADOW RD	72 B1 1		1.95
CALDWELL RD	16 B3 1		1.00
MILLERS FALLS RD	70 A4 1		4.50
Summary of non-productive land			90.86
Total agricultural acres in Ch. 61A			2096.47

Source: Northfield Assessor's Records and Maps, 2012.

Much of the land enrolled in Chapter 61A also abuts rivers and streams. While agriculture can have negative impacts on water quality, these impacts can be reduced or avoided through the use of best management practices. When best management practices are observed, agriculture is compatible with watershed protection, because it keeps the land open, while development results in conversion of land to impervious surfaces, with negative impacts on water quality.

Agricultural lands enrolled in the Chapter 61A program offer much value to the town, even if the farmlands are only “temporarily protected.” Firstly, the agricultural parcels often contain prime farmland soils that should be preserved for continuing use. These privately owned open spaces also contribute to the town’s tax base and generate revenue, employment, and food products. In addition, some landowners may allow access to their property for recreational purposes, like hiking or snowmobiling. Most Chapter 61A landowners take pride in their land, while practicing good stewardship. They help to define a sense of place for Northfield and contribute to community stability over time.

A.2 Privately Owned Forested Land

Approximately 30 percent of Northfield’s open space with some level of protection is privately owned forest in one of the Chapter 61 or 61B tax abatement programs, accounting for approximately 2751.72 acres, or 12 percent of the town’s total land area. There are also six conservation restrictions in town protecting 385.85 acres of forest. Three of these conservation restrictions are held by the Mount Grace Land Conservation Trust.

**Table 5-4: Privately Owned Forested Land Protected from Development
(Conservation Restrictions)**

Owner	Holder of the Conservation Restriction	Location	Assessor’s Map	Assessor’s Lot	Acres	Stewardship of Conservation Restriction
French, Dick	Northfield Conservation Commission	Millers Falls Road			19	NCC with Franklin Land Trust-MOU
Ames, William and Nancy H	Mount Grace Land Conservation Trust	Old Wendell Rd.	44 45	A5.4, 5.5 A 2.1	8.6	Mount Grace Land Conservation Trust
Richardson, Sam and Barbara	Northfield Conservation Commission	Stratton Mt.	35	A	37.75	Greater Northfield Watershed Assoc
Copeland, William and Christine	Mount Grace Land Conservation Trust	Off west Rd.	2, 3	B4.1; A2,4	183.4	Mount Grace Land Conservation Trust
Hatton, Abbie, Robert Jr. & David	Unknown	Rear Old Vernon Rd.	13	A6	9.0	Unknown
		Rear Old Vernon Rd.	13	A8	24.2	
		Rear Old Vernon Rd.	13	A9	33.0	
		Rear Old Vernon Rd.	13	A9.1	7.0	
		Rear Old Vernon Rd.	13	A12	50.0	
Mount Grace Land Conservation Trust	Mount Grace Land Conservation Trust	Warwick Rd.	19	A5	0.9	Mount Grace Land Conservation Trust
		Warwick Rd.	19	B7	13.0	
		TOTAL			385.85	

Source: Northfield Assessor’s Records and Maps, 2012; Mount Grace Land Conservation Trust, 2012

Privately owned forestland with temporary protection is shown in Tables 5-5 and 5-6. In addition, many of the temporarily protected farms shown in Table 5-3 include farm woodlots. Landowners have enrolled 2489.94 acres in the Chapter 61 program, roughly 81.9 percent of the privately owned forest with temporary protection in Northfield. The other 13 percent of forest in the local tax abatement programs (262.31 acres) is enrolled in the Chapter 61B program for Recreational Open Space.

Table 5-5: Privately Owned Forestlands with Temporary Protection from Development Enrolled in the Ch. 61 Forestland in Northfield

Location	Assessors Map		Acres
Land used for forest land - West			
REAR OLD VERNON RD	13 A12 1		50.00
REAR OLD VERNON RD	13 A6 1		9.00
REAR OLD VERNON RD	13 A8 1		24.20
REAR OLD VERNON RD	13 A9 1		33.00
REAR OLD VERNON RD	13 A9.1 1		7.00
REAR WEST RD	15 A1.1 1		52.57
OLD VERNON RD	26 A4 1		28.00
OLD VERNON RD	26 A5 1		14.50
OLD VERNON RD	26 A6 1		18.00
REAR MT HERMON STATION RD	27 A12 1		5.00
MT HERMON STATION RD	27 A4.2 1		15.00
REAR MT HERMON STATION RD	27 A5 1		5.00
REAR MT HERMON STATION RD	27 A6 1		43.83
Summary of land used for forest land - West			305.10
Land used for forest land - East			
REAR STROWBRIDGE RD	18 B2 1		10.00
OLD WARWICK RD	18 C1 1		12.20
OLD WARWICK RD	18 C2 1		1.82
WARWICK RD	18 D2 1		29.00
WARWICK RD	19 A1 1		28.00
WARWICK RD	19 A4 1		0.25
WARWICK RD	19 A5 1		0.86
WARWICK RD	19 B1 1		2.45
WARWICK RD	19 B7 1		13.00
WARWICK RD	20 A1 1		238.56
WARWICK RD	21 A4 1		98.00
OLD VERNON RD	26 A13 1		10.00
ALEXANDER HILL RD	32 B3 1		13.85
ALEXANDER HILL RD	33 A4 1		17.00
ALEXANDER HILL RD	33 A4.1 1		3.25
PRATT HOLLOW RD	33 A7 1		8.00
PRATT HOLLOW RD	33 A7.1 1		8.00
ALEXANDER HILL RD	34 B1 1		26.00

ALEXANDER HILL RD	34 B2 1		6.75
WARWICK RD	35 A11 1		80.00
STRATTON MTN	35 A2 1		9.75
STRATTON MTN	35 A8 1		11.00
GULF RD	36 A2 1		163.00
GULF RD	37 A4 1		24.00
GULF RD	37 A6 1		55.00
CAPT BEERS PLAIN RD	38 A14.1 1		1.30
OLD WENDELL RD	45 A2 1		48.00
OLD WENDELL RD	45 A8 1		28.00
ORANGE RD	46 A2 1		20.00
REAR MILLERS FALLS RD	56 B8 1		18.00
MILLERS FALLS RD	56 B8.1 1		31.62
MILLERS FALLS RD	56 B9 1		24.00
FISHER RD	58 A2.2 1		49.81
SO MOUNTAIN RD	59 B4 1		0.25
WINCHESTER RD	6 C1 1		7.14
LOUISIANA RD	6 C17 1		7.00
LOUISIANA RD	6 C19 1		1.00
WINCHESTER RD	6 C2 1		4.50
REAR WINCHESTER RD	6 C22 1		1.00
WINCHESTER RD	6 C3 1		6.75
WINCHESTER RD	6 C5 1		5.50
LOUISIANA RD	6 D2 1		5.96
LOUISIANA RD	6 D5 1		25.00
LOUISIANA RD	6 D6 1		9.00
SWAMP RD	62 A2 1		103.00
GULF RD	65 B1 1		13.90
GULF RD	65 B1.2 1		6.60
GULF RD	65 B2 1		7.60
OLD WENDELL RD	66 A1.4 1		57.35
OLD WENDELL RD	66 A3 1		20.94
SO MOUNTAIN RD	66 A7 1		30.00
OLD WENDELL RD	66 B1 1		10.30
OLD WENDELL RD	66 B3.1 1		10.00
FOUR MILE BRK RD	69 A1 1		17.80
FOUR MILE BRK RD	69 A1.3 1		2.00
FOUR MILE BRK RD	69 A3 1		20.63
FOUR MILE BRK RD	69 A5 1		60.00
FOUR MILE BRK RD	69 A6 1		4.40
FOUR MILE BRK RD	69 B3 1		35.60
FOUR MILE BRK RD	69 B4 1		20.00
REAR LOUISIANA RD	7 A1 1		36.70
REAR LOUISIANA RD	7 A10 1		33.34
LOUISIANA RD	7 A11 1		30.00
LOUISIANA RD	7 A12 1		15.00
LOUISIANA RD	7 A2 1		13.00

LOUISIANA RD	7 A3 1		12.20
LOUISIANA RD	7 A4 1		24.08
LOUISIANA RD	7 A7 1		34.14
LOUISIANA RD	7 A8 1		15.60
FOUR MILE BRK RD	71 B1 1		1.10
REAR OLD WARWICK RD	8 A1 1		28.00
OLD WARWICK RD	8 A2 1		226.00
OLD WARWICK RD	8 A5 1		50.00
REAR OLD WARWICK RD	8 A6 1		32.00
STROWBRIDGE HL	9 A9 1		50.00
Summary of land used for forestland - East			2,184.84
Total land in Ch 61 Forestland			2,489.94

Source: Northfield Assessor's Records and Maps, 2012

All of the parcels in Tables 5-5 and 5-6 are temporarily protected in the Ch.61 Forestland and the Ch. 61B Recreational Open Space Classification and Taxation Programs, and the degree of protection of these parcels is short term. There are no public grants awarded as a result of the programs; however, the owner agrees not to change the land use for ten years while paying reduced property taxes during that time period.

