CHAPTER 3: LAND USE & COMMUNITY VISION

1. INTRODUCTION

Community land use patterns are the physical expression of past decisions as well as of past failures to make decisions. Future land use patterns will emerge from existing patterns plus a series of future decisions made and not made. It is the purpose of this chapter to provide a framework for future land use decision-making in Hanover by exploring the relevant values and goals of the community, as well as the opportunities and constraints of both geography and existing development. That information is the foundation for recommended planning guidelines which promote land use in Hanover in ways that support the aspirations of the community and protect and promote its health, safety and welfare.

The Town of Hanover, New Hampshire, is a college town that has maintained a distinctive New England character. Attractive elements of that character include:

- a beautiful natural setting;
- a relatively densely populated and attractive downtown offering a variety of services;
- an active college center and associated cultural, sports, and recreational amenities;
- a strong public education system;
- outstanding public facilities;
- an adequate water supply;
- excellent employment opportunities;
- a variety of recreation activities; and
- a compatible mix of urban and rural neighborhoods.

This quality of life generates growth and development pressures that could lead to its demise. Recognizing that change is inevitable, we choose instead to maintain this character by circumscribing and guiding growth. Public surveys support this effort. Maintenance of the quality of life that residents cherish is the focus of our planning efforts, described in the Master Plan and implemented in our land use regulations and public policies.

Section 2 of this chapter summarizes the values and goals of the community in relation to future development. Many of these are described in detail in other chapters. In addition, there is a summary of surveys and focused studies that have been solicited by the Town that provide valuable insight.

Those aspects of present land use and geography that either support, threaten or constrain desired development patterns are summarized in Section 3.

Finally, Section 4 presents planning strategies and recommendations which emerge from considerations of the two previous sections, and also identifies several areas in which proactive decisions need to be considered. Appendices include extensive information regarding land use trends and reports and studies that support this land use chapter.

2. COMMUNITY VISION, VALUES AND GOALS

Fortunately there is a considerable body of information offering insight into the goals and values of the community as well as factual information relevant to ongoing planning activities and physical aspects of land use. These resources, all available at the Town Offices and libraries, include the following surveys and reports:

1. Systematic surveys of public opinion on a variety of topics relevant to Hanover's future were conducted in 1974, 1981, and 1994.

The survey forms prepared by people experienced in survey techniques were distributed to all residents. Fortunately, there was very substantial overlap in the questions asked in these surveys, so trends over time can be identified. Relevant results are summarized in Appendix 3-1.

2. *Hanover Master Plan of 1976, and Master Plan Revisions of 1986.*

These master plans have guided the town for more than a quarter of a century. The 1974 and 1981 community attitude surveys, mentioned above, were commissioned as part of the preparation of the 1976 and 1986 master plans.

3. *Something For Everyone; The Scenic Locales Committee Report to the Town of Hanover, NH,* August 1998.

A nine-member committee was charged by the Selectboard with identifying areas of particular scenic value in Hanover. Twelve hundred randomly selected households were surveyed, and about 75 suggested sites were evaluated by various criteria. In addition to identifying a list of 9 "high priority" sites, the committee presented a broad range of "Recommendations for Municipal Action" designed to greatly improve the ability of the Hanover community to identify and protect its treasure of scenic locales. A summary of the report's main recommendations is contained in Appendix 3-2.

4. *Guiding Growth In Rural Hanover: Citizen Meetings and Community Survey on the Future of the Less Developed Parts of the Town,* December 1999.

Initiated by an ad hoc committee of rural residents with the approval of the Planning Board, this study was based on a survey sent to most rural landowners in Hanover, followed by extensive discussion at well-attended public meetings. The final report presented substantial consensus on issues of rural character, transportation, commerce and village area, open space, and zoning.

5. *Natural Communities And Rare Plants Of Hanover, New Hampshire: A report submitted to the Town of Hanover, New Hampshire* by the New Hampshire Chapter of the Nature Conservancy, March 2000, and *Botanical Survey Field Work*, addendum by Alice Schori, December 2001.

Funded by the Town of Hanover, the Hanover Conservation Council, and the U.S. Fish and Wildlife Service Silvio O. Conte Wildlife Refuge, the *Natural Communities* study aimed to

"serve as a starting point for the accumulation of a more detailed inventory of habitats and biodiversity; collect information on species and communities; provide information useful for conservation planning; and enhance knowledge and appreciation of Hanover's rich natural endowment." The addendum, a study which re-examined sites at different times in the growing season, was conducted during 2000 and 2001.

6. *Downtown Hanover Vision,* April 2001.

The Downtown Visioning Committee was established by the Hanover Selectboard in November 1999 in recognition of the fact that substantial projects affecting the downtown were in early planning stages, including, for example, expansion or relocation of the Howe Library and the Hanover schools, development of extensive properties recently acquired by Dartmouth, and a recognized need to revisit zoning and parking impacts on commercial development in the downtown area. The study reports a vision for the downtown which includes the following elements: the commercial center should reinforce Hanover's sense of community; commercial spaces should be available in the center to provide places to work, to serve the retail needs of daily life and offer opportunities to gather, relax and be entertained; housing should be an important component of the downtown and buildings within the downtown may be diverse in function but should be relatively compatible with their neighbors in size and in disposition on their lots.

7. *Affordable Housing Feasibility Study,* July 2001.

The Hanover Affordable Housing Coalition was established in Summer 2000. Its progress and recommendations are reported elsewhere in this document. The importance of translating these recommendations into practice was recognized by the Hanover Selectboard in September, 200l by the establishment of a Hanover Affordable Housing Commission.

8. *Dartmouth College Master Plan,* 1998.

Dartmouth College is in the early stages of an ambitious construction program, both on and off campus, including major projects of library expansion, faculty housing, development of the north campus, graduate student housing, academic facilities for biology, mathematics and engineering. A summary of Dartmouth's master plan is given in Chapter 10.

9. *Open Space Priorities Plan*, December 2000.

A committee appointed by and working under the auspices of the Hanover Conservation Commission began its deliberations in November 1999. In this comprehensive report, specific areas of Hanover that should receive priority for open space protection are identified. Recommendations are supported by criteria for evaluating important areas, actions by which to achieve the goals of the plan, and techniques by which those actions might be accomplished. The Open Space Committee, a standing committee of the Commission, has been established to facilitate implementation of recommendations of the report using the town's Conservation Fund and other means. A map showing the open space priorities is included at the end of Chapter 5 and a summary of this report is contained in Appendix 3-3.

10. *The Long Term Viability Of The Hanover Water System*, Winter 2000; *Vox Clamatis in Metropolite*, Winter 1998; and *Land Use Planning In Hanover: Policies And Mechanisms For Implementing The Open Space Priorities Plan*, Spring 2001.

These are three Dartmouth student reports, prepared for Environmental Studies 50, a course at Dartmouth in which the entire assignment of a class of 25-35 students examines a single local or regional topic of environmental interest. The assignment is to examine the issue, consider possible policy options, and to make recommendations. Results are prepared in a written report and a public presentation.

Core Principles

A dominant and recurring theme that is central to virtually all of these reports is that Hanover residents attach very high priority to preserving the quality of life they now enjoy. They value living in or near the vibrant, user-friendly and intellectually stimulating urban community of downtown Hanover, while enjoying the aesthetic and recreational opportunities of a beautiful rural setting. At the same time, they are acutely aware that continuing steady or accelerating rates of growth and development have the potential for undermining those values through sprawl, traffic congestion, wildlife habitat destruction, loss of open space and rural character, disruption of the recreation network, light pollution of the night sky, and many other unintended side effects of poorly conceived and poorly managed development. What the authors of the *Scenic Locales Report* say about the importance of scenic areas, could well speak for the community priorities for overall land use policy:

> *Hanover's scenic landscape is vital to the town's identity and economy. It touches the lives of everyone. Directly or indirectly, it provides income, recreation, aesthetic and spiritual opportunities for all. It is the foundation of our quality of life. …This study underscores the public's unequivocal mandate for scenic protection, and provides guidance for a multi-faceted action program by which the town government, institutions, businesses, landowners and the public can find ways to ensure that the landscape that brought and keeps us here, and brings people from all over the world, will be sustained into the future and not be randomly chipped away until only token fragments remain.*

The community's concerns are succinctly stated in the "Guiding Growth" document's "Key Findings":

> • *(there is) a sense of vulnerability – we risk losing rural character if we don't take action*
> • *We should proactively manage growth*

Because the rural community has stated a clear preference for saving its rural character, this term must be defined to be understood. Based on responses to the *Guiding Growth* survey, "rural character" has been defined as "quiet, privacy, dark night sky" and "woods, wildlife, farms and fields". Thus, this master plan aims to promote and protect those aspects of rural character as the town grows into the next century.

