SECTION 4 - ENVIRONMENTAL INVENTORY AND ANALYSIS

4.1 GEOLOGY & SOILS

The geological history of South Hadley is both dramatic and significant. Continental drift, the formation of the Appalachian Mountain chain, volcanoes and glacial scouring, have all played a role in the physical development of the Connecticut River Valley. These factors have influenced the topography and soils which, in turn, have determined surface and ground-water characteristics, forest cover and finally land use.

During the Triassic Period (220 to 180 million years ago), two faults formed on either side of what is now the Connecticut Valley. The forces of continental drift pulled these faults apart causing the land between to drop and form the Triassic basin (the Connecticut Valley). The subsequent geological activity formed the topography, rocks and soils of the Valley have given present day South Hadley its landscape characteristics**.** Figure 2 shows a cross section of the sedimentary and igneous rocks in the Range and Valley and is to be used as a reference for the following discussion.

Sugarloaf Arkose

Sugarloaf arkose was the first deposit in the Triassic basin. It arrived from streams in the east which first deposited larger rocks in the eastern portion of the Valley and then dropped smaller rocks gradually westward as the streams slowed. It is a buff to pale red arkose (a sandstone with a high percentage of feldspar fragments) that gets its color from both iron found throughout the cement of this sediment and the pinkish to orange grains of orthoclase feldspar.

Hitchcock Volcanics

The Triassic era was unusually active with volcanism. Lava from volcanic fissures and low vents is manifested in different forms such as the Hitchcock Volcanics. These are stacked, volcanic cones that shot up through the early, uncemented arkoses. The arkose mixed with the bases of the cones which formed sections of diabase and basalt (a dark igneous rock).

Holyoke Basalt

This rock is one of the most prevalent in the Mount Holyoke Range today and has been quarried for use in road beds. It is also called diabase or traprock. It is reddish brown with feldspar crystals when it is weathered and light to dark gray when freshly exposed. Most Holyoke basalt was formed from a lava flow that extended southward through the basis while smaller amounts spread east and west against alluvial fans. The thickness of the flows range from 100 to 700 feet. A phenomenon known as columnar jointing occurred when the basalt cooled from its parent lava. These are hexangular joints or cracks that occur perpendicular to the cooling surface. Titan's

Figure 2

Cross Section of Sedimentary and Igneous Rocks
(Available for Review in the Planning Board Office)

Piazza in South Hadley is probably the best example of columnar jointing in the Range.

Second Sugarloaf Arkose

This arkose is much like the first but was formed after Holyoke basalt came into existence. The sediments in the second are coarser as well. This is due to the fact that westward flowing streams at this later date were running at great volume and were able to carry heavier material. Second Sugarloaf arkose outcrops are found only on the south side of the Range.

Granby Tuff

Granby tuff is made up of volcanic ash and fragments, crumbles easily and is darkly colored. Like the Second Sugarloaf arkose, it occurs on the south side of the Range. Purer layers resulted from violent, volcanic eruptions while mixed fragments indicate formation from quieter lava flows. The tuff can be up to 1000 feet thick.

Intrusions

Sills, dikes and pipes of fine-grained basalt bisect the Granby tuff and nearby sedimentary material. These intrusions are between 15 and 200 feet in diameter and rise 10 to 30 feet above the tuff surface. South Hadley's Black Rock Dike is the largest intrusion in the Range.

Longmeadow Sandstone (or the Portland Formation)

Many of the brownstones in New York City are constructed from this valuable sandstone. It is a brownstone containing quartz and iron oxide cement. Layers were deposited before and after the Granby tuff and may be 2,000 feet thick at one point. This unit is also known as the Longmeadow Shale, for it is shaley in places.

Chicopee Shale

This rock is found just south of the Mount Holyoke Range and was formed toward the end of the Triassic Period. It is finer grained than the sandstones below. The Triassic Period laid the geological foundation for what was to develop millions of years later. The Pleistocene Era, or what is commonly referred to as the ice age, arrived approximately 1 million years ago and lasted until roughly 7,000 years ago. Glacial advance and retreat during this period had a significant effect on the Valley and Range. The glaciers came in thicknesses of up to 10,000 feet scouring and carrying Triassic bedrock, clay and sand.

Till deposits (the unsorted "mix" of clay, silt, sand and boulders deposited by glacial ice) can be found on both sides of the Mount Holyoke Range today. A dam of till was formed on the Connecticut River just north of Middletown, Connecticut at Rocky Hill during one glacial retreat. This formed a series of lakes known collectively as Lake

Hitchcock that extended 160 miles north to Lyme, New Hampshire. Except for seasonal flooding, Lake Hitchcock provided the most recent important sediments in the Valley. Deltaic and Lacustrine fine sands and silts were deposits on the interior Valley floor. These deposits have contributed to the rich, alluvial soils that predominate the "tabletop" farmlands of the region.