Table 5-6: Privately Owned Forestlands with Temporary Protection from Development Enrolled in the Ch. 61 B Recreational Open Space Taxation Program in Northfield

Land used for recreation	Ch. 61B		
Location	Assessors		Acres
	Records		
WEST RD	2 B4.1 1		76.56
OFF WEST RD	3 A2 1		17.63
REAR MT HERMON STATION RD	3 A4 1		79.00
ORANGE RD	49 B3.4 1		6.68
SO MOUNTAIN RD	60 A2 1		64.00
MILLERS FALLS RD	72 C4 1		16.44
NEW PLAIN RD	38 B11 1		2.00
Total land in Ch 61 Recreation			262.31

Source: Northfield Assessor's Records and Maps, 2012.

Privately owned forestland offers many values to the community and are important resources for several reasons. First, many forestlands are large parcels with a low degree of fragmentation, so wildlife and plant habitats are preserved. When these forestlands are protected from development, they help to protect and provide clean water, air, and healthy wildlife populations. Forest soils have a high infiltration capacity, so they absorb moisture and permit very little surface runoff. Once absorbed, water is released gradually so flooding is reduced during large

rain events and streamflow is maintained during low water months. Forests recycle nutrients, so the nutrients do not pass into waterways, and water quality is preserved. Because forest soils are absorptive, soil erosion is reduced and fish habitat is preserved. Chapter 61 lands are managed for forest products, which result in employment of loggers, foresters, and local mill workers, income for landowners, and the availability of locally grown wood for flooring, furniture making and firewood. Many forested lands also provide recreational value for Northfield residents. The Chapter 61 forests help to preserve the character of the wooded landscape prized in Northfield.

Table 5-7 shows that portion of the Louisiana Brook watershed that is leased to the East Northfield Water Company. The land is privately owned by Northfield Mount Hermon School and has limited protection from development

Table 5-7: Land with Limited Protection from Development owned by the Northfield Mount Hermon School and Leased to the East Northfield Water Co.

Owner / Property Manager	Site Name	Assessor's Map	Assessor's Lot	Acres
NMH/East Northfield Water Co.	East Northfield Water Co.	6	C19, C20, C22	58
NMH/East Northfield Water Co.	East Northfield Water Co.	7	A1, A2, A3, A4, A7, A8, A9, A10, A11, A12	<u>200</u>
TOTAL				258

Source: Personal Communication with Jim Poulson of NMH, 2012; Northfield Assessor's Maps, 2012.

B. PUBLICLY OWNED PROTECTED LAND

Publicly owned protected open space equals approximately 45.2 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 Massachusetts Department of Conservation and Recreation. The town-owned parcels includes 37.3 acres of open space with a limited amount of protection and 21.6 acres in cemeteries, which are considered to be protected. The following inventory also includes those parcels that are owned by the Northfield Water District, a quasi-public entity.

B.1 Publicly Owned Open Space

There are approximately 3,411.90 acres of publicly owned open space in Northfield, accounting for 15 percent of the town's land area. In Northfield, publicly owned open space includes land owned by state conservation agencies, the town, and the Northfield Water District. These lands are described in Tables 5-8, 5-9 and 5-10. For the purposes of this section, the town's cemeteries are included in this category. Cemeteries are listed in Table 5-11. Most of the publicly owned open space in Northfield is forested or occupied by cemeteries.

Table 5-8: Publicly Owned State Land Protected from Development in Northfield

Property Manager	Site Name	Assessor's Map	Assessor's Lot	Acres	Current Use	Condition	Recreation Value	Public Access
MA Division of Fisheries and Wildlife (DFW)	Satan's Kingdom WMA	1	A2, A4, A6, A7, A8, A9, A10	350.5	Hiking, hunting	Good	High	Yes
DFW	Satan's Kingdom WMA	2	A2, B1, B7, C1, C2	116.3	Hiking, hunting	Good	High	Yes
DFW	Satan's Kingdom WMA	13	A2, A3, A13, A14, B1	134.3	Hiking, hunting	Good	High	Yes
DFW	Satan's Kingdom WMA	14	A5	45.6	Hiking, hunting	Good	High	Yes
DFW	Satan's Kingdom WMA	15	A10, A11	40.0	Hiking, hunting	Good	High	Yes
DFW	Satan's Kingdom WMA	25	A4	23.3	Hiking, hunting	Good	High	Yes
DFW	Satan's Kingdom WMA	26	A12	12.0	Hiking, hunting	Good	High	Yes
DFW	Pauchaug Brook WMA	5	A1, A2, A14, A15	157.2	Wildlife viewing, hunting	Good	High	Yes
DFW	Pauchaug Brook WMA	10	A5	4.7	Wildlife viewing, hunting	Good	High	Yes
Total DFW				883.9				
Dept. of Conservation and Recreation (DCR)	Ct. River Greenway State Park	73	A3, B6	32.0	State Park	Good	High	Yes
DCR	Northfield State Forest	13	A4	105.3	Hiking, fishing, hunting; cross country skiing, snowmobiling	Good	High	Yes
DCR	Northfield State Forest	14	A2	127.0	See Above	Good	High	Yes
DCR	Nfd/ Warwick State Forest	35	A12	1.5	See Above	Good	High	Yes
DCR	Northfield State Forest	20	A2	2.7	See Above	Good	High	Yes
DCR	Northfield State Forest	34	A5, A6	218.0	See Above	Good	High	Yes

DCR	Northfield State Forest	35	A5, A6, A10	141.0	See Above	Good	High	Yes
DCR	Northfield State Forest	47	A1, A2	375.0	See Above	Good	High	Yes
DCR	Northfield State Forest	48	A1, A2, A3, A6, A9, A10	336.2	See Above	Good	High	Yes
DCR	Northfield State Forest	62	A1, A3, B1, B2, C1	197.0	See Above	Good	High	Yes
DCR	Northfield State Forest	63	B1, C1	189.2	See Above	Good	High	Yes
DCR	Northfield State Forest	64	B3, B4, C2	373.7	See Above	Good	High	Yes
Total DCR				2,098.6				
TOTAL STATE LAND				2,966.9				

Source: Town of Northfield Community Development Plan, 2003; Northfield Assessor's Record and Maps, 2004; Personal Communication with Dept. of Conservation and Recreation, and Division of Fisheries and Game, 2004.

The Massachusetts Department of Conservation and Recreation, Division of State Parks and Recreation manages approximately 2,083 acres and the Department of Fish and Game manages approximately 884 acres.

The Town of Northfield owns 206.5 acres of open space that have permanent protection from development (*Table 5-9*). These parcels are under the authority of the Northfield Conservation Commission. Because the Conservation Commission holds the land, it would take a majority vote by the Mass. State Legislature to convert this open space to a non-conservation use.

Table 5-9: Town-owned land with Permanent Protection from Development in Northfield

Owner / Property Manager	Site Name	Size, Zone	Assessor's Map - Lot	Current Use	Condition	Recreation Potential	Public Access	ADA compliant	Purchase Source
Town of Northfield Conservation Commission	Brush Mt. Conservation Area	46 acres, RAF	50 – A2	Recreation, Historical Site, Wildlife Habitat	Good	High – Hiking, Snowshoeing, X-country Skiing	Yes	No	DCS LAND, Rec Trails grants
Town of Northfield Conservation Commission	Town Forest Brush Mt.	150 acres, RAF	45-A1 1,5	Forest, Sustainable Logging, Wildlife Habitat	Good	High – Hiking, X-country Skiing, Orienteering	Yes	No	Forest Legacy grant
Town of Northfield	King Philip's Hill	10.5 acres, RA	29-E4	Historical Site and Monument	Good	High – Trails, Picnics	Yes	MED	Private Gift
TOTAL		206.5							

Source: Northfield Assessor's Records and Maps, 2012.