Preservation of the quality and variety of Hanover's community character is very important to accommodating any new population growth or development. The eventual size and rate at which it is achieved should be controlled so that the existing character does not become overwhelmed and so that change can be assimilated into the community's fabric.

The existing physical development pattern of the town, which is a result of over 240 years of the town's evolution, should be both respected and protected. (see Maps 3-1 and 3-1a, Existing Land Use) Broadly, this pattern consists of identifiable focal areas of historic settlement, such as the urban area, Hanover Center, and Etna Village, set in a human-created rural landscape. This rural landscape is itself framed and punctuated by extensive forests, wetlands and topographically prominent hills and mountains, relatively free from human intervention.

We should continue to maintain this equilibrium that we have achieved with a thriving, attractive denser urban portion of the town, both commercial and residential, with central civic facilities, and a rural area designed to fit the capabilities of the land and visually arranged to retain its rural character. The success of this model has allowed our citizens to enjoy a high quality of life. Property owners should have the reasonable expectation that the Hanover life they have invested in and enjoy will be maintained.

An important consideration in land use planning is using the concept of land capability to direct development to lands suitable for development and to recognize that structures are but one of several competing uses of land; other uses include groundwater recharge, habitat, open space, recreation, protection of steep slope stability and scenic vistas. Not all land is suitable for building. Constrained land, such as wetlands which have low development value, and lands with important natural values, such as heavily-vegetated steep slopes, which control runoff and erosion and absorb pollutants, should be carefully considered as to whether they should be counted in density calculations. To count these lands in density calculations based on acreage alone, without consideration of the suitability of that acreage to actually support development can result in granting to the development densities that may be quite inappropriate to the site. Further, to drive up market value of inappropriate (undevelopable) lands leads to design challenges and land use quite unrelated to the nature of the site, and devaluation of the important environmental functions served by the "constrained" lands. Degradation of the downstream habitats and decreased flow in streams are some secondary effects of ignoring these constraints. For these reasons, environmentally sensitive lands of high resource value may be excluded in whole or in part from the calculation of development density.

Overall, it is clear that the Hanover community expects the land use principles of its Master Plan to provide a framework that will follow these core principles:

1. *Protect and preserve our natural resources*: These include both urban and rural open space, wildlife habitat, water and wetlands, agricultural and forestry lands and associated recreational resources.
2. *Respect, protect and strengthen the distinctive qualities of the urban and rural parts of Hanover:* We should strive to sustain the present 3:1 urban/rural population ratio. We should enhance the vitality and small, college-town character of the urban area and its

neighborhoods. Green space should be sustained as a background to the urban area. We should preserve the character of our rural areas and villages.

3. *Actively manage future growth*: We need to manage the rate, nature, and location of growth in view of their effects on municipal capital expenditures and the tax rate and to ensure that future growth is in keeping with the existing character of the community.
4. *Encourage affordable and diverse housing and development where served by existing municipal infrastructure*: The current public water and sewer service area should not be extended beyond its current extent, and development should be managed to minimize the need for new roads, schools, and other municipal infrastructure.
5. *Expand opportunities for, and accessibility to, outdoor recreation:* All residents and neighborhoods should be within easy walking distance of publicly accessible open space and natural recreation areas.
6. *Reduce excessive reliance on automobile transportation and its adverse impacts:* We should work with area employers and neighboring communities to manage local and through traffic, minimize its impacts on our community, and make the community more pedestrian-friendly. Development should be directed to transit-accessible areas, and multi-modal transportation should be promoted.
7. *Preserve a healthy balance between community and campus so that neither dominates nor has an adverse impact on the other:* Maintenance of this balance is central to retaining and preserving the essential attributes of Hanover as a small, attractive and livable New England college town. A key element in maintaining the core characteristics of the existing community is the need for enhanced interaction between the Town government, residents of the Town, and Dartmouth College.

3. DRIVING FORCES AND CONSTRAINTS INFLUENCING GROWTH IN THE 21ST CENTURY

While the land use policies of a master plan may aim to implement the aspirations of the community, they should be built upon the realities of past development history and local geography, variable demographic trends, and the regional context. A brief summary of the history and current status of land use in Hanover is contained in Appendix 3-4. In this section we examine demographic, physical and social circumstances that in one way or another must be considered as driving forces or constraints to growth.

Population and development trends

The population chapter of this document describes the difficulty in understanding past population trends in Hanover, much less projecting future trends. It particularly emphasizes the uncertainties introduced by a large College student population, Hanover's increasing popularity as a retirement community, and the major influence of two large regional employers, Dartmouth College and the Dartmouth Hitchcock Medical Center.

It is reported in Chapter 7 that Hanover's population grew by a total of 7.4% during the 1970's, but slowed to 1% during the 1980's. The recently released United States Census reports a 17.8% increase during the 1990's. All of these numbers include the Dartmouth student

population in residence at the time of the Census. If the in-residence student population is excluded from the Census population, the overall growth of the Town population from 1950 to the year 2000 is 67.5%, an approximately 1.0% compounded annual rate of growth.

The number of households is probably a more useful measure of development pressure than the population, and this grew by 19% during the 1970s, 10.5% during the 1980s and 13.6% during the 1990s. This represents an annual increase of 1.7% between 1970 and 2000, slightly larger than the population growth rate. Given the extremely active building programs of both the College and the Medical Center projected between 2000 and 2010, the housing demand in that period is likely to exceed the 1.3% compounded annual growth in households of the last three decades, and an approximately 1.0% compounded historic annual rate of population growth. In response to anticipated increases in development pressure, land use planning in Hanover must anticipate steady new housing demand.

Biodiversity

The natural infrastructure- the combination of vegetation, water, soil, and topography- creates a landscape that is cherished in Hanover. The landscape is valued for its ability to provide clean water, wood to supply mills and domestic wood stoves, habitat for both flora and fauna, recreational opportunities, and scenic beauty. According to reports documenting Hanover's biodiversity, Hanover is situated to support a variety of plants, some of which are rare or endangered, and a population of animals whose balance is increasingly threatened by destruction of habitat with associated fragmentation of open areas and invasive plants.

In Hanover, preservation of biodiversity in an ecosystem that will support the diverse mix of plants and animals necessary for that system to be sustainable is a priority. The plan for open spaces embodied in the proposed Land Use Concept Map is structured to support biodiversity.

Agricultural lands

Some fragments of Hanover's agricultural past are still with us. But, with a handful of exceptions, it is probably true that our traditional dairy and sheep farming days are over. A major problem is that land prices have become too high for farmers to buy tracts large enough to support those activities.

But dairy and sheep farming are not the only forms of agriculture. In an article titled *Agriculture is Big Business in New Hampshire* by John C. Porter, printed in the *Concord Monitor* on February 9, 2003, it says,

> "Over the years, the dairy industry declined and people automatically assumed that the state's agriculture was on a downward trend as well.
>
> Actually, just the opposite is true. New Hampshire is one of the few New England states where agricultural enterprises are on the rise. The growth areas are in ornamental horticulture, small fruits, vegetable, and specialty crops."

These crops take much less land than traditional farming. A very small number of acres can support a family or provide supplemental income. So, while active agriculture may be at its

lowest ebb in Hanover since Colonial days, small-scale, specialty, affordable farming is a growth industry in New Hampshire, and could become a significant part of Hanover's future.

Rather than jeopardize the possibility of locally-produced food, which is always desirable and may be necessary in the future with prohibitively expensive transportation or other problems, it would be conservative to recognize the special role and characteristics of productive soils and to take steps to ensure the possibility of their use in the future. Development is completely destructive of the soils on which it rests. It destroys soil structure and its drainage, mixes in inappropriate materials that would be costly or impossible to remove later, and destroys the living organisms necessary to growing crops. The old adage, "Asphalt is the last crop", is also a truism. With soils, "gone" is gone. For these reasons, development should be guided to locations other than agricultural soils. (see Figure 4-2 for a listing of these soils)

Land capability

The fundamental premise of the concept of land capability is that the natural features of the environment vary from place to place in their ability to support development. Steep slopes, flood-prone areas, wetland soils, the presence of bedrock at or near the surface and availability of a sufficient supply of clean drinking water can serve as major constraints to development and/or disruptions of natural systems. Efficient and environmentally sound planning seeks to guide growth into areas with adequate natural capacity to support development.