In terms of development constraint, soils can be considered to be the most critical element of the physical environment, the understanding of which can help the community to decide, for any given location, which land uses are realistic and which are not. Therefore, careful attention to the various properties and geographic concentrations of soils can prove to be an advantage in planning for a community's open space and recreation needs.

The U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS) makes soils information available in the form of soil surveys, of which Soil Survey of Hampshire County, Massachusetts, Central Part provides the reference material for South Hadley. Although the NRCS maps many different soil classifications for the town land base, it is helpful for our purposes to distinguish between the various so-called "soil associations". These are groups of soils named for the dominant soil type, and characterized primarily by common geographic patterns, parent material, and limitations for particular uses *(see Appendix G, Map 2 for the Special Landscape Features and Soil Zones Map, and see Figure 3, "Estimated Limitations of Soils for Specific Uses").*

References to limitations contained in the following section provide a general guide only. Due to the wide variation of potential recreation development, reference to the NRCS Soil Survey should always precede the design of any specific recreational or open space project. The NRCS recognizes four soil groups or associations for the Town of South Hadley, as follows:

Roughly 38% of the Town is underlain by the **Hinkley-Merrimac-Windsor** association concentrated primarily in the eastern and southern sections of Town, and including the village of South Hadley Falls. The Hinkley and Windsor components are described as excessively drained, draughty soils, upon which plant growth is limited by the lack of available moisture. Despite the poor filtering capabilities of these soil for on-site septic systems, all of this association is currently in residential or commercial use supported by an existing public sewer system. Few limitations exist for forest management operations in this soil group, with the exception of those associated with tree growth itself. Conditions in this association are described as excellent for most recreational development.

The moderately well to poorly drained **Amostown-Scitico-Boxford** group represents roughly 34% of the soils of South Hadley. These soils are concentrated in the lowlands which spread eastward from the Connecticut River, and are predominantly loamy and clayey soils formed in postglacial outwash, that is, sorted material

Figure 3

Estimated Limitations of Soils for Specific Uses
(Available for Review in the Planning Board Office)

deposited by glacial melt water, or "lacustrine sediments". Though most of the association is in agricultural or forest use, it is described by the NRCS as limited for building and on-site septic due to wetness and slow permeability typical of the Scitico component. In general, there are limitations for recreational development in this association, especially with regards to actual construction, due to soil saturation conditions. To be successful, the scheduling of forest management operations may need to be limited to times of frozen ground conditions to be successful.

The **Rock Outcrop-Narragansett-Holyoke** association covers approximately 22% of the town land base located primarily at the northern (essentially the south-facing slopes of the Mount Holyoke Range) and southwestern sections of the town. This grouping is characterized by high, massive ridges, and shallow to bedrock conditions typical of the Holyoke soils component. This group is also a result of glacial ice deposition. All of this association is currently in forest use, with severe limitations for residential development, as described by the NRCS. The soil survey rates this association moderate to severe in limitation for forest management purposes, primarily due to steep slope conditions. Mitigating measures to protect these soils against erosion are necessary for successful forest management. Recreational development will be limited to trail system and associated construction, with particular attention to erosion potential.

Approximately 4% of the Town falls into the **Gloucester-Montauk-Paxton** association, soils which are deep, well and somewhat excessively drained, sandy and loamy, and formed in glacial tills. This grouping is confined to uplands along the eastern boundary which South Hadley shares with Granby. Most of this association is currently in forest use, and is described as having severe limitation for building and on-site septic due to the existence of surface stones. Limitations are slight to moderate for forest management in this association. A preponderance of small to large surface stones could be the primary drawback to development of recreational facilities.

Finally, 2% of the South Hadley's land base is underlain by the **Hadley-Winooski-Limerick** association which is characterized by deep loamy soils formed in alluvial material, typical of the floodplains within the Connecticut Valley. This association consists of well drained Hadley soils, moderately to well drained Winooski soils, and the more poorly drained Limerick soils, located in depressions throughout the northeastern section of town. Limerick soils are those which exhibit high water table conditions. This association is generally suited to tree and crop growth. This group is limited, however, for building purposes due to its propensity for flooding and wetness.

4.2 WATER RESOURSES

The Town of South Hadley lies within the 11,250 square mile Connecticut River Basin and enjoys the distinction of marking the dramatic transition between the primarily agricultural and predominantly industrial segments of the Massachusetts portion of the river *(see Appendix G, Map 3 for the Water Resources Map).*

A significant portion of South Hadley's major streams in South Hadley are located in the northern half of the community. Bachelor Brook and Stony Brook are two major waterways which flow westward from neighboring Granby to the Connecticut River. Elmer and Dry Brooks run south and westward from the slopes of the Mount Holyoke Range to the River. Finally, White and Buttery Brooks feed into the Connecticut River from wetlands in the south section of Town.