B.2 Town Owned Land with Limited Protection

The Town of Northfield owns 26.8 acres of open space that have limited protection from development (*see Table 5-10*) and the Northfield Water District, a quasi-public entity, (*see table 5-11*) owns 173.6 acres with the same designation. All of these Northfield-owned parcels are under the authority of the Select Board and are therefore considered to have limited protection from development. If residents wanted to sell town land for development, the Select Board or a Town Meeting vote could provide the authority. Some of these open spaces may be set aside for municipal uses like schools, parks, or historic sites

Table 5-10: Town-owned Land with Limited Protection from Development in Northfield

Owner / Property Manager	Site Name	Acres	Assessor's Map	Assessor's Lot	Current Use	Condition	Recreation Value	Public Access	ADA compliant
Town of Northfield	Northfield Elementary School	10.0	23	A3	Playground; Playing Fields	Good	High	Yes	MED
Town of Northfield	Rear Parker Ave.	0.4	24	D9	Open Land	Good	Low	No	NA
Town of Northfield	Parker Ave.	6.5	24	D3	Open Land	Good	Low	Yes	NA
Town of Northfield	Parker Ave.	6.0	24	D4	Open Land	Good	Low	Yes	NA
Town of Northfield	Great Meadow Rd.	0.5	24	D5	Open Land	Good	Low	Yes	NA
Town of Northfield	Old Road Bed off Old Bernardston Rd.	1.7	29	B7	Old Road Bed	Good	Low	Yes	NA
Town of Northfield	Gill Center Rd.	0.6	40	B1	Open Land	Good	Low	Yes	NA
Town of Northfield	Historical Site, Millers Falls Rd.	0.7	43	A5	Historical Site and Monument	Good	High	Yes	MED
Town of Northfield	Old Road Bed on corner of Cross Rd. and Rte. 63	0.4	55	D9	Old Road Bed	Good	Low	Yes	NA
TOTAL		26.8							

Source: Northfield Assessor's Records and Maps, 2012.

It is not unusual for a community to set aside land for future expansion of schools, sports fields, police and fire stations, and drinking water supplies. Open space planned for these purposes might be used as open space today and placed under the authority of the Select Board. It may also be sensible to place town-owned land that clearly contains wetlands or wildlife habitat, but

which does not provide for easy development, under the authority and protection of the Conservation Commission.

Table 5-11: Northfield Water District Land with Limited Protection from Development

Owner / Property Manager/Site Name	Assessor's Map	Assessor's Lot	Acres
Northfield Water District	21	A5	153.0
Northfield Water District	22	B9	2.1
Northfield Water District	22	B10	1.3
Northfield Water District	22	C20	17.3
TOTAL			173.6

Source: Northfield Assessor's Records and Maps, 2012; Personal Communication with Steve Malsch, Northfield Water District, 2012.

Table 5-12 lists the cemeteries in Northfield that are owned by the town and the Roman Catholic Society and are protected from development. Most cemeteries represent well-maintained open space areas that are sometimes appropriate for walking and bird watching.

Table 5-12: Cemeteries in Northfield

Owner / Property Manager	Site Name	Assessor's Map	Assessor's Lot	Acres
Town of Northfield	West Northfield Cemetery	16	A2	1.7
Town of Northfield	Pentecost Cemetery	17	B 6.1	4.5
Town of Northfield	Center Cemetery	24	C2	8.1
Town of Northfield	Center Cemetery	24	C4	0.7
Roman Catholic Society	St. Mary's Cemetery	31	A9	2.0
Town of Northfield	Mount Hermon Cemetery	40	B 24, B25	0.7
Town of Northfield	Coller Cemetery	48	A7	0.3
Town of Northfield	South Mountain Cemetery	65	D1	0.3
Town of Northfield	Northfield Farms Cemetery	74	A3	4.0
TOTAL				22.3

Source: Northfield Assessors Records and Maps, 2012

C. UNPROTECTED LANDS OF CONSERVATION AND RECREATION INTEREST

C.1 GDF Suez/FirstLight Power

Within the Town of Northfield, GDF Suez/FirstLight Power owns approximately 876 acres of land. These lands are unprotected and are considered of high conservation/recreation value. The following describes GDF Suez/FirstLight Power land in Northfield:

C.1.1 Bennett Meadows Wildlife Management Area

Bennett Meadows Wildlife Management Area is located in West Northfield. It is comprised of approximately 200 acres of mostly agricultural land. Bennett Meadows is owned by GDF

Suez/FirstLight Power and co-managed as a conservation/recreation area by the Massachusetts Division of Fisheries and Wildlife for the purpose of seasonal hunting and wildlife viewing.

C.1.2 Northfield Mountain Recreation Area

Located in the southern portion of Northfield, along the town's border with the Town of Erving, approximately 287 acres of the Northfield Mountain Recreation Area are within the Town of Northfield, with the remainder located in the Town of Erving. The Northfield Mountain Recreation Area offers cross-country skiing, snowshoeing, mountain biking, horseback riding, and recreational and environmental programs.

C.1.3 Riverview Picnic Area

The Riverview Picnic Area, a part of the Northfield Mountain Recreation Area, consists of approximately fifteen acres and is located on the Connecticut River. Riverview offers picnicking and river access.

C.1.4 Munns Ferry Camping Area

Munns Ferry is a camping area on the Connecticut River accessible by boat only. It is also a part of the Northfield Mountain Recreation Area and is comprised of approximately 2 acres.

C.1.5 Kidd Island

Kidd Island is a twelve-acre island in the Connecticut River. It is leased to the Franklin County Boat Club and is used by its members for camping and picnicking.

C.1.6 Other GDF Suez/FirstLight Power Lands

Approximately 360 acres of the remaining GDF Suez/FirstLight Power land includes parcels that comprise a narrow corridor of land along the banks of the Connecticut River in Northfield. These parcels do not have public access.