With this in mind, the first major constraint to land development in Hanover arises from the fact that the Moose Mountain ridge divides Hanover from north to south and comprises a large percentage of Hanover's land area. A significant part of the area is conserved by the Appalachian Trail corridor. This area and the area to the east is now zoned as "Forestry", with only seasonal development allowed. Because of its scenic, recreational, and biodiversity values, its topography and the great difficulty and expense of providing town services, this area should remain zoned to accommodate the least intensive uses; development should continue to be severely restricted on Moose Mountain, both flanks, and to the east of Moose Mountain.

As defined in the Natural Resources Conservation Service (NRCS) Soil Survey, soils with a high potential for development are relatively scarce in Hanover. According to NCRS, sixty-two percent of the land area in Hanover has soils that are considered of low or very low potential for development due to depth to seasonal high water table, slope of the land, depth to bedrock or hardpan, and/or surface rockiness. Severe limitations to development that might involve leach fields, dwellings with basements and local roads are posed by soils in 44% of the Town. As presented in detail in Chapter 4, natural constraints to development posed by land characteristics in Hanover include:

- Slopes - almost 40%, 12,740 acres, of the land in Hanover is greater than 15% slope. While not all soil/grade combinations present severe erosion potential, generally slopes greater than 15% require careful site planning, erosion control and special care for the disturbed soils;
- Shallow depth-to-bedrock soils - nearly 30%, 9,550 acres, of the land area in Hanover probably has bedrock within two feet of the surface as delimited by NRCS;
- Wetlands - over 9%, 3,000 acres, in Town are defined as wetland by NRCS;
- Flood plains - nearly 1%, 466 acres, of Town are flood plain soils as defined by NRCS.

Recognizing these and other limitations, the following land classification system has been incorporated into our concept for land use and is shown on the Land Use Concept Map at the end of this chapter.

- Development should be excluded from environmentally sensitive lands of high resource value: floodplains, wetlands (including hydric soils), headwaters of major streams, perennial stream courses and adjacent natural buffer, and steep slopes. These lands should be excluded in whole or in part from the calculation of development density. This exclusion may be applied differently to areas served by the existing water and sewer infrastructure from those that are not.
- Development may be permitted, subject to stringent review that includes impact identification, avoidance, and mitigation, on lands of moderate resource value: lands with important agricultural soils and moderate slopes, aquifers, hilltops and ridgelines, significant identified wildlife habitats and corridors, and areas of identified biodiversity.
- Certain other lands, especially those significant to open space protection, may be developed only after stringent review and mitigation.
- Development may be permitted on remaining lands with due regard for its effect on the established character of developed and natural areas, and on public infrastructure.

In summary, the topology and hydrology of Hanover place substantial constraints on the ability to accommodate indefinite and unmanaged growth. The Town therefore should reserve remaining land suitable for development and develop land use controls to enable its future use.

Build-Out analysis

One way to envision the future of a community is to consider what the town would be like if all of the land was developed according to a set of assumptions about how development will occur and by adherence to the current rules for development established by the town's land use controls. A build-out analysis of Hanover carried out in 1998 by the Upper Valley Lake Sunapee Regional Planning Commission, revised to reflect the 2000 Census, projects that at full build-out under present zoning, the current population of 10,850, occupying 2832 dwelling units, would grow to a population of 20,493 occupying 6457 dwelling units. A detailed presentation of the 1998 build-out analysis, including breakdown by area and discussion of methodology and limitations, is included in Appendix 3-5.

Despite the many qualifications which must be attached to such an analysis, it seems valid to conclude that with continued growth, 2003 zoning controls (see Map 3-2 and 3-2a, Zoning 2003) would lead, roughly, to a 100% increase in the Hanover population, and a 130% increase in housing units. If not carefully planned, growth of the magnitude and distribution depicted in this build-out scenario could be inconsistent with the community values and goals described in Section 2 of this chapter as well as the land and water resources. Such growth should be managed carefully to minimize impacts on town services, and, on average, at a rate of growth consistent with the preservation of community character. It is, of course, impossible to predict when the "point of full build-out" would be reached, but conceptually it can be noted that a continued 1% per year growth leads to a doubling in 70 years, roughly the projection of the 1998 build-out analysis.

The rate of growth is governed by many local and regional factors, such as the regional demand for housing, the regional economy and the College's and Dartmouth Hitchcock Medical Center's building plans and Hanover's attractiveness to retirees. Currently, there are no regulations in effect in Town that control the rate of growth. Should such regulations be developed, they ought to be related to the Town's ability to accommodate and pay for increased services needs and the rate of growth of the School budget and Selectmen's budget, especially for infrastructure improvements.

A build-out analysis has been developed by the Planning and Zoning Department staff based on the recognized constraints and established goals, shown on the Master Plan Land Use Concept Map (Map 3-4). The results of this build-out analysis are shown on Map 3-5. An eventual maximum population of 17,133 is projected with a total of 5,373 dwelling units. The land use concept in the plan keeps the balance of population in the rural and existing municipal service areas of the Town at roughly the same proportion as it is today, with approximately 75% of the residents living in the area currently served by water and sewer and approximately 25% in the rural portion of Town. Regulations will need to be developed with a view toward managing the financial impact of this growth as well as the pace and location of the growth.

4. STRATEGIES AND GUIDELINES FOR THE FUTURE

In this section guidelines for future land use development in Hanover are presented. Strategies which derive from the visions developed in Section 2 of this chapter and driving forces/constraints described in Section 3, are presented first, leading to explicit guidelines and some specific recommendations. (see Maps 3-3 and 3-3a, Generalized Future Land Use)

Strategies

Several strategies for guiding growth emerge from the first parts of this chapter.

Prevent Sprawl The first of these is the importance of the relationships between development density, open space and rural character. This subject of concern might best be defined as the sprawl problem. One of the earliest uses of the word "sprawl" in terms of land use was in a 1937 speech by Earle Draper, then director of planning for the Tennessee Valley Authority: "Perhaps diffusion is too kind a word. ... In bursting its bounds, the city actually sprawled and made the countryside ugly ..., uneconomic [in terms] of services and doubtful social value." While there is no universally accepted definition, the Vermont Forum on Sprawl concisely defines sprawl as "dispersed development outside of compact urban and village centers along highways and in rural countryside."

The Hanover community has stated repeatedly that it wants development to proceed in ways that protect open spaces, scenic views, farmlands, historical landmarks, diverse ecosystems, wildlife habitats, recreational areas, and unique residential areas, and with a general respect for the environment in both rural and urban areas. This strategy leads to a recommendation that priority be given to development in which meaningful open spaces share the landscape with relatively higher density residential and commercial development. In downtown Hanover this means a priority for high-density development including apartments, multi-family houses, and multi-use commercial/residential buildings. In new housing

developments outside downtown it gives priority to cluster and planned residential developments that achieve open areas by clustering the housing in one portion of a lot.

On a larger scale, this strategy leads us to recommend planning for new village centers in the Centerra North and Dresden areas, and to devise ways to protect both the character and the viability of the existing downtown and the village of Etna and Hanover Center, all while simultaneously protecting landscape assets of defined community value. New village centers at high residential densities should be encouraged in ways that will promote housing diversity and affordability and that will facilitate increased use of non-automobile commuting. Village center development should respect and be enhanced by critical natural resources, such as the Connecticut River, Rix Ledges, and the Mink Brook corridor. New village centers should be organized around a common and supportive neighborhood commercial uses, contain significant open space and provide usable connections into the town-wide trail and open space system.

For the existing villages of Hanover Center and Etna, their unique characters should be respected and enhanced. New development should be fostered only as appropriate to the distinctive character of each.

The Town should be divided into areas where different development densities are allowed, taking into account terrain, supporting infrastructure requirements and the community's clearly expressed goals. Proposed types of new development are: forestry, sparse, very low, low moderate and high. Specific recommendations are contained in the *Master Plan 2003 Land Use Concept* and accompanying map included at the end of this chapter.