There are four major open water bodies in the community. At the base of the Mount Holyoke Range lies the Lithia Springs Reservoir (formerly a source of drinking water for Fire District #2) which is now part of the Mount Holyoke Range State Park. Within the Mount Holyoke College campus are the Upper and Lower Ponds parts of the Stony Brook waterway. Leaping Well Reservoir, formerly a source of drinking water for Fire District #1, is along the south side of Granby Road in the southern portion of the community. Smaller ponds include Black Stevens Pond, Titus Pond, Hillcrest Pond, and a few unnamed ponds in the Bynan Conservation Area.

The Buttery Brook corridor includes 9.8 acres of publicly owned greenbelt within the total 29.2 acres of Buttery Brook Park. A canoe launch or dock is available for public use at Bicentennial Canal Falls Park on the Connecticut River. Other private recreational facilities including Brunelle's Marina and the Red Cliff Canoe Club, also utilize these streams and the Connecticut River.

The inhabitants of the Town of South Hadley derive their potable water supply from both surface and ground water sources, administered by two separate political bodies, Fire Districts #1 and #2. District #1 serves approximately 70% of the Town's population, as well as sections of both Granby and Ludlow under a contract to purchase DCR Quabbin Reservoir water. Within this district, two water sources, Leaping Well and Buttery Brook Reservoirs, were abandoned circa 1950 due to poor water quality, in favor of the currently operated hookup to Quabbin via the Chicopee Valley Aqueduct system which went on line in 1952.

The water supplied from District #2 is pumped from the 108-foot deep Dry Brook wells located near Dry Brook Hill. This well is situated in saturated sand and gravel deposits sandwiched between the approximately 80 feet of confining clay layer above, and impervious bedrock below.

1. <u>FLOOD HAZARD AREAS</u>

   Historically, the Connecticut River has flooded both from excessive rainfall and from rain in combination with snowmelt runoff. The greatest flood of record in South Hadley occurred in March, 1936, as a result of heavy spring rains accompanied by melting snow. The second greatest recorded flood, in September, 1938, resulted from intense rains associated with a hurricane (Federal Insurance Administration's Flood Insurance Study, 1979). Tributaries of the Connecticut River, particularly Stony Brook and Bachelor Brook, are also subject to considerable flooding. The level that flooding will reach on the average of every

100 years (the 100-year flood, which has a 1% change of occurring any given year) is shown as the 1% flood zone (also called the 100-year flood plain). The Flood Insurance Rate Maps prepared in conjunction with the National Flood Insurance Program delineate zones A and V (areas of 100-year flood).

These maps for South Hadley are available at the office of the South Hadley Planning Board and are identified as Community Panel Number 250170 0005 A and 250170 0010 A: Effective Date August 15, 1979 from U.S. Department of Housing and Urban Development, Federal Insurance Administration.

2. WETLANDS

Wetlands play an important role in any community. Their functional values include flood control, aquifer recharge and discharge, pollution control, fish and wildlife habitat, increased biodiversity, recreational use and aesthetic appreciation. The Water Resources Map *(see Appendix G, Map 3)* shows the areas of forested and non-forested wetlands in South Hadley. The floodplain forest along the Connecticut River and the mouths of Bachelor and Stony Brooks are of great value to the town. (See a complete discussion of floodplain forest in Section 4.3, Vegetation.) The southeast corner of town also has extensive and unusual pine barren habitat that has recreational potential for trail users and bird watchers. White Brook, east of River Road, is another area of special consideration. This location includes many acres of relatively undisturbed wetlands, but is under pressure for future development potential. The Town may want to determine this area's importance as an undisturbed wetland. Most of the Natural Heritage and Endangered Species Program's rare habitat areas are in the wetland areas and the Mount Holyoke Range.

Town Meeting recognized the importance of wetlands in 2005 by adopting the Town's first Wetland's Bylaw. This regulation established a 50-foot no disturb buffer zone adjoining all wetlands and larger vernal pools. Through adoption of this Bylaw, the Town has taken a major step towards utilization of its regulatory tools to protect the functions of some of the natural open space.

3. AQUIFER RECHARGE AREA

The Mount Holyoke Range constitutes the watershed for the former Lithia Springs Reservoir and recharges the underground aquifer in the northern section of South Hadley. This aquifer supplies water for District #2's Dry Brook Hill wells. A Water Supply Protection District (Section 7N of the South Hadley Zoning By-Law) was established in 1992 to protect and preserve the quality and quantity of surface and ground water in this area of Town *(see Appendix G, Map 4 for the Water Supply Protection Overlay District Map)*.

4.3 VEGETATION

1. GENERAL INVENTORY

South Hadley has a diverse vegetative cover reflecting its mixture of lowland and mountain settings. Forests dominate the vegetative communities. But, the forests are themselves diverse and have played a significant role in the community's development.

In general, the forest cover in South Hadley is typical of that found in central New England and the Connecticut River Valley. The warmer, south slopes of the Mount Holyoke Range grow a forest with a predominantly oak-hickory composition including northern red oak and shagbark hickey, in direct contrast to the hemlock-white pine-northern hardwood mix found on the cool, moist northern slopes of the range.