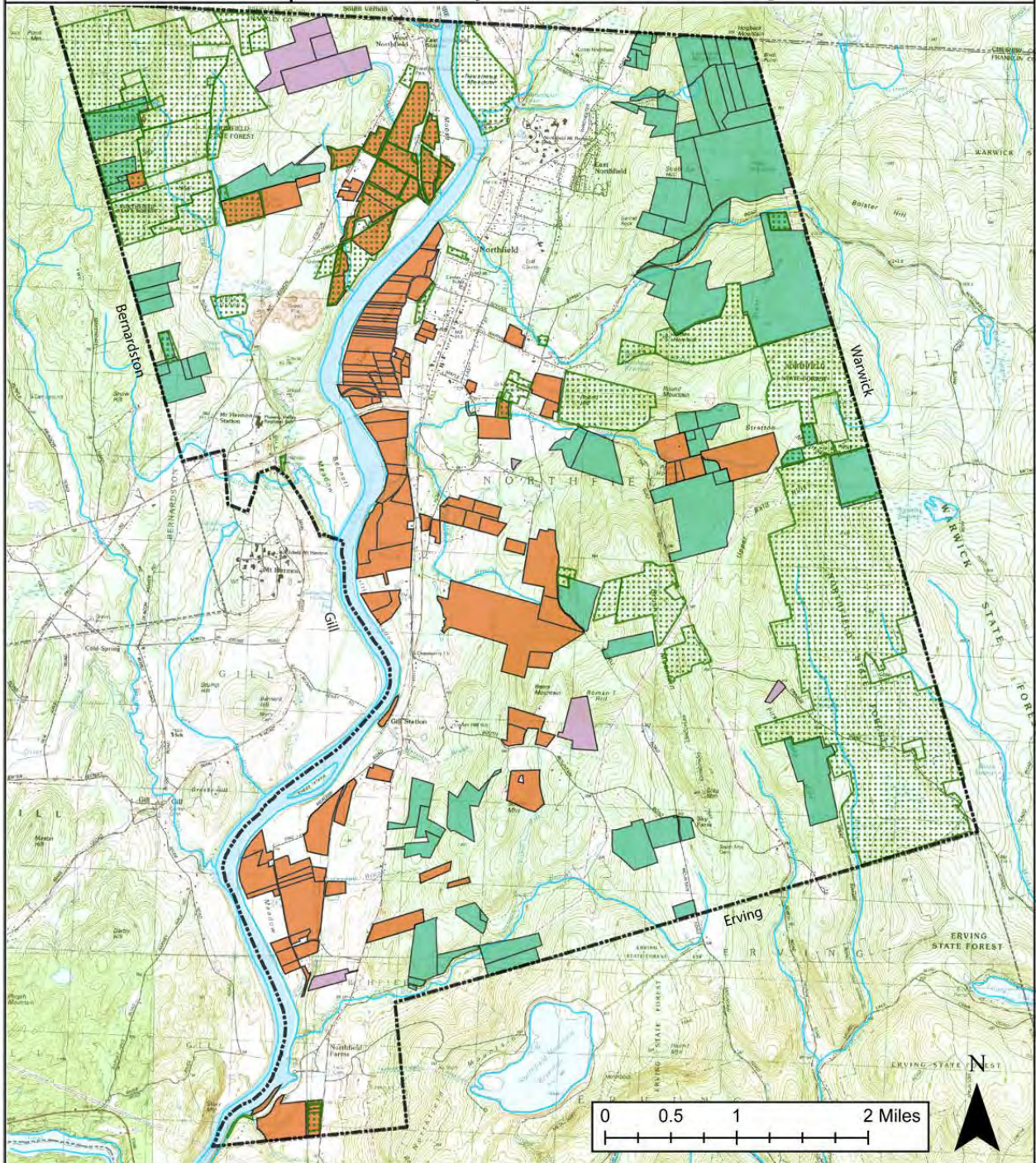
C.2 Northfield Mount Hermon

Residents value the undeveloped land in town owned by Northfield Mount Hermon even as its future owner is unknown. Much of this forestland is highly valued as areas for hiking, nature study, and other recreational activities. The school owns 138 parcels totaling 2,028.4 acres, most of which is located in East Northfield, north of Warwick Road. NMH also owns about 95 acres of significant wetlands in the center of town and bordered by Main St, School St, and Birnam Rd. This area is an important birding site and includes a nature trail.

C. 3 Greater Northfield Watershed Association

The Greater Northfield Watershed Association owns an eleven-acre parcel of forestland located on Alexander Hill Road with limited protection.

Town of Northfield | Permanently Protected and Chapter 61 Land



Legend

- Chapter 61: Forestry
- Chapter 61 a: Agriculture
- Chapter 61b: Open Space & Rec.

Permanently Protected (Public & Private)

Chapter 61 is a State of Massachusetts program that allows property owners to temporarily classify their land as active forestry, agricultural, or open & recreational uses. Public access varies. "Permanently Protected Land" includes both public (e.g. town or state owned) and private (usually Conservation Restrictions).

Data Sources

Map produced by the North Quabbin Regional Landscape Partnership, in collaboration with the Northfield Open Space Committee. Data obtained primarily through MassGIS and the Town of Northfield.

Map Produced - November 2012

SECTION 6

COMMUNITY GOALS

A. DESCRIPTION OF PROCESS

The Town of Northfield's open space and recreation goal statement was developed through the following planning process:

- In September 2011, an open space and recreation survey was developed by the Northfield Open Space Committee. The survey was mailed to approximately 1,391 households in Northfield (*see Appendix A for a copy of the survey and the results*) and made available via SurveyMonkey on the web. Overall, 151 were returned, which represents an 11 percent rate of return. The survey responses were used to revise Section 8 - Goals and Objectives.
- In February 2012, the Open Space Committee held a public forum to obtain additional public input for the revised OSRP (*see Appendix A for the results of this forum*).
- Monthly throughout 2011 and 2012 the Open Space Committee held open meetings at which the revision of the OSRP was discussed.

B. STATEMENT OF OPEN SPACE AND RECREATIONAL GOALS

As with the vision of the 2005 version of the OSRP, the town's active farmland and large blocks of forest will be preserved as a result of town purchase as well as cooperative efforts between private landowners, the Northfield Conservation Commission, Northfield Planning Board, and local private non-profit organizations like the Greater Northfield Watershed Association, Franklin Land Trust, and Mount Grace Land Conservation Trust. These lands will mostly remain in private hands and control, and continue to contribute property taxes in support of the town, but will protect forestlands that feed and recharge the town's surface waters and drinking water supplies. The historical landscapes and the town's scenic areas and views will also be preserved.

Residents of all ages and abilities will continue to enjoy access to the facilities of the Northfield Town Forest, King Philips Hill, the Northfield State Forest and the Northfield Mountain Recreation Area, as well as other areas in the town. A town-wide system of well-maintained trails will provide residents with year-round outdoor recreation opportunities close to home. Opportunities for increased access to the Connecticut River and community park facilities, such as playing fields, swimming, and ice skating, will be explored.

SECTION 7

ANALYSIS OF NEEDS

The Northfield Open Space and Recreation Plan incorporates the inventory of all the land-based natural, scenic, and cultural resources that are available 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 recreation and open space 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

According to the 2011 Open Space and Recreation Survey, more than 90% of the survey respondents weighted the following as having nearly equal importance for preservation: air/water quality, forests, farms and farmland; in addition, more than 80% wanted rural character and quiet preserved. In addition, public input from the Northfield Open Space and Recreation Public Forum helped determine what resources are of priority concern to residents (see appendix A).

The previous sections examined the variety of these natural and cultural resources. Preserving them is likely be especially challenging in the near future, as the fate of the Hobby Lobby campus becomes clear (see Section 1). The following section outlines the key natural resource protection needs.

In 2008 the Open Space Committee, together with the Northfield Selectboard, arranged to have the Trust for Public Land do a comprehensive *GreenPrint* for Northfield, determining open space conservation priorities based on significant public input. The map of those final results is included at the end of Section 5 and will be used as a guideline for conservation priorities in the town.

A.1 Protection of Groundwater

Northfield has a comprehensive Water Supply Protection District, which is an overlay district on the basic zoning districts; its purpose is "to promote the health, safety, and welfare of the community by preserving and maintaining the existing and potential groundwater and surface water supply resources for private and public water wells and reservoirs within the Town of Northfield" (*Northfield Protective Bylaws, Section 4.03, and see the zoning map at the end of Section 3 above*). The key need here is to

communicate this overlay district clearly to relevant town officials, boards, and entities such as the recipient of the Hobby Lobby campus, and to encourage its enforcement.

High yield aquifers provide significant amounts of water to community water supply systems. Northfield has such aquifers. It is important to protect these aquifers from potentially contaminating land use, including residential, college, and industrial uses. Especially important is the revegetation of mined properties.

A.2 Protection of Forests and Rare Wildlife

The town has seven BioMap2 Core Habitat Areas that have natural communities supporting rare plants and animals and should be prioritized for protection; these areas are described in detail in Appendix D. The Supporting Natural Landscapes (see the *Core Habitats and Critical Landscape Maps* at the end of Section 4) in town include Satan's Kingdom, the northern slopes of Northfield Mountain and all the forest to the east of Northfield Center, East Northfield, and Orange Road. As is discussed in Section 4, Environmental Inventory and Analysis, the best way to conserve wildlife in Northfield is to protect both the core habitats and the largest connections of unfragmented forest so that native species common to Northfield remain as such over time.

Northfield has, in 2011, adopted the Massachusetts Open Space Residential Design (OSRD) model as the preferred zoning option for subdivisions, with preservation of 50% of the land as permanently protected open space. As this should help protect forests, use of this approach should be encouraged for any future subdivisions in Northfield.

A.3 Working Farm and Forest Land

Northfield contains some of the richest prime farmland soils in the Commonwealth. West of the Connecticut River most of this farmland is permanently protected from development under the Agricultural Preservation Restriction (APR) program. East of the Connecticut River only a small portion is protected by the APR program, but some is also temporarily protected under the Chapter 61A program. Agricultural and forestry operations help to maintain land in its undeveloped state.

Imagine if the town knew that in five years farmers that have not protected their land would be approached by individuals to purchase their fields in order to develop large subdivisions. How would that knowledge impact the town's actions regarding its farm and forestland today? Town officials might consider reaching out to farm and forest landowners in town so that in the future there might be opportunities to conserve the most valued food and wood fiber producing soils. By promoting and preserving active farmland and by seeking to increase the market value of local agricultural and forest-based goods and services, the town could help stabilize local residential property tax bills and create jobs. (See also the COCS analysis for Northfield in Section 3.)

Northfield has adopted the Community Preservation Act (CPA), which provides matching funds to allow farm owners to participate the the Massachusetts Agricultural

Preservation Restriction Program (APR). Promoting this capability, as well as the use OSRD for subdivisions, will help preserve Northfields farms and farmland.