Preserve Downtown Character A second strategy is the importance of preserving downtown character**.** Part of this, of course, is covered in the preceding paragraph, but beyond that is the image conjured up by the description of Hanover as "a small college town." The presence of Dartmouth is, of course central to this image, and Hanover's land use planning needs to continue in ways that support the College's development as part of the town. It also means that the College should guide its own development in ways that respect and enhance the Town's small-town character and support the goals expressed in this Master Plan. The recent construction of high-density moderate cost faculty and staff housing in and around downtown is an example of such an approach. Another important element of preserving downtown character is maintaining the small town atmosphere. This small town atmosphere can be reinforced by keeping the town offices, a post office, the Howe Library and the high school in the downtown close to the in-town neighborhoods. Hanover's recognition as a "Tree City" speaks to its attention to planting in the downtown. This program should continue.

This town character also requires a community that is pedestrian-, transit- and bicycle-friendly – a community that gives priority to people rather than cars. The recent creation of a free bus system supported by Hanover, Lebanon, Dartmouth and the Dartmouth Hitchcock Medical Center is an excellent example of such a policy. Expanded use of school buses, and imaginative policies offered by employers for encouraging reduced reliance on automobiles should be implemented.

Protect the Character of Hanover's Residential Neighborhoods A third strategy is the protection of the character of Hanover's residential neighborhoods**.** Hanover, particularly Hanover Plain and adjacent areas, contains a variety of well-established, stable neighborhoods, where in fact the majority of the Town's citizens live. All of these neighborhoods share some common characteristics- family-orientation, moderate or moderately high density, substantial and well-maintained housing, attractive landscaping. All of these neighborhoods face similar potential impacts- commercial or institution intrusion, absentee-rental growth and consequent noise and other quality-of-life disruptions, demolition of existing houses and construction of inappropriately sized replacements, cut-through and speeding traffic, inadequate parks and recreational amenities, lack of accessibility to trails and open space. Moreover, each of these neighborhood is distinct- ages, sizes, lot coverage; street and sidewalk patterns; topography; relation to open space and to community and employment centers. The Town's land use policies, practices, and regulations should provide effective means to address impacts to neighborhoods; to protect the distinct character, amenity, and value of each of our neighborhoods; and to enable change and growth only in ways that support, respect, and continue these qualities.

Master Plan 2003 Land Use Concept

The 2003 Land Use Concept Map shown at the end of this chapter along with its accompanying text is a synthesis of the community values and goals and core principles. The land use pattern it portrays takes into account population and development trends and land capability. The resulting build-out analysis reflects the current goals and values of the community: overall growth is reduced and, more importantly, growth is more appropriately allocated between urban and rural areas, and within those areas.

Land is classified into four types according to its natural resource value and its development status: land of high resource value, land of moderate resource value physically or environmentally, unconstrained land suitable for development and developed land. These land types are described above and on the reverse side of the Land Use Concept Map. The Town is organized into the following major districts: open space, forestry, residential at various densities, high density residential with commercial. In addition, existing villages, new village centers, the existing rural and urban neighborhoods, Dartmouth College campus and open space lands, business and downtown areas are recognized. Each of these districts proposes development at a different level of intensity and is organized to minimize sprawl.

Land Use Guidelines

Natural resources, water quality and open space The natural environment is fundamental to the town's human, animal and plant populations. A high value is placed on protecting the natural resources to support plants and animals, and for the health and enjoyment of the people.

- Preserve the natural infrastructure necessary to preserve biodiversity in a sustainable ecosystem.
- Protect ground and surface waters to guarantee a safe and abundant water supply.
- Conserve the open space system proposed in the *Open Space Priorities Plan* and incorporate open space into each development proposed in new planned residential developments (PRDs), and the downtown.
- Protect and expand open space and outdoor recreational assets.
- Preserve open space to protect natural areas, and to enhance developed areas.

- Fashion an interconnected trail network to expand opportunities to bicycling, hiking, skiing; and to access natural and open space areas from all parts of Town.
- Direct new development to locations other than agricultural soils.

Population and housing Powerful driving forces for growth exist by virtue of the attractive community and the growth patterns of regional employers, especially the College and Medical Center. These must be balanced by constraints set by community values as well as physical constraints of soils, topography and water resources.

- The Planning Board should monitor the growth of population and housing carefully and be prepared to institute policies which continue to direct growth in both the manner and the pace consistent with this Master Plan.
- Adopt policies that insure that the housing stock grows in ways that accommodate people representing a broad range of economic circumstances.
- Support research and planning and, if necessary, implement land use policies that address the possibility that future growth may be limited by the availability of a sufficient supply of clean drinking water and wastewater treatment capacity.

Rural character Our present Zoning Ordinance directs most future growth of the town into rural areas- encouraging an undesirable sprawled pattern of development. Zoning changes should be made to guide growth toward the downtown and the rural fringe that is served by water and sewer. The current proportion of population living in the rural area to population living in the area served by water and sewer, 1:3, should be maintained. The Master Plan 2003 Land Use Concept Map and text showing how this might be achieved, is proposed by the Planning Board.

- Preserve and respect the rural character of Hanover that includes quiet, privacy, dark night sky, a mixture of woods and fields, wildlife, scenic views including uncluttered views of the hilltops and ridgelines, natural areas and other places for outdoor activities.
- Discourage major new single lot subdivision development.
- Decrease the overall density allowed in the rural areas as proposed in the Master Plan 2002 Land Use Concept Map and text.
- Encourage PRD development in rural lands but only where suitable access and on-site conditions exist.
- Protect the unique character of Hanover Center and Etna, respecting and enhancing the existing qualities of these historic villages, and fostering new development only as appropriate to the distinctive character of each. In Hanover Center, commercial uses other than legal home occupations should be prohibited. Existing vistas and view corridors especially from the Parade Ground, should be preserved. In Etna Village, commercial uses should be restricted to those compatible with neighborhood scale and local service. Appropriate new development should be permitted through building sizes and locations and parking areas should be restricted so as to be in keeping with the scale established by existing buildings.
- Farming, gardening and forestry should be encouraged to make productive use of rural land.
- Prohibit year-round and discourage seasonal housing on Moose Mountain and the land to the east of Moose Mountain.

In-town character Most of the future growth in Hanover should be directed to the downtown, campus, surrounding residential areas and new village centers served by the existing municipal service area.

- Hanover's population center should include a vibrant, compact commercial area balanced by the adjacent campus of Dartmouth College and offering an abundant mix of housing opportunities in close proximity.
- Hanover's small town atmosphere can be reinforced by keeping the town offices, a post office, the Howe Library and the high school in the downtown.
- The new Dresden village center should include a variety of residential densities and function as a transit node.
- The new Centerra North village center should include mixed commercial and residential uses built at a variety of residential densities and should function as transit node.
- Village centers should be carefully planned to contain significant open space and usable connections into the town-wide trail and open space system.
- Increased residential density should be limited to in-town areas (i.e. served by water and sewer) and be accommodated in ways that protect existing neighborhood quality.
- Mixed use should be encouraged in the village centers and downtown.
- Town policies should strive to make affordable housing more feasible in new residential developments.
- Dartmouth College's campus planning should continue to promote and maintain a system of articulated open green spaces, a walkable campus, and walkable connections between campus and town, preserve the traditional setting around the Green and historic buildings, and respect the character of downtown and nearby neighborhoods.
- The ambiance of Hanover's downtown is greatly enhanced by in-town open spaces, a vegetated streetscape, small parks, mature trees in the adjoining residential areas, the ability to see a dark night sky and enjoy a quiet evening.
- As shown on Map 12-2, sidewalks should be maintained and expanded in the downtown area and provided on the collector streets in the "near downtown" area.
- Road design utilizing traffic calming devices should divert traffic onto arterial roads and away from residential neighborhoods.

5. PUBLIC POLICIES AND LAND USE AND DEVELOPMENT RECOMMENDATIONS

Based on the values reflected in the surveys and information generated by the reports listed in Section 2, the Planning Board developed the following set of policies and recommendations to guide this master plan and the future development of Hanover.

- Growth should be directed to maintain the current population balance between rural Hanover (25%) and the area served by municipal water and sewer service (75%).
- Municipal cost control is important to most residents; future development should be considered along with its long-term public expense burden.
- In situations where improvements in existing infrastructure are necessitated by proposed development and such improvements are deemed consistent with this master plan and its standards, developers should pay for the infrastructure needs their developments create.