In addition to the above, typical species throughout South Hadley include eastern hemlock, yellow birch, paper birch, as well as white pine, red maple, sugar maple, American beech, white ash, balsam fir, red spruce and white spruce, red spruce and white spruce. Associated understory vegetation and ground cover include such plants as common witch-hazel, viburnums, mountain laurel, pink lady's slipper, trilliums, tree club moss, Canada mayflower, and wintergreen.

During the Industrial Revolution of the 19th century, wood from the Range fed the kilns which baked the bricks for mill construction in Holyoke and South Hadley. The eventual use of oil and coal for fuel served to ease the pressure on the Range forests, allowing them to regenerate. Today, the forest and adjacent agricultural land provide the Town with a pleasant landscape and visual link to its past, a good supply of timber, wildlife habitat, as well as climate moderation and erosion control in the Range and watershed protection in the lower, wet areas.

The Massachusetts Natural Heritage and Endangered Species Program (MNHESP) has mapped identified 959 acres of lands classified as priority habits for 49 threatened and endangered species in South Hadley. Of the 49 species listed, 18 are animals (fish, amphibians, reptiles, birds, mussels, dragonfly/damselfly, and butterfly/moth) and the remaining 31 species are vascular plants.

The Connecticut River riparian zone contains a unique forest type especially adapted to the seasonal flow of water over the river's banks; the so-called northern floodplain forest. This special forest composition exists in successive waves of vegetation out from the river and into the floodplain. The first flank is comprised primarily of the willows and green ash which survive the immediate riverside environment to stabilize the river's banks. Farther out on the low ridges of heavy course sediment created by river flooding grows the eastern cottonwood, which pushes taproots deep into the alluvial soil. A relatively undeveloped shrub or intermediate layer of vegetation can been seen beneath the sheltering canopy of the

cottonwood, due in large part to both the shade of the over story and the scrubbing effect of river flooding. Seedlings of silver maple, elms, box elder, and white ash can be found here, as well as ostrich fern, and sedges, and grasses, depending on the light levels in a given area of the forest floor. Grapevines and american black currant are among the prolific under story plants in this section of the floodplain. Still farther back from the river, trees such as sycamore, sour gum, tulip-poplar, red maple and American beech comprise the over story. These species grow close enough to the river to be rooted in moist floodplain soils, yet far enough away from serious flooding.

According to the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife (MNHESP), the lower portions of Bachelor Brook and Stony Brook are excellent examples of "Small River Floodplain Forest", a natural community targeted as a priority for protection in the state. These floodplain forests provide habitat for several state-listed rare plant species, as well as for state-listed mussels. MNHESP advises that the greatest threat to these communities and their rare plant populations is the invasion and spread of non-native plant species.

MNHESP has indicated that the Bachelor Brook/Stony Brook area harbor two of the best examples of the state's small river floodplain forest (only 10 exist statewide). The general area of the Bachelor Brook/Stony Brook floodplain forests are known to be habitat for thirteen documented rare species – an exceptional concentration of rare species. Most of the species in this area are sensitive to the likely deleterious effects of development. Due to the very unique qualities of these lower portions of Bachelor Brook and Stony Brook, the MNHESP strongly supported and endorsed the Town's successful application for Self-Help funds to assist in acquisition and permanent protection of a 288-acre tract in 2004. This acquisition ensured that these unique areas are protected from development and clearing of the nearby upland forest, and cutting and grazing within the floodplain forest itself.

2. FOREST LAND

Forest is a major part of the open space picture in Massachusetts. The 1988 USDA Forest Service publication, Forest Statistics for Massachusetts – 1972 and 1985 reports that, while cropland and pasture comprise 5.3% of the state land base, Massachusetts forest covers over 2.9 million acres and represents over 64% of the total land area. If Massachusetts Audubon Society projections of open space consumption (over 2 million acres by 2030 based on current rates) prove correct, the lion's share of conversion will likely occur in our state's forest environment. In addition, the Massachusetts forest is undergoing fragmentation into an ever increasing number of even smaller private ownerships causing a nightmare for the planning, protection and management of our forest recreation, watershed, aesthetic, products and wildlife functions.

In many cases, the fragmentation of forest ownership into many smaller parcels marks a prerequisite to conversion. This will result in the fragmentation of larger forest tracts into even smaller parcels, causing the disruption of the necessary functions performed by our forestland.

South Hadley's forest land reflects this conversion pattern. Fifteen (15) years ago, forest lands covered approximately 6,965 acres or 59% of the total town land base. Data from the MassGIS (2003) indicates that forest lands now account for only 5,639 acres or 48% of the land area. The June, 1991 Mass. Agricultural Experiment Station Research Bulletin #735 Forest Productivity Mapping of Massachusetts, indicated that 55.7% of the forest lands were considered of prime productivity for growing eastern white pine and red oak.

The many functions of forest use are well documented (Report of the State Forestry Committee on Minimum Forest Cutting Practices Regulations). The State's primary forest activity, recreation, is critical for a state ranked 4th in the nation in population density.