A.4 Balancing Development and Conservation: Planned vs. Unplanned Development

The challenge for many rural towns in the Commonwealth is to grow in population without diminishing natural resources like clean drinking water and contiguous forests beyond the capacity of local ecosystems. Although exact capacity thresholds for water supplies and forest habitat acreage are not yet known, poorly planned development can detract from the town's rural character and erode the quality of the environment over time.

Of course, some types of residential, commercial, and industrial development can be beneficial to a community especially if it is consistent with a town plan that balances growth with natural resource protection. Well-planned economic development, for example, could help provide jobs for low and moderate-income households and lower the expense per household for community services. In comparison, poorly planned economic development could result in higher costs than the revenues it generated via property taxes.

In Northfield, much of the development will be determined by the recipient of the Hobby Lobby campus, as well as the possibility of NMH selling some of its open-space land. The nature and extent of this is, at this time, unknown. The need here is to clearly communicate to the campus recipient and NMH the nature of the resident surveys and forum input and the resulting content of this OSRP.

As more families move to a rural community, a greater level of municipal services would be required to serve the growing population, including schools and road infrastructure. Based on regional trends, the average residential tax bill will likely rise faster as the population of Northfield increases because service costs are typically greater than the revenues generated from residential property. This is demonstrated in the Cost of Community Services analysis done for Northfield and described in Section 3 above.

Not all development is undesirable, nor could the town over-control land development, even if this was the consensus of residents and officials. Most residents understand the need for balance and respect the rights of property owners, including the right to develop land. Through zoning and non-zoning techniques the town could provide incentives to developers so that development could contribute as much as possible to the residents' shared vision for their town. For example, by encouraging smaller lot sizes near historic village centers, forest or farmland could remain undeveloped.

In summary, one of the most important natural resource needs is for a continuing discussion on how residents want their town to develop over time, and which areas should be protected from development so that water, forests, habitat, and farmland can be conserved for the next year, and the next 100 years.

B. SUMMARY OF COMMUNITY NEEDS

This section will outline the community needs as determined from the survey tabulation and public forum discussions. Table 7-1 shows the comparison of these results with the Connecticut River Valley results of the Statewide Comprehensive Outdoor Recreation Plan (SCORP) inferred needs.

Table 7-1 - Comparison of the Northfield survey results and SCORP inferred needs

	Natural Areas	Water Bodies	Hiking	X-country Skiing	Bike Trails	Play-grounds	Picnic Areas	Playing Fields	Swimming Pool	Soccer Fields
Northfield	83%	78%	75%	59%	54%	51%	49%	46%	39%	31%
SCORP	29% ¹	39% ²	36% ³			41% ⁴				

¹ average of SCORP categories *Mountains, Wildlife Areas, Forests, Wetlands*

² average of SCORP categories *Rivers & Streams, Shorelines, Lakes & Ponds*

³ average of SCORP categories *Trails & Greenways, Bikeways*

⁴ SCORP category *Parks & Golf Courses*

The highest correlation in Table 7-1 is for public parks; accordingly section 7.B.1 below describes the open space and recreation need in Northfield for a community park (Northfield currently has no public park facilities, except as available on public school grounds).

The correlation between SCORP and Northfield for trails is not quite as great - the Northfield survey results showed a somewhat higher interest in trails than might be implied by the SCORP inferred needs results. Accordingly, trails are an important part of this plan; section 7.B.2 below summarizes these trail aspects.

Both Northfield and SCORP rate public access to water bodies as reasonably high, and the action items of this plan include increased access to the Connecticut River (the main water body in Northfield).

The most surprising lack of correlation between the Northfield and SCORP results are with respect to public access to natural areas - this gets the highest rating in the Northfield survey and is the lowest in the SCORP inferred needs. The reasons for this discrepancy are not clear, but Northfield is a very rural area with correspondingly great resident appreciation of the natural landscape. In any event, the action items of this plan include continuing efforts to protect appropriate areas of the natural landscape and make them available to the public.

B.1 Northfield Community Park

The respondents to the Community Survey, the attendees at the Community Forum, and subcommittee meetings with the Northfield Recreation Commission revealed the need for recreational swimming facilities, ice skating facilities, and playing fields for school-age baseball, softball and soccer teams. Currently there are no tennis courts and only one basketball court available for recreational use. In addition, Northfield needs a pre-school playground for families and caregivers during the school day when the elementary school

playground is reserved for school children. This suggests that Northfield needs a community park that provides these facilities in an efficient, coordinated manner. The Town will need to identify a suitable piece of land, determine the feasibility of developing a community park, build community support, and identify sources of funding.

B.2 Access to Recreational Trails

Respondents of the 2011 Open Space and Recreation Survey clearly requested more priority for walking, bicycling, and hiking trails. A strong volunteer network of local trail enthusiasts has developed their own trails and maintained others around town. The survey highlighted that these trails are not as well marked/documented as they should be. While the need for certain new trails was noted in the public input, the far more important need was to make access to the existing trails much better.

The sidewalks of Northfield are popular walking areas for those living in and near the village - sidewalks are an important recreational facility. Most of the sidewalks were replaced during 2010-2011. Especially as the older population increases, the need for well-maintained sidewalks will be even more important.

Bicycling is a popular recreational activity that could see an upsurge over the next decade. The Franklin County Bikeway, which has recently been completed, consists of a combination of off-road bike paths and shared roadways that together create an extensive network of bicycling opportunities throughout Franklin County. This network includes the full north-south length of Northfield on the east side of the Connecticut River and several miles in Northfield on the west side of the river. In addition, there is always the opportunity to link local trail loops into this county-wide network as well as connect the two sides of Northfield via rehabilitation of the historic Schell Memorial Bridge.

Since hiking trails are a very popular recreational resource among Northfield residents, and since so many existing trails and potential trails are located on lands that are not currently protected from development, another need is to consider ways of conserving the resource such as seeking trail easements from landowners.

B.3 Groups with Special Needs

As described in Appendix B, Northfield currently has a mixed set of handicap-accessible public facilities. The public schools, library, and town hall all have handicap-accessible parking spaces and access to interior spaces without the need to climb stairs. However, the trails at the town areas of King Philips Hill, Brush Mountain, and the Northfield Town Forest are primitive and not ADA-compliant; handicap-accessible parking at trailheads is limited.

The trail-related action items of this plan include better parking at trailheads, as well as addition trailhead information (kiosks) that would be helpful to handicapped individuals and those with limited abilities. There are no plans, however, to make the trails themselves more ADA-compliant.

With regard to community park facilities and additional access to the river, it is expected that any such new facilities will include adequate handicap-accessible parking and reasonable attempts to make the facilities, as appropriate, accessible to those with limited abilities.

For many years the Northfield senior center has been located in the town hall. Though this provides facilities for senior luncheons, the space is limited for other senior activities - therefore there has been a continuing need for better senior center provisions. In 2011 an outdoor shelter for seniors was constructed near the town hall that provides space for certain forms of table-oriented recreation, as well as horseshoes and raised-bed gardening near the shelter. This has mitigated the need for a senior center, but not eliminated it as this facility is useful only in warm weather.

Part of the need for a community park is to provide appropriate recreational activities for young teens, in the form of playing fields, tennis courts, etc. Young teens typically do not, on their own, make significant use of the area trails or boating on the Connecticut River, and therefore need more community-oriented recreational opportunities. This places particular importance on the community park objective of this plan since such facilities currently do not exist in Northfield.

C. MANAGEMENT NEEDS

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

C.1 Town-wide Cooperation

A good cross section of Northfield residents, including landowners, town officials, and GNWA members, participated actively in the drafting of this 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 endeavor, ongoing land conservation, natural resource protection, and recreation projects may need the input and effort of many individuals, whether town officials, or members of town associations, or others. In particular, the implementation of this revision of the Northfield Open Space and Recreation Plan (OSRP) is best overseen by the Northfield Open Space Committee.

C.2 The Department of Conservation and Recreation (DCR) on Boating Issues

The town might consider teaming up with other communities on the Connecticut River in Franklin County dealing with similar issues and together seek an audience with the DCR and the Division of Environmental Law Enforcement. Other towns that might be interested in participating in a meeting are Gill, Greenfield, Montague, Deerfield, Sunderland, and Whately. The Franklin Regional Planning Board could be a good forum for discussing these issues on a regional basis.

C.3 Hobby Lobby Campus, Northfield Mount Hermon and Northfield Mountain

The town of Northfield needs to establish a good working relationship with the ultimate recipient of the campus.