- The Town should seek alternatives that minimize the need for new road infrastructure by implementing less expensive solutions such as traffic calming.
- The desirability of uses should be defined by the impacts of the uses; the best uses will be characterized by minimal noise, light, and traffic, and a favorable ratio between tax revenues and municipal expenses.
- Mix land uses at new village centers where it would benefit residents, reduce traffic, and encourage pedestrian circulation between houses, schools, jobs and businesses.
- The preservation of open space should be accomplished using a mix of private, municipal, and other public initiatives; this may include acquisition of conservation easements or lands; transfer of development rights, and integration of mandated open space in new residential developments.
- Municipal investment in open space should be encouraged because it will have the dual benefit of preserving open space and rural character and minimizing the municipal costs associated with developed land.
- Regulations guiding the location and configuration of the undeveloped areas associated with development should be flexible enough to ensure the optimal planning of those open space areas for recreation, habitat and resource protection.
- Developed areas should be linked with public facilities by an adequate network of pedestrian paths, sidewalks and bike paths.
- All homes should be within a five minute walk to public open space lands and the town-wide trail network.
- Land use controls should be used to protect interconnected networks of permanent open space.
- Compact development should be promoted by encouraging the use of cluster or planned residential developments, and by discouraging development of scattered subdivisions layout without regard to natural features in rural Hanover.
- Site plan review should continue to address conformity of the development to the natural topography of the site and with current and future development of adjacent properties, minimizing the alteration of natural drainage patterns, site clearing, regulating exterior lighting and signs, and instituting landscaping and screening requirements.
- Lot coverage or impervious surface limitations should be broadened for all districts, as appropriate.
- The public's ability to view the night sky unimpaired should be protected by adopting standards for public street lighting and by further regulation of private lighting.
- Noise from existing development, maintenance or construction activities should not be an unreasonable annoyance to the general public or abutters. Noise restrictions should be enforced using the Zoning Ordinance, Site Plan Regulations and a Noise Ordinance.
- Prior to the creation of specific plans for a property, developers should be educated about conservation options, and offered suggestions for siting, design and construction, and screening techniques and standards so as to protect public views.
- Consider the adoption of environmentally sensitive road standards such as those promulgated by the Vermont Agency of Transportation.
- Subdivision review should encourage preserving attractive vistas and incorporating meaningful open space areas into and between residential developments.

- Maximum as well as minimum lot sizes should be considered for lots created for development in rural area to meet open space objectives.
- Land use controls should be flexible to enable development to be respectful of the natural character of the land.
- For the purposes of determining allowable density, environmentally sensitive lands of high resource value, such as floodplains, wetlands, headwaters of major streams, perennial stream courses and adjacent natural buffers and steep slopes, may be excluded from the calculation of development density. This exclusion may be applied differently to areas served by the existing water and sewer infrastructure from those that are not.
- Policies and codes that improve the lifetime energy efficiency of new buildings should be developed. Such policies might address, for example, building orientation, insulation, fenestration, and fuel source.

APPENDIX 3-1 COMMUNITY ATTITUDES TOWARD GROWTH AND LAND USE

The following tables are excerpted from the *1994 Survey of Hanover Residents* by Robert Sokol, 1994.

Residents were asked: Are you concerned that the present growth rate in Hanover is too fast or too slow? (Question 19)

	1974 % of 327 responses	**1981 % of 344 responses**	**1994 % of 545 responses**
Too fast	54	38	17
Too slow	4	6	8
Is about right	not asked	40	56
I have no opinion	31	13	16
NA	11	4	4

Source: *Report of the 1994 Survey of Hanover Residents*, Robert Sokol, 1994.

Residents were asked: Are you concerned about the location of possible residential growth in Hanover? (Question 21)

	1974 % of 327 responses	**1981 % of 344 responses**	**1994 % of 545 responses**
Concerned	84	80	59
Unconcerned	4	9	21
I have no opinion	not asked	7	16
NA	11	3	4

Source*: Report of the 1994 Survey of Hanover Residents*, Robert Sokol, 1994.

Residents were asked: If you are concerned, where do you think the new residential growth should be located? (More than one answer could be indicated)

	1974 %of 275 concerned	1981 % of 280 concerned	1994 % of 321 concerned
In existing downtown	10	8	15
On the fringe of downtown	17	20	31
In Etna	10	15	28
In Hanover Center	10	13	27
On Lyme Road	not asked	not asked	35
In the Rte 120/DHMC area	not asked	not asked	41
Elsewhere in rural Hanover concentrated as a new community	11	15	28
NA	16	13	not asked

Source: *Report of the 1994 Survey of Hanover Residents*, Robert Sokol, 1994.

Residents were asked: Do you believe Hanover should: (Question 23)

	1974 % of 327 responses	1981 % of 344 responses	1994 % of 545 responses
Restrict residential growth	19	14	11
Encourage residential growth	4	4	6
Guide residential growth by encouraging it in some places and discouraging it in others	57	64	55
Neither actively restrict no actively encourage residential growth	8	12	16
I have no opinion	6	2	6
NA	0	3	5

Source: *Report of the 1994 Survey of Hanover Residents*, Robert Sokol, 1994.

Residents were asked: Which of the following means do you personally favor for encouraging Hanover's commercial and industrial growth? (Check any that apply) (Question 30)

	1994 % of 545 respondents
I oppose encouraging commercial & industrial growth	30
Encourage new business & industry of the types in Hanover today	55
Advertise the attractiveness of Hanover	23
Expand town water & sewer services	12
Zone for more intensive development	11
Encourage institutional growth	17
Other means	4

Source: *Report of the 1994 Survey of Hanover Residents*, Robert Sokol, 1994.

APPENDIX 3-2 SUMMARY FROM SCENIC LOCALES COMMITTEE REPORT

High Priority Action List
from
Something for Everyone: The Scenic Locales Committee Report to the Town of Hanover, NH, August, 1998.

The following high priority action list is the result of the work of the Scenic Locales Committee whose charge included identifying and prioritizing specific sites and areas for municipal action. Of the more than 200 sites that were named in the public surveys and the committee's own work, nine emerged as having the highest priority. The list that follows gives specific suggestions for municipal action for their protection.

Moose Mountain

Tighten the Forestry Zone conditions to limit density, limit development to down slope locations, minimize the visibility of structures from both nearby and distant locations and to prevent spillage of artificial light to the surrounding area and night sky.

Maintain the wild, scenic and other special qualities of the east slope of Moose Mountain, and the land between it and Goose Pond.

Develop a system to monitor and enforce seasonal dwelling restrictions in the "F" Zone.

Goose Pond

Limit the amount of forest clearance that will be seen from the pond. Coordinate with the Town of Canaan, and with the Goose Pond Association, to protect views of the pond from Hanover's shoreline.

Develop a system to monitor and enforce seasonal dwelling restrictions in the "F" Zone.

Mink Brook Corridor

Mink Brook cuts a sinuous swath through Hanover that starts on the slopes of Moose Mountain, descends through the center of Etna, parallels Greensboro Road and ends at its confluence with the Connecticut River. The environs of the brook are protected by public ownership primarily at its lower end close to the river.

Since the brook functions as a linear scenic and environmental resource, it should be treated as a unit. A plan for the whole corridor would include data collection and mapping of current easements, owners, associated wetlands, water quality, and the sewer line; designation of site-by-site trail locations the length of the corridor, parking sites, and public access to be requested by the Planning Board in the event of development applications; severe restriction of high-impact development within the watershed; and designation of advocates for implementation of the corridor plan on the Planning and Zoning Boards, and on the Conservation Commission. The Upper Valley Land Trust should be involved in planning and implementation.

King Road/Robert Frost Lane

Acquire land or a scenic easement to protect views from the intersection of King Road and Robert Frost Lane across the fields to the west and southwest. Provide a small vehicle pull-off for peaceful enjoyment of sunsets, celestial events, etc.

Ensure that the location of new structures, or growth of vegetation, does not encroach on the public's access to the view.

Etna Farm at Ruddsboro Road

Encourage continued agricultural use of farm land.

If, and when, owners are willing, be ready to acquire or place easements on the open land and surrounding woods.