The watershed function of the forest involves the sheltering of South Hadley water supplies by regulating the amount of water, its flow and quality. Watershed protection is an important characteristic of forest cover in South Hadley.

Streamside stands remove excess nutrients and sediment from surface runoff and shallow groundwater. They also shade the Town's streams and the Connecticut River to optimize light and temperature conditions for aquatic plants and animals. Streamside forest buffers against some pesticides and provides organic food to maintain the biological integrity and diversity in the adjacent stream. Figure 4, "Streamside Forest Buffer", describes these characteristics as well as management considerations for water resource protection.

The South Hadley forest serves an important wildlife habitat function as home to a large and diverse population of mammals, birds, reptiles, amphibians and fish, particularly within the Mount Holyoke Range ecosystem, as well as the floodplain forest along the Connecticut River and tributaries and the remaining open space.

Figure 4

Streamside Forest Buffer

(Available for Review in the Planning Board Office)

The scenic quality of forestland defines the "rural character" of a Mount Holyoke Range community like South Hadley. Forest production, according to sound management principles, is critical to local economies and open space retention. In many cases, keeping the land productive is the key to keeping the land "open".

Forest cover affects air quality in many ways. The forest filters particulates from the air, shades and cools forest interiors through evapotranspiration, and reduces wind and consequent drying. It is also becoming widely recognized that forests may play an important role in the helping to mitigate the effects of global warming. Every forest parcel is part of a regional and global "system" which both affects and is affected by temperature and air quality on a much larger scale.

The above describes the various forest functions which are, in fact, integral parts of each other; functions which are often misinterpreted as forest uses, such as wildlife use, recreation use, etc. In fact, the functions are interrelated and cannot be separated out from the whole. The "use" itself is forest.

Chapter 61 of the Massachusetts General Laws, the Massachusetts Forest Tax Law represents the best state-level effort to maintain forestland productivity through local use assessment and sustained-yield management planning. This program offers forest landowners the option of reduced taxation, emphasizing the long-term nature of forest growth rather than short-term building lot value, in exchange for carrying out activities outlined in a forest management plan.

All parties to the Chapter 61 program financially benefit through its participation:

- The property owner receives a direct benefit through reduction in taxes
- Communities, such as South Hadley, are entitled to bill for and receive an 8% tax on all products removed from these "classified" lands.

Of most significance from the perspective of long-term open space protection, Chapter 61 gives the community a 120-day first refusal option to purchase the land upon notification that a particular forestland parcel will be converted to another use. This aspect of the program is obviously important as part of South Hadley's overall open space planning strategy.

The Forest Tax Law program is usually a reliable measure of a community's efforts at retention of land in forest use. Based on the most current data, however, the total amount of forestland managed under the authority of this planned program in all of South Hadley is negligible: currently 30 acres or 0.6% of total Town forestland (South Hadley Assessor's Office, 2007). Opportunities exist to encourage more South Hadley landowners to participate, especially within the slopes of the Mount Holyoke Range.

4.4 FISHERIES AND WILDLIFE

Typical wildlife found in South Hadley includes such species as the eastern cottontail, beaver, northern flying squirrel, gray squirrel, Virginia opossum, wood thrush, morning dove, and downy woodpecker, to name only a few.

The larger areas of contiguous forest land in the northern portion of town are also home to white-tailed deer, bobcat, red fox, wild turkey, ruffed grouse, pileated woodpecker, barred owl, coyote, great horned owl, and red-tailed hawk.

Wetlands and the northern floodplain (found in such areas of town as the mouths of Bachelor and Stony Brooks and along the Connecticut River) are important habitat for a great variety of wildlife species. The bald eagle is on the top of this list. This legally protected bird relies on the relatively undisturbed waters of the Connecticut River for forage and nearby tall trees for nesting. Although there are no known nesting pairs in South Hadley at this time, potential areas for such activity presently exist within town boundaries.

Other floodplain and wetland wildlife includes the wood duck, great blue heron, red-winged blackbird, silver-haired bat, mink, spotted turtle, red-spotted newt, wood frog and spring peeper.

Bachelor Brook, Elmer Brook, Stony Brook and particularly the Connecticut River are important fisheries resources for the town. The Massachusetts Division of Fisheries and Wildlife has identified 37 fish species in the Massachusetts portion of the lower Connecticut River. Common species include large mouth bass, pickerel, bullhead catfish, carp, white suckers, bluegill, and yellow perch. American shad arrive in great numbers in the spring and the federally-designated endangered shortnose sturgeon has a significant breeding population in these waters. The reintroduced Atlantic salmon (Salmo salar) also make their way from the Atlantic and up the Connecticut River every spring.