Northfield Mount Hermon School, which sold the Northfield campus to Hobby Lobby Corporation still owns considerable forest and agricultural acreage in Northfield; a large portion of this acreage lies in the Water Supply overlay district mentioned in subsection A.1 above. Thus there is a definite need to work with NMH to protect this open space.

The Northfield Mountain Recreation Area also comprises large area forest in the town, and so coordination is also need to maximize the chances for preservation of these resources. The Northfield Mountain Recreation Area and its staff could serve as a resource to the town in its efforts to engage people in learning about and conserving natural and cultural resources.

C.4 Strengthen the Conservation Commission's Ability to Manage Conservation Land

The Conservation Commission (CC) is authorized to hold conservation land for the town and to oversee its management. One of the top reasons for pursuing land protection in Northfield would be to protect trail access to natural areas. The CC could play a significant role in protecting trail access by either securing trail easements on private land or, by accepting, purchasing, or otherwise acquiring land for protection by the town, or by facilitating its conservation by state or non-profit land conservation agencies or trusts. The Open Space Committee could assist the CC with municipal conservation land management.

C.5 Prioritize Open Space and Work With Town Boards to Develop Protocols for Action

The Town of Northfield may have opportunities to act on its right-of-first refusal, or after prioritizing the types of resources it wants to protect and eliciting land or easement donations or sales to the town, it might have to consider whether to follow through with a particular parcel. Once the town has to choose whether to act on an available parcel of land, it could be important for transparency purposes that all boards had already participated in the development of a protocol designed to guide relevant decisions and actions. Northfield has recently adopted a policy in which the Open Space Committee serves as the *Coordinating Committee* for gathering and coordinating input from town committees, abutters, and other interested persons whenever a right-of-first-refusal opportunity arises.

C.6 Stewardship of Northfield'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 the integrity of the sub-watersheds in town, 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 leadership that produces a fun, meaningful, and satisfying stewardship project will engender opportunities among the participants for feelings of responsibility and ownership that will be directed towards the special resource and to the town as a whole.

C.7 Regional Partnership Opportunities

The Town of Northfield is fortunate to be located within the region served by Mount Grace Land Conservation Trust, Franklin Land Trust, the North Quabbin Regional Landscape Partnership, the Connecticut River Watershed Council, the Franklin Regional Planning Board, and others. By continuing to collaborate with these regional groups, the town will be more able to leverage actions that benefit the town whether through land protection where the funding used comes from outside the town's boundaries or, through shifts in state policies from lobbying efforts in the region.

SECTION 8

GOALS AND OBJECTIVES

The following Goals and Objectives were formulated from community input. The Northfield Open Space and Recreation Survey was conducted in September of 2011; 1,391 surveys were mailed to households in town and the survey was available via Survey Monkey on the web. 158 responses were received, an 11.6 percent rate of return. The survey responses, together with the results of a public forum in February 2012 were used as a foundation for preparing the Open Space and Recreation Plan revision.

Open Space Goal: Ensure that Northfield protects farmland, forest land, scenic views, and other open space vital to sustaining the town's historic rural character and maintaining the quality of air, water, and wildlife habitats.

Objectives:

OS1. STEWARDSHIP

Develop effective means for Northfield citizens to become engaged in the stewardship of the natural and recreational resources of the town.

OS2. COORDINATION

Work with town committees and other organizations to achieve this open space goal.

OS3. FUNDING

Set aside municipal funding each year to be used as a town match to help enable landowners to protect their land through the APR and other appropriate programs.

OS4. CONSERVATION

Continue working to preserve areas of Northfield that are most important to protect from development.

OS5. MANAGEMENT

Assist the Conservation Commission in managing town-owned and town-managed conservation areas and conservation restrictions held by the town.

OS6. WATER

Monitor the quality of surface water in Northfield and monitor the town's sources of drinking water (surface water, groundwater, and medium to high yield aquifers).

Recreation Goal: Ensure that Northfield maintains and improves the variety, quality, and accessibility of recreational facilities important in the twenty-first century for health and well being of all residents, and promote the use of these facilities and any organized programming thereof.

Objectives:

R1. COORDINATION

Work collaboratively with town boards, committees, and community organizations to achieve the Recreation Goal.

R2. COMMUNITY PARK

Create a Northfield recreation area that includes playing fields, swimming, playgrounds, ice skating, and other activities for all ages.

R3. TRAILS

Promote the use of new and existing trails in Northfield, and develop and/or improve trail systems throughout the town.

R4. RECREATION ACCESS TO THE CONNECTICUT RIVER

Increase the number of public access points on the Connecticut River, including boat and paddling launching areas.

SECTION 9

SEVEN-YEAR ACTION PLAN

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

The objectives are listed in the far left column of Table 9-1 in the same order as they appear in Section 8. They are followed in the same row by recommended actions, the board or group responsible for implementation, start dates and funding sources. 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 Open Space Committee, Board of Selectmen, Planning Board, Conservation Commission, and others.

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.

The Northfield Open Space Committee identified the most important action steps. Although the community will be seeking to complete all fifty-four actions, the following action steps are considered to be the most critical for the town to accomplish over the next seven years:

- OS2.8 - Develop an “open space tour” for the new residents of the Northfield campus and for the Master Plan consulting firm.
- OS3.1 - Promote full funding of the Community Preservation Act (CPA).
- OS4.2 - Promote the conservation priorities identified in the Trust for Public Land Greenprinting of Northfield.
- OS5.3 - Draft management plans for potential conservation areas, such as the Mill Brook areas west of Birnam Road.
- OS6.1 - Support existing GNWA Stream Teams and recruit new members; consider establishing new stream teams in town. Help distribute the Stream Team Reports.
- OS6.6 - Develop detailed water supply recharge area maps for use by the Zoning Board of Appeals, in considering special permits, and by other town committees.

- R2.3 - Form an ad hoc Northfield Community Park Committee to further investigate the possibilities.
- R2.5 - Research potential locations for a community park and hold public forums to discuss these possibilities.
- R3.2 - Develop and disseminate a brochure or printed Northfield Trail Guide.
- R3.7 - Create new trails on public lands or private lands with permission, including plans for their maintenance and management.
- R4.1 - Facilitate the building of a canoe/kayak launch ramp at Bennett Brook Wildlife Management Area.

Table 9-1 – Recommended Action Steps to Implement the 2012 Northfield Open Space and Recreation Plan

OBJECTIVE	ACTION	RESPONSIBLE GROUP(S)	START DATE	FUNDING SOURCE
Open Space Goal: Ensure that Northfield protects farmland, forest land, scenic views, and other open space vital to sustaining the town’s historic rural character and maintaining the quality of air, water, and wildlife habitats.				
OS1. STEWARDSHIP Develop effective means for Northfield citizens to become engaged in the stewardship of the natural and recreational resources of the town.	1. Recognize outstanding citizen stewards.	Open Space Committee (OSC)	ongoing	volunteer time
	2. Conduct a stewardship workday for people of all ages to participate in the care of public conservation land and recreational areas.		ongoing	
	3. Plan outreach activities for the Town Forest, King Philips Hill, Brush Mountain, and other conservation areas.	Greater Northfield Watershed Association (GNWA)	ongoing	
	4. Launch an anti-litter campaign for Northfield.		2013	
	5. Encourage town residents to participate in the Keystone forest management program sponsored by UMass, and other conservation management programs.		ongoing	
OS2. COORDINATION Work with town committees and other organizations to achieve this open space goal.	1. Discuss conservation goals with area land trusts.	OSC	ongoing	volunteer time
	2. Bring land trust representatives to Northfield with programs on the value of land conservation, wildlife protection, etc.			
	3. Consult as needed with the Board of Health, Zoning Board of Appeals, Planning Board, water districts, and the Building Commissioner to discuss drinking water vulnerabilities.			
	4. Work with the Planning Board to explore new zoning bylaws that protect open space and surface waters in town.			
	5. Discuss policies associated with connecting protected Wildlife Management areas with the supervisors of the Northfield State Forest, Department of Conservation and Recreation (DCR), and Department of Fish and Wildlife.			
	6. Support the development of a Pioneer Valley Regional School Land Management Plan that encourages open-air educational options and recreation on the school's 90-acre parcel.			
	7. Help coordinate the local response regarding the 2018 relicensing of the First Light Power (FLP) pumped storage hydroelectric facility, for maximum attention to river and wildlife restoration.			
	8. Develop an “open space tour” for the new residents of the Northfield campus and for the Master Plan consulting firm.			