Etna Village and Hanover Center

Conduct a planning study of Etna Village and Hanover Center. Consider the competing interests of the very special scenic village character of each versus the high (and increasing) volumes of traffic and the rate of development. Scenic viewsheds are critical in Hanover Center. Historic and scenic qualities of Etna Village should be protected. Current zoning requirements may need reconsideration.

Hanover Country Club Golf Course

Rezone to protect scenic qualities and open space.

Trescott Ascutney View

Encourage continued agricultural use of farm land.

If, and when, owners are willing, be ready to acquire or place easements on the open land and surrounding woods.

Protect the viewshed of Mt. Ascutney, as seen from Trescott Road near Etna, using easement, purchase, or other means.

Hanover Water Company Land

Rezone as an "NP" district (Natural Preserve), or take other strong measures, at the earliest opportunity to ensure open space protection in a natural state.

Open Class VI roads to passive recreation where water quality will not be compromised.

Development review standards

Many Hanover residents are keenly in favor of using a higher set of standards for development review. Ideas being considered include: requiring presentation of plans to better anticipate and regulate visual impact; requiring design of developments to conform to existing topography, thereby minimizing cut and fill and changes in natural drainage; establishing lot coverage

limitations for all districts; and giving high priority to protection of people's ability to view the night sky.

Education is key to this effort. It has been suggested that a pamphlet providing a description of conservation options, suggestions for siting, design and construction so as to protect public views, and screening techniques and standards be given to landowners and their consultants prior to their development of specific plans for a property.

APPENDIX 3-3 SUMMARY OF THE *OPEN SPACE PRIORITIES PLAN*

In its history, opportunities, and quality of life, Hanover, New Hampshire is a very special place. Shaped in the colonial New England pattern of a small town surrounded by farms and great expanses of forest, its landscape is varied and beautiful, and its natural resource base plentiful.

Hanover's traditional land uses are undergoing fundamental and permanent change. Farms are being replaced by residences which are springing up throughout the rural fields and woods. The long-established network of hiking and skiing opportunities, and the varied, linked habitats necessary for local wildlife are being gradually fragmented. Future development will place increasing stress on water supply and other resources.

In the year 2000, the Hanover Town Meeting voted to create a Conservation Fund for the protection of open space. The Conservation Commission developed criteria for its use in the Open Space Priorities Plan.

In years past, many public entities and private landowners have established open space protection on scattered pieces of land throughout the town. The *Open Space Priorities Plan* integrates those parcels, along with additional "open space action areas" that meet the plan's goals, into Hanover's first town-wide open space plan for the future. Evaluation criteria, ways to achieve the goals, and methods of funding are also part of the plan.

1. GOALS OF THE PLAN

- To promote the conservation, protection and sound management of the natural resource base;
- To protect and enhance the ecological integrity of the town's diverse natural communities and wildlife habitats;
- To sustain the scenic quality and visual character of the town;
- To maintain and expand landscape-based recreational and educational opportunities;
- To protect the town's historic sites and cultural landscapes;
- To protect in-town open spaces.

2. OPEN SPACE ACTION AREAS

Twelve action areas are identified in the plan. Some serve conservation and/or recreation needs in the rural parts of town. Others focus on the in-town region. Between the two, and linking them, are the forested hillsides that form a tree-covered backdrop to in-town development. Areas vary in size from a fraction of an acre to hundreds of acres with many landowners.

Acquisition or protection of land using Conservation Fund moneys can only be accomplished in conjunction with willing landowners.

The plan also encourages use of other techniques for protection of land for public purposes. Zoning changes and regulations, introduction of transfer of development rights,

establishment of conservation easements by individual landowners, and other methods are available to accomplish the end result – a system of lands that permanently protects the natural resources, wildlife habitat, recreational opportunities, traditional landscapes, and scenic treasures of Hanover.

3. HANOVER'S CONSERVATION FUND

The Conservation Fund is managed by the town's Conservation Commission. It is designated for multiple purposes, including land purchase, establishment of easements, assistance to landowners, stewardship of easements for which the town is responsible, and enabling public use of specified lands. By means of Town Meeting vote, the fund is replenished annually by 50% of the land use change tax received in the preceding year as well as by revenue from timber sales from town-owned lands, and fines collected by the town for conservation and environmental violations.

4. LAND PROTECTION ASSISTANCE

To encourage and enable Hanover landowners to participate in creating a town-wide system of open space protection, a portion of the Conservation Fund is available each year to assist with the cost of donation, sale, or placement of a conservation easement on private lands which meet the plan's criteria. Property surveys, title searches, legal counsel for preparation and/or review of easement deeds, stewardship fund fees, and appraisals may be eligible for support.

5. FOR MORE INFORMATION…

Copies of the *Open Space Priorities Plan* are available at the Planning and Zoning Office, at the town libraries, and on the town's website: hanovernh.org. If you have questions or would like to pursue conservation options on your property, please contact Vicki Smith at vicki.smith@hanovernh.org, or 643-0742 (ext. 113).

APPENDIX 3-4 HISTORY OF LAND USE IN HANOVER
Land Use Trends and Existing Land Use

The present pattern of land use in Hanover began when the Town Lots were laid out by the Proprietors in Connecticut shortly after the signing of the Charter in 1761. Governor Wentworth reserved five hundred acres in the southwest corner of the Town for himself at the signing. In August of that year a committee of five men, led by Edmund Freeman, came here and surveyed the Town Plot, a 121-acre tract at the center of Town, southeast of the present church of Hanover Center, dividing it into sixty-six lots, separated by streets. It was not a convenient place for settlement and no buildings were built on the lots. The Committee laid out sixty-six narrow river lots north of the Governor's five hundred acres. In 1764 the first division of hundred-acre lots was made, and the following summer the first settlers arrived and built log houses in the northwestern quarter of the Town.

After Dartmouth College was chartered in 1769, the Governor's five hundred acres were given to the College, and the Proprietors gave Eleazar Wheelock three hundred acres near the Lebanon line on the Greensboro Road and four hundred acres in the easterly part of the Town on the Canaan line. With the arrival of Dr. Wheelock in 1770, log houses and a College building were built on the Hanover plain. A road was built from the College over Moose Mountain to Wolfeboro to accommodate Governor Wentworth's travels to early commencements.

During the period of early settlement, development was concentrated around the College, while farming was dominant in the rural area. Saw and grist mills were built on Mink Brook. Town Meetings were moved to a hall over a store in Etna. Since that building burned in 1922, the Meetings have been held in the downtown area. A Hanover Center Post Office was established in 1828. "Mill Village" received its new name, Etna, and its Post Office in 1884, a new name being necessary as there was already a "Mill Village" in another part of the state.

Hanover's pre-1920 population peak occurred in the middle of the nineteenth century when sheep raising was the dominant agricultural activity. However, cellar holes and abandoned roads remain as evidence of the decline of the sheep industry, the lure of more fertile lands to the west and the availability of mill jobs in southern New Hampshire. Throughout the nineteenth century, private enterprise and Dartmouth College focused activity in the present downtown area.

The 36-bed Mary Hitchcock Hospital and a nursing school were built in 1893. A 1915 expansion added several wards and an operating suite. Many additional expansions have occurred since then. The Hitchcock Clinic was founded in 1927.

The Water Company and reservoirs were created in 1893. By 1903, the Town farm and six other farms near the reservoirs were purchased by the Water Company.

The College, Hospital, and Clinic continued to grow through the first half of the 20th century. Expansion in the activities of these institutions attracted a large workforce, many of whom preferred to live close to their jobs. Dartmouth College took an active part in providing locations for home sites. The largest tract of land to be developed in the early 1950's was the Chase Farm, formerly part of an agricultural college property. This included the Valley Road,

Kingsford Road and Conant Road areas. Other residential areas were developed by local businessmen.

Land development by Dartmouth College between 1950 and 1970 included further residential subdivision of the land on the west slope of Balch Hill and construction of the Hopkins Center. In the 1960's, major expansions to the hospital added more specialized beds, an intensive care unit, cardiac care unit, recovery area and mental health center. Capable of providing tertiary care, medical facilities in Hanover are a regional health care resource as well as a major employer of Upper Valley residents.

Established in 1961, the Cold Regions Research and Engineering Laboratory (CRREL), located on Route 10, north of Hanover's CBD, is one of two US Army Corps of Engineers laboratories in the country. The organization occupies a site of nearly 29 acres, and is a major employer.