The Massachusetts Natural Heritage Program has identified several areas that bear special consideration in the design of development projects in South Hadley. The entire 6.6 miles of Connecticut River riparian zone is considered protected wetlands wildlife habitat. In addition, both the area along Lithia Springs Road between Lithia Springs Reservoir and Elmer Brook, and along the Moody Corner section of town, south of Pearl Street along Bachelor Brook, are habitats for rare wetlands vertebrates. Under provisions of the Massachusetts Wetlands Protection Act, any proposed activity within these areas is to be reviewed by the Natural Heritage and Endangered Species Program for potential impact and possible modification of the project.

The Town of South Hadley should pay considerable attention to proposed development along the Connecticut River. The two protected species mentioned, the

Bald Eagle and Shortnose Sturgeon, depend on waterways that are relatively uncontaminated from non-point and point source pollution and on a somewhat contiguous buffer along the river's banks. The river also acts as an important nesting and feeding area for migrating waterfowl in the Atlantic flyway. The Town should also be careful to maintain the contiguity of its forest land in the northern part of the town. Further development could result in fragmentation and elimination of habitat for a number of species.

The Town was notified on July 30, 1998 that the Connecticut River, seven (7) miles of which forms the western boundary of South Hadley, along with thirteen (13) other rivers in the country gained national recognition as an American Heritage River. The town now shares a particular status along with other communities along the river enabling them to work in partnership to carry out 29 conservation and development projects that were proposed during the nomination process, and made specific in the nomination's Action Plan. As the process now evolves, the nomination will take on greater importance in terms of the Open Space and Recreation Plan.

4.5 SCENIC RESOURCES AND UNIQUE ENVIRONMENTS

South Hadley is rich in scenic, cultural, and unique resources and environments. Many of these resources derive from the community's unique setting along the Connecticut River and the Mount Holyoke Range.

1. SCENIC LANDSCAPES

According to the 1981 Massachusetts Landscape Inventory, prepared by the Massachusetts Department of Environmental Affairs, most of the southern slope of the Mount Holyoke Range within the Town of South Hadley is considered Class A "Distinctive" by virtue of the visual quality of this landscape. The land along the Connecticut River is described as Class B "Noteworthy". Supporting this high visual quality ranking and the threatened condition of the Mount Holyoke Range, in 2000, the Mount Holyoke Range was designated by Scenic America as one of 10 "Last Chance Landscapes". The scenic value of the Mount Holyoke Range arises from both an external view as one looks toward the range from the lowland areas and from looking down to the lowland areas from atop the range *(see Appendix G, Map 2 for Special Landscape Features).*

2. MAJOR CHARACTERISTICS OR UNUSUAL GEOLOGIC FEATURES

Titan's Piazza and the Black Rock area (see Section 4.1 Geology)

3. CULTURAL AND HISTORIC AREAS

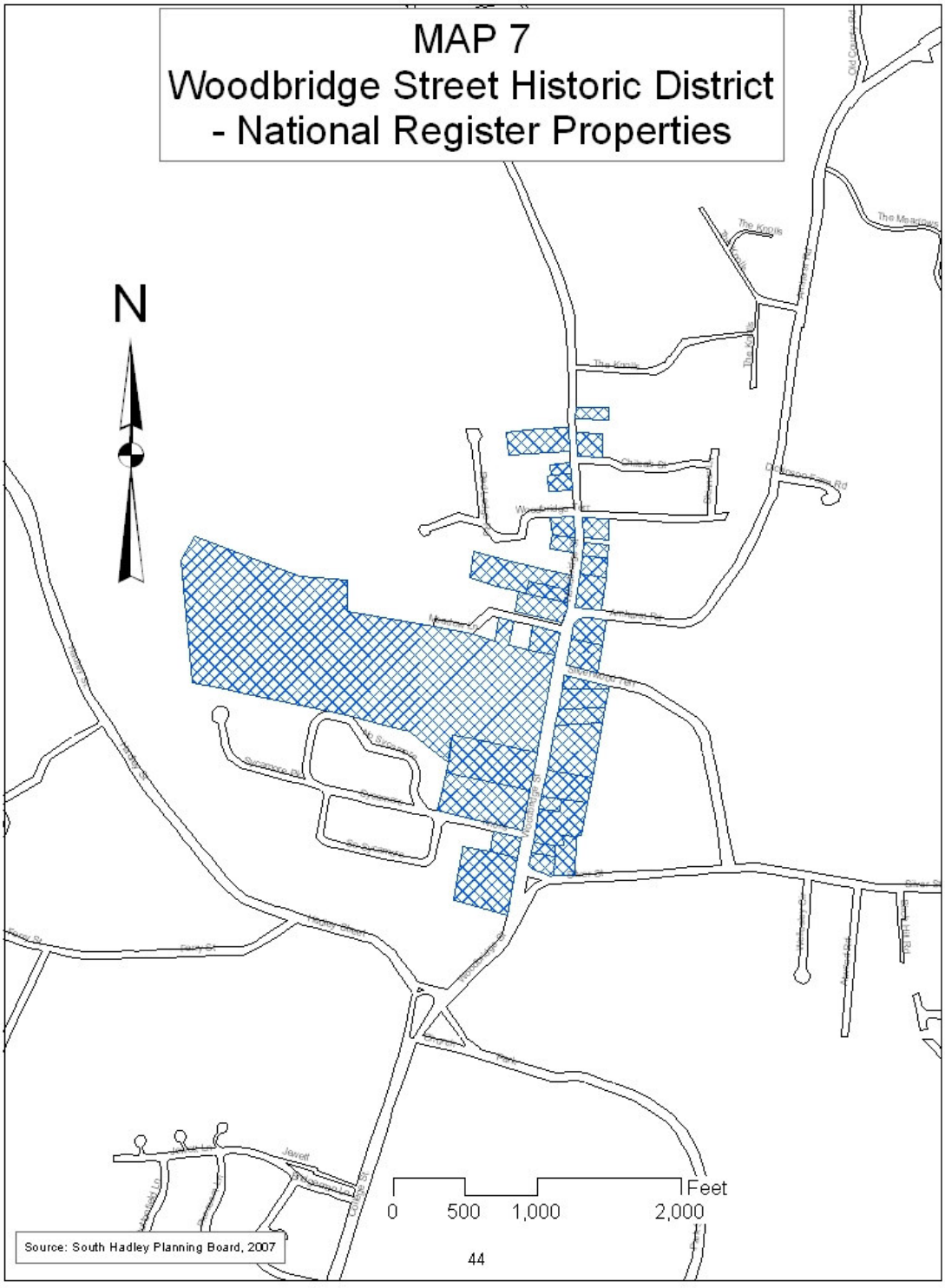
The Town of South Hadley has two significant Historic Districts which contribute to the Town's character. On March 1, 1992, the National Park Service placed the South Hadley Canal District, including one piece of property located at 315 River