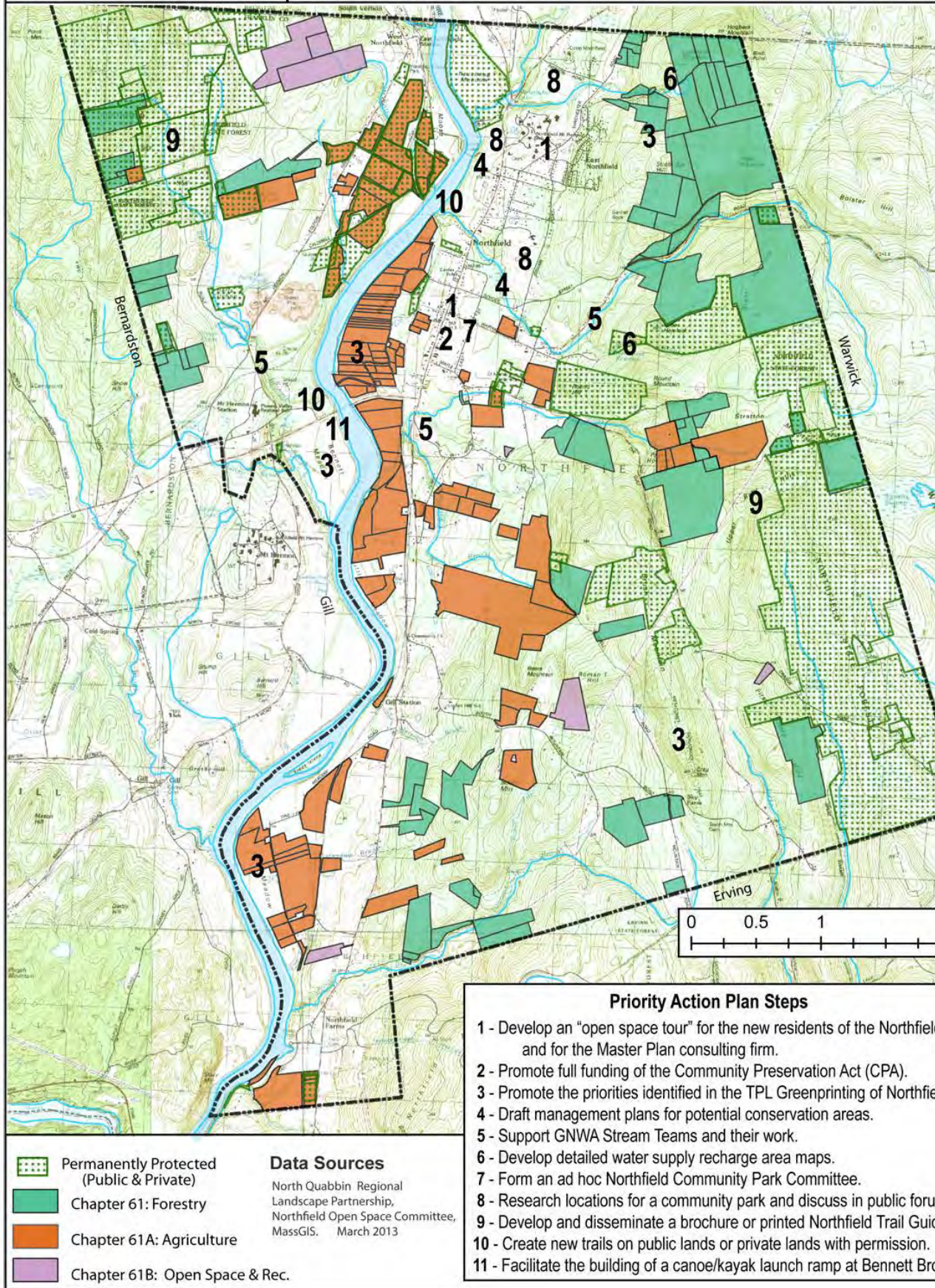
OBJECTIVE	ACTION	RESPONSIBLE GROUP(S)	START DATE	FUNDING SOURCE
Open Space Goal: Ensure that Northfield protects farmland, forest land, scenic views, and other open space vital to sustaining the town's historic rural character and maintaining the quality of air, water, and wildlife habitats.				
OS3. FUNDING Set aside municipal funding each year to be used as a town match to help enable landowners to protect their land through the APR and other appropriate programs.	1.Promote full funding of the Community Preservation Act (CPA).	OSC Community Preservation Committee (CPC)	ongoing	volunteer time
	2.Educate residents about the CPA committee process.			
	3.Explore and prepare project proposals that meet CPA criteria.			
	4. Apply for relevant state LAND and other grants for funding activities associated with preserving open space; matching to come from CPA funds.			
OS4. CONSERVATION Continue working to preserve areas of Northfield that are most important to protect from development.	1. Identify scenic views, roads and byways, and special places.	OSC Conservation Commission (CC)	ongoing	volunteer time
	2. Promote the conservation priorities identified in the Trust for Public Land Greenprinting of Northfield.		ongoing	
	3. Ensure that the consulting firm hired to do Master Plan has a list of these areas.		2013	
	4. Work with landowners, including Northfield Mount Hermon, to improve and preserve for public enjoyment natural environments such as scenic views and other landscape features.		ongoing	
	5. Discuss ways to provide land protection and estate planning information to landowners in the region (Northfield, Gill, Erving, Bernardston).		ongoing	
	6. Inform landowners about the Chapter 61 provisions for temporary land preservation and encourage the use of Chapter 61 in appropriate instances.		ongoing	
	7. Support the Historical Commission and the Historical Society in efforts to preserve the historical character of the town.		ongoing	
OS5. MANAGEMENT Assist the Conservation Commission in managing town-owned and town-managed conservation areas and conservation restrictions held by the town.	1. Discuss with the Conservation Commission ways the Open Space Committee can assist with the stewardship of the Northfield Town Forest, King Philips Hill, Brush Mountain, and potential protected land.	OSC CC	ongoing	volunteer time
	2. Arrange for briefings on the management of wetlands and protected land, and promote attendance at stewardship monitoring workshops.		ongoing	
	3. Draft management plans for potential conservation areas, such as the Mill Brook areas west of Birnam Road.		2013	

OBJECTIVE	ACTION	RESPONSIBLE GROUP(S)	START DATE	FUNDING SOURCE
Open Space Goal: Ensure that Northfield protects farmland, forest land, scenic views, and other open space vital to sustaining the town's historic rural character and maintaining the quality of air, water, and wildlife habitats.				
OS6. WATER Monitor the quality of surface water in Northfield and monitor the town's sources of drinking water (surface water, groundwater, and medium to high yield aquifers).	1. Support existing GNWA Stream Teams and recruit new members; consider establishing new stream teams in town. Help distribute the Stream Team Reports.	OSC GNWA	ongoing	volunteer time
	2. Work with the State Department of Public Health and the Northfield Board of Health on (a) monitoring water contamination of the Connecticut River and its tributaries (b) annual cleanup efforts, (c) monitoring junk & car yards, and (d) building general public awareness of pollution threats.		ongoing	volunteer time
	3. Provide educational opportunities to landowners whose land abuts tributaries to the Connecticut River watershed to help residents learn how to minimize the amount of runoff produced by their land.		ongoing	volunteer time
	4. Monitor efforts of the Connecticut River Streambank Erosion Committee.		ongoing	volunteer time
	5. Monitor the FLP Pumped Storage Facility relicensing process.		2014	volunteer time
	6. Develop detailed water supply recharge area maps for use by the Zoning Board of Appeals, in considering special permits, and by other town committees.		2013	OSC budget

OBJECTIVE	ACTION	RESPONSIBLE GROUP(S)	START DATE	FUNDING SOURCE
Recreation Goal: Ensure that Northfield maintains and improves the variety, quality, and accessibility of recreational facilities important in the twenty-first century for health and well being of all residents, and promote the use of these facilities and any organized programming thereof.				
R1. COORDINATION Work collaboratively with town boards, committees, and community organizations to achieve the Recreation Goal.	1. Members of the OSC will include representatives of related Town boards and commissions, including from the Conservation Commission, Planning Board, and Historical Commission. 2. OSC plans joint meetings with town boards and community groups as needed. 3. Maintain regular contact with each group. 4. Keep an OSC mailing list. 5. Coordinate with the Recreation Committee to incorporate recreation goals in the relicensing negotiations with FLP.	OSC Recreation Commission (RC)	ongoing	volunteer time
R2. COMMUNITY PARK Create a Northfield recreation area that includes playing fields, tennis courts, swimming, playgrounds, ice skating, and other activities for all ages.	1. Coordinate with the Recreation Commission on current and future recreational needs. 2. Sponsor public forums to obtain appropriate input for a community park. 3. Form an ad hoc Northfield Community Park Committee to further investigate the possibilities. 4. Construct a rough draft of a possible community park and a timetable for providing the various facilities. 5. Research potential locations for a community park and hold public forums to discuss these possibilities. 6. Identify sources of funding for planning, construction and maintenance of a community park.	OSC RC	ongoing 2013 2014 2016 2017 2018	volunteer time