In the early 1970's, significant institutional changes occurred which have influenced growth and development in Hanover. In 1972, Dartmouth College began year-round operation and expanded the undergraduate student body from 3,000 to 4,000 to include women. Soon after, the Medical School became an M.D. degree program. With these changes, there was a corresponding increase in faculty and support personnel. The College changes brought about: a broadening of local retail base to serve College women; more activity in the summer; and faculty housing projects in the Balch Hill area. In 1973 the Dartmouth-Hitchcock Medical Center (DHMC) was created to incorporate the Mary Hitchcock Memorial Hospital, Hitchcock Clinic, Dartmouth Medical School, and Veterans Administration Hospital. The Norris Cotton Center was also established, adding to the health services available in Hanover. In 1991, DHMC, the Mary Hitchcock Memorial Hospital and the Hitchcock Clinic moved to land just south of Hanover in Lebanon off Route 120.

Although the first zoning ordinance in Hanover was adopted in 1931 for the village precinct area, it was not until 1961 that the first townwide zoning ordinance was adopted. Fourteen years later, in response to concerns about the future development of the Town brought to attention of residents by the 1975 Master Plan, new land use controls were adopted by the Town. These included provisions for cluster housing and site plan review. Residential projects in the 1980's included condominium development in the Brook Hollow and Greensboro Road areas. Major subdivisions were developed off Trescott Road, on Blueberry Hill, and on Grasse Road, and off Route 10, north of the downtown. In the early 1990's, Kendal at Hanover, a 250 unit continuing care retirement community, opened on Route 10 north of CRREL. Residential subdivisions are being developed throughout the Town with the more recent larger projects being concentrated near the urban area or on roads with good access to the urban area.

In the past 25 years, business and manufacturing development has taken place on Route 10, Great Hollow Road, and off Buck Road. More intense use of the urban area, rather than expansion of the district, has increased commercial and office space.

Land Use Change The areas associated with specific land uses in Hanover have been measured several times since the earliest known map of land use in Hanover was drawn in 1926 by J.W.

Goldthwait. While categorization of land use by different reports may not be absolutely comparable, major land use trends are certainly apparent. As shown in Table 1, in 1926 woodland covered over half the Town. Pasture and cultivated land accounted for 39 percent of the land area, betraying the extent of farming. Areas of Moose Mountain, Balch Hill, Oak Hill, and Lord's Hill were pastured. Only a few very small parcels to the east of Moose Mountain were cultivated or in pasture. Goldthwait's urban land comprised 2.7 percent of the total land area. This included Hanover's urban area, roughly bounded by Mink Brook, the River, Greensboro Road and Reservoir Road, and a strip of homes in Etna. The land considered urban in 1926 also included open space areas, such as the golf course, currently considered as recreation land.

Table 1 Land Use in Hanover, 1926

Land Use	Acres	% of Total
Woodland	17,241	54.1
Pastured Woods	47	1.5
Pasture	7,165	22.5
Cultivated Land	5,360	16.8
Urban Land	860	2.7
Water	500	1.6
Total	31,596	

Source: Map of Town of Hanover, J.W. Goldthwait, 1926,
in the Baker Library Map Collection;
acreages calculated using digital planimeter.

By 1956, as shown by Table 2, nearly four percent of the Town was designated as developed area. Residential and recreational use account for over three-fourths of the developed area. Between 1926 and 1956, the most dramatic shift in land use is from pasture and cultivated land to woodland. Over 75 percent of the Town was forested. The area of unforested land shrank from approximately 40 percent of the Town in 1926 to less than 17 percent only 30 years later.

Table 2 Land Use in Hanover, 1956

Use	Acres	% of Total Developed or Rural Area	% of Total Area
		Developed Land	
Residential	716	57.1	2.2
Commercial	43	3.4	0.1
Institutional	49	3.9	.015
Recreational	335	26.7	1.0
Cemeteries	30	2.3	0.1
Vacant Lots	80	6.4	0.2
Total Developed	**1,253**		**3.9**
		Open Land	
Cropland	1,960	6.6	6.2
Pasture/Field	3,239	0.9	10.2
Woodland	24,374	82.4	76.5
Gravel Pits/Sawmill	20	0.1	0.1
Total Open	29,593		92.9
Streets/Roads	508		1.6
Water	512		1.6
TOTAL AREA	**31,866**		

Source: *Hanover Plans Ahead*, Adams, Howard and Greeley, 1957.

A University of New Hampshire and Soil Conservation Service team analyzed land use change between 1952 and 1975 in every New Hampshire Town. They concluded that 27 percent of the State's land in agriculture in the 1950's had gone out of production. For Hanover, this decrease was five percent. The results for Hanover are shown in Table 3. The land use changes reported in this study are far less drastic than the 1926-1956 shifts. The nearly five percent decline in land used for agricultural activities resulted in a 2.5 percent increase in idle land (which may have been counted as pasture and field by other analysts), and 1.5 percent increases in developed land and forest. The acreages reported in this and the 1956 study are not significantly different.

Land uses were mapped again in 1984. Land use by area is presented in Table 4. Comparison between land use in 1956, 1970, and 1984 is shown by Table 5. The trend toward increasing forestation continues through 1984. The total acreage in cropland, pasture and field has decreased by one-half between 1956 and 1984. It is interesting to note that this decline did not occur gradually over the 28-year period; instead there was a 1.4 percent decline during the first 14 years and a 6.8 percent decline in the latter period. This acceleration in the loss of cropland, pasture and field coincides with the institutional expansions mentioned previously and the population growth experienced throughout the Upper Valley.

Between 1956 and 1984, the land area used for residential purposes increased by more than 1,050 acres. It should be noted that the 1984 estimate includes Dartmouth dormitories and the street and road areas associated with the newer residential subdivisions. Commercial land use, including research and manufacturing, tripled as a percent of total area, but did not quite

double in absolute terms. The area used institutionally has increased from 49 acres in 1956 to 73 acres in 1984.

This land use information suggests that Goldthwait's Hanover was quite different from the Hanover of today in the following ways:

- There are more trees and fewer wide open spaces in Hanover today. Forests occupied 54% of the Town in 1926 compared to 82% in 1984. Over 600 acres of pasture and fields now are forested or developed.
- Farming is an uncommon activity in Hanover today. In 1926, there were 5,360 cultivated acres. Eighteen acres were counted as cropland or orchard in 1984.
- The total urban area was less than half the size of the residential area in Hanover today. Goldthwait considered 2.7% of the Town as urban, including all residential, commercial, and institutional uses. In 1984, residential use alone accounted for 5.6% of the Town, or 78% of the developed area.

Table 3 Land Use in Hanover, 1955 and 1970

Use	1955 Acres	1955 Percent	1970 Acres	1970 Percent	Percent Change
Agriculture	5,302	17.5	3,771	12.4	-5.1
Idle	252	.08	794	2.6	2.52
Forest	23,729	78.2	24,194	79.7	1.5
Developed	1,024	3.4	1,507	4.9	1.5
Other	42	.001	83	.002	.001
TOTAL	**30,349**				

Source: *Agriculture, Forest and Related Land Use in New Hampshire*, 1952 to 1975, G.G. Coppelman, S.A.L. Pilgrim and D.M. Peschel, University of New Hampshire in cooperation with Soil Conservation Service, 1978.

The following description of land use types helps explain the 1984 existing land use map prepared for this Master Plan. Table 4 lists land uses shown on the map and the acreage associated with each use.

Residential Use(R) Single-family residential settlements occur around the Hanover central business district, Etna Village/Trescott Ridge, Hanover Center and Blueberry Hill. Lyme Road and Greensboro Road have become increasingly residential. A low-density scattering of houses occurs throughout the rest of the Town except for the slopes of Moose Mountain and the area east of Moose Mountain. With the exception of seasonal dwellings clustered on the shores of Goose Pond, this area is very sparsely settled. Zoning prohibits additional year-round dwellings east of Moose Mountain.

RM Multi-family residential areas are close to the institutional and central business districts. These areas include dormitories, fraternities, sororities and apartments on Wheelock Street. Less centrally-located areas of multi-unit residential development are Rivercrest and condominiums in the Brook Hollow area and on Greensboro Road. Single multi-unit residences scattered throughout the Town were not mapped individually.