Road on the National Register of Historic Places commemorating the rich history of this engineering and cultural wonder (included in Section 3.2 HISTORICAL OVERVIEW).

Also significant to the Town's historical and cultural resources is the Woodbridge Street Historic District which was established and added to the list of properties of the Massachusetts Historical Commission on November 14, 1983, and includes properties at the following locations:

7 Silver Street	-	Rev. John Lovell, Willard House
25 Woodbridge Street	-	Daniel House
28 Woodbridge Street	-	The Sycamores
29-31 Woodbridge Street	-	Lyman House
32 Woodbridge Street	-	Graves House
33 Woodbridge Street	-	Skinner Museum
35 Woodbridge Street	-	White, Joseph III
36 Woodbridge Street	-	Skinner-Harris House
40 Woodbridge Street	-	White, Dea J. House
41 Woodbridge Street	-	
43 Woodbridge Street	-	Clark Isreal House
48 Woodbridge Street	-	Skinner
49 Woodbridge Street	-	Chapin House
51 Woodbridge Street	-	Tinkhas House
53 Woodbridge Street	-	
61 Woodbridge Street	-	
63 Woodbridge Street	-	Montague House
64 Woodbridge Street	-	White Cyrus House
68 Woodbridge Street	-	
69 Woodbridge Street	-	
70 Woodbridge Street	-	
71 Woodbridge Street	-	Seith-Steven House
77 Woodbridge Street	-	Saith, Arthur House
78 Woodbridge Street	-	White, Major J., Sr, House
82 Woodbridge Street	-	White J. Sr. House
92 Woodbridge Street	-	Barrett House

This district is limited to a portion of Woodbridge Street north from the Town Common and extends for about one mile (see Map 7).


MAP 7
Woodbridge Street Historic District
- National Register Properties
N
Feet
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500
1,000
2,000
Source: South Hadley Planning Board, 2007
44

4. AREAS OF CRITICAL ENVIRONMENT

With its setting bounded by the Connecticut River and the Mount Holyoke Range and its abundant and rich history, and extensive vegetation, it is of no surprise that South Hadley has several areas of "critical environment". Generally, these areas fall into six categories:

- The Mount Holyoke Range
- Large woodland tracts
- Farmland
- Scenic roads
- Riverfront
- Acquifer recharge

Mount Holyoke Range. A relatively large portion of the Mount Holyoke Range in South Hadley, as it is generally identified, is in public ownership with permanent protection. However, an equally significant portion of the Mount Holyoke Range is not in permanently protected status. Public lands can be sold. Private lands can change hands from a conservation-oriented owner to one who is not committed to conservation. As development moves northward and land prices continue to rise in South Hadley, the potential for owners to sell land for development and the amount developers are willing to pay will increase. Development of just a few of the larger tracts could result in irreversible loss of habitat.

A regional Land Use Task Force initiated an effort in 2004 to explore designation of the Mount Holyoke Range as an "Area of Critical Environmental Concern". However, after reviewing the criteria for designation, particularly the rules governing the definition of the boundary for such an area, the Task Force elected not to pursue such designation even though the members were in agreement that the "Mount Holyoke Range" as it is commonly identified met the environmental criteria for such designation.