OBJECTIVE	ACTION	RESPONSIBLE GROUP(S)	START DATE	FUNDING SOURCE
Recreation Goal: Ensure that Northfield maintains and improves the variety, quality, and accessibility of recreational facilities important in the twenty-first century for health and well being of all residents, and promote the use of these facilities and any organized programming thereof.				
R3. TRAILS Promote the use of new and existing trails in Northfield, and develop and/or improve trail systems throughout the town.	1. Write a series of columns for the Northfield Newsletter, describing a different trail in each column, complete with directions and maps.	OSC Northfield Trails Association (NTA)	2013	volunteer time
	2. Develop and disseminate a brochure or printed Northfield Trail Guide.		2014	CPA funds
	3. Provide Northfield trail maps online and link to the New England Trail and Northfield Mountain sites.		2015	volunteer time, CPA funds
	4. Assist in evaluating and acquiring signage and trailhead kiosks.		ongoing	DCR grants, CPA funds
	5. Coordinate hikes to historic sites and lesser-known trails.		ongoing	volunteer time
	6. Survey existing trail systems and conduct a needs assessment for their improvement or expansion.		2015	volunteer time
	7. Create new trails on public lands or private lands with permission, including plans for their maintenance and management.		ongoing	DCR grants, CPA funds
	8. Work with the Northfield Highway Department to design and create parking for trailheads.		2014	Town funds, CPA funds
R4. RECREATION ACCESS TO THE CONNECTICUT RIVER Increase the number of public access points on the Connecticut River, including boat and paddling launching areas.	1. Facilitate the building of a canoe/kayak launch ramp at Bennett Brook Wildlife Management Area.	OSC RC	2016	DCR grant, FLP
	2. Solicit suggestions for additional paddle access to the river.		2015	volunteer time
	3. Propose accessible river-front walkways and river-viewing stations.		2018	volunteer time

Town of Northfield | Action Plan



SECTION 10

PUBLIC COMMENT

Public input was sought throughout the entire Open Space and Recreation Plan revision process. The text and maps included in this revised Plan reflect this input. The proposed revision, including in particular the seven-year action plan, was placed on the town website and made available to the public. Explicit invitations were made to all Northfield residents, relevant town boards (including the Select Board, the Planning Board, and the Conservation Commission), the Mount Grace Land Conservation Trust, the Franklin Regional Council of Governments, and the Massachusetts Executive Office of Energy and Environmental Affairs for feedback on the seven-year action plan; all such feedback was considered in preparing the final document.

Letters of comment and approval are inserted into the plan on the following pages.

TOWN OF NORTHFIELD
BOARD OF SELECTMEN

69 Main Street, Northfield, Massachusetts 01360
Phone: (413) 498-2901 Fax: (413) 498-5103 www.northfield.ma.us



Melissa Cryan
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, MA 02114

October 30, 2012

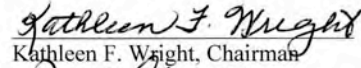
RE: The Town of Northfield's Open Space Plan

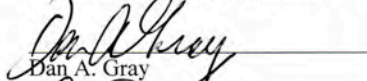
Dear Ms. Cryan:

The Selectboard of the Town of Northfield is pleased to support the revised Open Space Plan as presented by our Open Space Committee, including Jerry Wagener, Chair; Mike Barry; Joanne McGee; Sue Ross; Kate Rossiter; and Jennifer Tufts.

Thank you very much.

Sincerely,


Kathleen F. Waight, Chairman


Dan A. Gray


John G. Spanbauer

SELECTBOARD

TOWN OF NORTHFIELD

Conservation Commission

69 Main Street, Northfield, Massachusetts 01360

Phone: (413) 498-2901 Fax: (413) 498-5103 www.northfield.ma.us



November 21st, 2012

Melissa Cryan
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, MA 02114

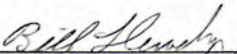
RE: The Town of Northfield's Open Space Plan

Dear Ms. Cryan:

The Conservation Commission of the Town of Northfield is pleased to support the revised Open Space Plan as presented by our Open Space Committee, including Jerry Wagener, Chair; Mike Barry; Joanne McGee; Sue Ross; Kate Rossiter; and Jennifer Tufts.

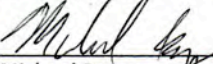
Thank you very much.

Sincerely,




William Llewelyn, Chairman

Charles Blanker



Micheal Barry



Joan Deely



Hunter Swanson

CONSERVATION COMMISSION

NORTHFIELD PLANNING BOARD

69 Main Street, Northfield, Massachusetts 01360

Phone: (413) 498-2901 Fax: (413) 498-5103

Northfield.PlanningBoard@gmail.com



November 14th, 2012

Melissa Cryan
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, MA 02114

RE: The Town of Northfield's Open Space Plan

Dear Ms. Cryan:

The Planning Board of the Town of Northfield has reviewed the revised Open Space Plan, as presented by our Open Space Committee, including Jerry Wagener, Chair; Mike Barry; Joanne McGee; Sue Ross; Kate Rossiter; and Jennifer Tufts and we are pleased to support it.

Thank you very much.

Sincerely,

Richard Fitzgerald, Chairman

Tammy Pelletier

absent

Jim Holloway

Robert Hall

PLANNING BOARD



Franklin Regional Council of Governments

December 10, 2012

Ms. Melissa Cryan
Division of Conservation Services
251 Causeway Street, Suite 600
Boston, MA 02114

Dear Ms. Cryan:

The Franklin Regional Council of Governments is pleased to endorse the work of the Northfield Open Space Committee and support their submission of the 2012 Northfield Open Space and Recreation Plan (OSRP) to the Massachusetts Division of Conservation Services for final review and approval.

As you know, the plan was developed by the members of the Northfield Open Space Committee and represents many months of diligent work by the committee to gather data and public input and work to update the maps of cultural, historical, scenic, archaeological, and natural resources in town. Throughout the plan update process, public input from residents and the town's governing bodies was actively sought and encouraged. The information gathered via a survey and a public forum was thoroughly evaluated. In particular, I was impressed by the detailed and thoughtful analysis of needs prepared by the committee (Section 7) and how these needs translated into action items in the Seven-Year Action Plan.

The Seven-Year Action Plan, numerous maps and other information contained in the plan provide Town officials and volunteers with an invaluable resource that they can consult to inform decisions regarding land use, recreation and open space. Once approved by the State, this plan will make Northfield eligible for land conservation and recreation project funding. In addition, the Town will be better able to collaborate with neighboring towns, local land trusts, the Franklin Regional Council of Governments, and others to plan for growth and development that is protective of the treasured local and regional cultural, historical, scenic, archaeological, recreation and natural resources.

We congratulate the members of the Northfield Open Space Committee for completing this project! We look forward to receiving updates from the town as it works to implement the Seven-Year Action Plan.

Sincerely,

Kimberly Noake MacPhee, P.G.
Land Use and Natural Resources Planning Program Manager

12 Olive Street, Suite 2, Greenfield, MA 01301-3318 • 413-774-3167 • www.frcog.org

SECTION 11

REFERENCES

The five pages of references included in the 2005 version of the Open Space and Recreation Plan (OSRP) have been included in this revision at the end of this section. Many of the same sources have been consulted for this revision for updated data. These include: using 2010 U. S. Bureau of the census Data to update the 2000 Census Bureau data in the 2005 edition; obtaining updated threatened and endangered species and other Biomap2 data from the Massachusetts Division of Conservation Services; using updated local workforce and related data from the Franklin Regional Council of Governments.

A tool that has become available since publication of the 2005 version of the OSRP is the online OLIVER GIS system, developed by the Massachusetts Executive Office for Administration and Finance, that allows convenient access to much up-to-date town-level geographical information, including vernal pools, endangered species, and much more. Some use was made of OLIVER during preparation of this revision, including the updated maps.

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