Large Woodland Tracts. The Town has several large woodland areas on the Mount Holyoke Range that abut the Towns of Amherst, Granby and Hadley. Some of these are not in conservation status, thus, they are subject to being sold for development. A few other large woodland tracts on and off the Mount Holyoke Range are in private ownership and could be sites for residential development, quarry development, or other ecologically disruptive uses. Several of these parcels are in public ownership and efforts must continue to obtain additional parcels currently in private ownership either through gifts, easements, outright purchase, or by a combination of these if the opportunities for hiking, camping, hunting, nature studies and the enjoyment of views and vistas are to continue.

Farmland. South Hadley has one significant actively operated farm. A few small "farms" also exist. However, much of the other land that is considered "farmland" by the general public are no longer used for active farm purposes. As the farm operations cease and residential development occurs, pressures increase on the remaining farms to convert to growing houses versus crops or dairy. Most apparent in this change is the Alvord Street area which has seen a rapid decline in open, agricultural lands. If this trend is left to continue, it will be the demise of the rural/farming community that this Town has been identified with. The State purchased the development rights to a 130-acre parcel on this street and continued efforts should be made to promote this type of land protection for the future.

Scenic Roadways. Town Meeting has designated three roadways as "scenic roads" pursuant to MGL, Chapter 40, Section 15C: Pearl Street, Alvord Street, and a portion of River Road. This designation offers protection for trees and stone walls when their alteration is to be part of a roadway improvement. While this offers some protection to the roads themselves, it does not protect the corridors or the adjacent land from the impacts of land development. Of particular concern are the properties at the foot of the Mount Holyoke Range and along the Connecticut River. In the case of River Road, the corridor along the Connecticut River has already been largely developed. Through the provisions of MGL, ANR lot development can occur along any of these roadways and have the effect of disrupting the features that make these roadway scenic.

Riverfront. South Hadley is graced by having over 6 miles of river along the Connecticut River and many more miles of frontage along numerous perennial streams and brooks. Increasingly, these sites are being viewed as attractive for residential development. Unfortunately, as noted earlier, these sites are increasingly being subject to development pressures.

Acquifer Recharge Areas. Fire District #2 obtains its water supply from wells on Dry Brook Hill. As development moves northerly in a more dense and concentrated fashion, the potential harm to the water supply increases. Much of the land which is the recharge area for these wells is private ownership. Some of the existing uses, such as quarrying, is adverse to the operation of the wells. While the Town has a Water Supply Protection Overlay District, this level of protection is not adequate for the most critical portion of the recharge area. Accordingly, public acquisition of the immediate areas around the wells should be a high priority. Additionally, the Town, working with Fire District #2 – Board of Water Commissioners, should take aggressive action to ensure that existing and future developments do not jeopardize these wells either from direct contamination or by deferring runoff which is needed to recharge the water supply.

4.6 ENVIRONMENTAL PROBLEMS

Due to its largely bedroom-community character, South Hadley is not as threatened by environmental problems as much as some of the nearby communities. However, the

community does have two potential sources of environmental problems unique to South Hadley:

- Sanitary landfill operation
- Hazardous waste sites

Sanitary Landfill. In 1992, the Massachusetts Department of Environmental Protection found that the unlined South Hadley sanitary landfill was leaking 1,4-dioxane into the groundwater. The landfill has been designated a priority "21E site." The Chapter 21E legislation, titled the Massachusetts Oil and Hazardous Materials Release Prevention and Response Act, was enacted in 1983 to protect supplies, wetlands and wildlife habitat.

This contamination of groundwater continues being assessed for its threat to public health and to determine what remedial action needs to be taken. Owners of wells in the vicinity were notified and advised to use municipal water. Surface waters in the area are also being monitored for contamination, and Buttery Brook has been posted to alert the public to avoid using the waters for recreation.

The contamination from the landfill potentially affects open space and recreation in several ways. Buttery Brook Park is downstream of the contaminated groundwater plume. People picnic and play along the brook, which also passes through animal pens in the park. The Bynan Conservation Area, with its extensive wetlands and ponds, abuts the landfill. Local children play here year round. Wildlife in the wetlands could also be affected.

Independently of this problem, the Town closed and capped its unlined sanitary landfill, as is legally required by the State. With DEP approval, the Town contracted operation of the landfill to a private vender and opened a lined, expanded cell in 2005. The Town and its contractor have taken necessary measures to ensure that this new operation will keep any leachate out of the groundwater. The Town is currently considering further expansion of the landfill. Operation of the landfill has resulted in issues of odors affecting surrounding neighborhoods. The Town's Board of Health continues to monitor the area and respond to complaints to ensure that no toxic or hazardous fumes are being emitted.

Hazardous Materials. Though largely a bedroom community, South Hadley has several industrial operations utilizing hazardous materials. These plants have, historically, not created any environmental issues. In the Fall, 2006, an industrial accident at one plant did create a hazardous materials incident of a temporary nature. Generally, the use of hazardous materials does not impact open space or recreation since the materials are generally confined indoors and do not escape to the groundwater supply or water bodies.