Commercial Use(C) Commercial activity in Hanover is concentrated in the central business district. Commercial use also occurs at the corner of Park and Lebanon Streets (supermarket, bank, gas stations), Lyme Road (printing, convenience store, restaurant, professional office, laundry and gas station), Route 120 (convenience store, restaurant, building contracting, office park), and the northwest corner of Town (sawmill). Home commercial operations are located throughout the Town.

Table 4 Land Use in Hanover, 1984

	Townwide(acres)	Urban Area(acres)	Total	% of Total Town Area
Residential(R)	1072	68	1640	5.2
Res. Multi-Family(Rm)	23	101	124	.4
Commercial(C)	3	47	50	2
Research/Manufacture(R/M)	33	-	33	.1
Institutional(I)	--	73	73	0.2
Public/Semi-Public(Pub)	3	7	10	.03
Recreational(Rec)	160	84	244	0.8
Cemetery(Cem)	5.5	21	26.5	0.1
Parking(P)	2.5	16	18.5	0.1
Total Developed Land	**1,302**	**917**	**2,219**	**7.0**
Cleared Land(G)	1,355	78	1,422	4.5
Cultivated Land(A)	13	--	13	.04
Pasture(Ps)	568	--	568	1.8
Brush(B)	546	46	592	1.9
Orchard/Plantation(N/P)	5	--	5	.02
Mixed Forest(Fm)	10,423	368	10,791	33.7
Softwood Forest(Fs)	8,233	528	8,761	27.5
Forest Hardwood(FH)	6,638	88	6,724	21.1
Sand & Gravel Excavation(X)	10	--	10	.03
Water(W)	597.5	148	745.5	2.4
Total Open Land	**28,386.5**	**1,256**	**29,642.5**	
TOTAL	**29,688.5**	**2,173**	**31,861.5**	

Note: Measurement differences from other acreage totals for the Town are due to planimeter measuring errors. Highway and road acreages are tallied with the adjacent land use.
Source: Land Use Map, available at the Town Offices and Howe Library.

Research and Manufacturing Use(R/M) There are two areas used for research and manufacturing: Route 10, north of downtown, and Great Hollow Road.

Public and Semi-Public Use(Pub) These uses include the Town Offices, the fire stations in Etna and on Route 10, the highway garages on Route 120 and Greensboro Road, and churches in the urban area.

Parking Use(P) Parking areas in the central business district and north on Route 10 are included in the acreage in Table 4.

Institutional Use(I) Institutional uses include all Dartmouth College and the affiliated graduate program classrooms, buildings and land; and elementary, middle, and senior high schools.

Recreation Use(Rec) Recreational areas include all the land used for active recreation (with the exception of forested trail areas). In the downtown area, major parcels include: the Dartmouth College Stadium; Chase Field; Dewey Field; and High School playing fields. North of the downtown, recreational lands include: the golf course; Lyme Road ballfields; and Storrs Pond recreation area. Three other playing fields are located in Etna Village, near Great Hollow Road and at Thompson Terrace.

Cleared Land, Pasture, Brush(G,Ps,B) Cleared land includes the open space around Occom Pond, the College green, and land adjacent to Reservoir Road, and surrounding Rivercrest. Open space along roads in more rural areas is generally counted as pasture. Brush areas are those where agricultural activity has declined and the land is no longer cleared, or where it is wet, such as the lowlands along Mink Brook.

Table 5 Land Use in Hanover, 1956, 1970, and 1984

	1956		**1970**		**1984**	
Land Use	**Total acres**	**% of Total area**	**Total acres**	**% of Total area**	**Total acres**	**% of Total area**
Residential	716	2.2			1,764	5.6
Commercial	43	0.1			83	0.3
Institution*	49	0.2			83	.23
Recreation	335	1			244	0.8
Cemeteries	30	0.1			26.5	0.1
Vacant Lots**	80	0.2			18.5	0.1
Total Developed	**1,253**	**3.9**	**1,507**	**4.9**	**2,219**	**7.3**
Cropland					18	.06
Pasture					2,593	8.2
Woodland					26,276	82.3
Gravel Pit/Sawmill					10	.03
Total Open	**29,593**	**92.9**	**28,759*****	**94.7*****	**28,897**	**90.59**
Streets	508	1.6				++
Water	512	1.6			745.5	2.4

* Includes 1984 public/semi-public area

** Vacant lots = 1984 parking area

++ 1984 streets and roads tallied with adjacent land use

*** Includes streets, roads and water

APPENDIX 3-5 RESIDENTIAL BUILD-OUT ANALYSIS HANOVER, NEW HAMPSHIRE—1998

Prepared for the Hanover Planning Board
by the Upper Valley Lake Sunapee Regional Planning Commission
October 10, 1998

INTRODUCTION

The Upper Valley Lake Sunapee Regional Planning Commission has prepared this residential build-out analysis report to further explore certain land use and zoning issues in conjunction with the Master Plan update. This study does not include estimates of potential commercial and industrial development in the Town at full build-out.

The term "build-out" is a planner's reference to a hypothetical point in the future when all land that can be developed has been developed. The purpose of the build-out analysis is to answer questions such as:

- How much land area can be developed under existing land use regulations and where will this growth occur?
- How many dwelling units could there be and how large will the population of Hanover be at full build-out?

Generally, the results of a build-out analysis facilitate further discussion relative to issues such as:

- Are there areas projected for development which the community would prefer to not develop or to develop at a lower density?
- Are there areas which the community would prefer to develop at higher densities?
- What steps should the community be taking now to accommodate future growth?
- What impacts wilt be associated with the projected growth?
- What additional services and facilities will be required to serve the needs of future residents and employees?

Essentially, the build-out analysis is a tool to test different future scenarios and serve as a catalyst for change if the anticipated impacts associated with future build-out under current regulations appear undesirable.

A build-out analysis is a model for predicting development possibilities. This build-out analysis looks at the potential residential development of Hanover under existing land use controls. The basis for the analysis is the Town's current Zoning Ordinance. The analysis is a tool for comparing the future currently enabled by the Ordinance with that desired by the community. Like all projections, it is predicated on certain assumptions, which are outlined in this report. A build-out analysis, unless performed lot-by-lot, also relies on many generalizations. The analysis is based on the premise that all land in the Town, whether already developed or not, will eventually be developed according to the maximum density enabled by the Zoning Ordinance.

The analysis also looks at certain aspects of the Town's current land use and treats them as a given to be projected forward. These include such things as conservation land, water and sewer

lines, and today's transportation patterns. A different set of assumptions would result in a different projected population. The underlying assumption is that, in this type of build-out analysis, factors which may bias the figures in one direction or the other balance out, and presenting the figures aggregated for larger areas of the community also balances out irregularities associated with data collected on smaller geographic areas.

Timing is not relevant to the build-out analysis as it is assumed that time is condensed to allow all possible development to occur today. The build-out analysis holds demographics, technology, zoning, municipal infrastructure, and other variables which affect development patterns, at today's conditions.

METHODOLOGY AND ASSUMPTIONS

Data Caveat:

The Upper Valley Lake Sunapee Regional Planning Commission used its geographic information system (GIS) and data layers developed for the Town of Hanover by Terra-Map, UVLSRPC, T & M Associates and others over the past several years. It is important to point out here that data layers from Terra-Map do not overlay accurately with other data which were used to perform much of the analysis and do not appear to be properly geographically referenced. Terra-Map's zoning boundaries were overlain with parcel data and then attached to Hanover Town Assessor's data. Several factors key for the analysis were based on the Assessor's data regarding land use. Town water and sewer service areas were created by UVLSRPC from data supplied by both Terra-Map and T & M Associates. Again neither of these data sets were correctly aligned. The Town of Hanover Public Works Department provided critical editing of these coverages and UVLSRPC redrew the boundaries using the parcel coverage as a base.

The zoning coverage was redrawn by UVLSRPC so that it would overlay coverages correctly referenced to the New Hampshire State Planes such as wetlands, floodplains, steep slopes and conservation lands etc. From this combination was derived land to be excluded from the developable acreages. Consequently there is some assumed minor error from using two distinct and slightly different data sets. Each of the GIS data layers and other data sources as well as the assumptions associated with the analysis are outlined below. The software used by UVLSRPC to perform the GIS analyses was PC-ARC/INFO version 3.5.1. Spreadsheet analysis was performed with Quattro Pro version 6.0 for Windows.

Zoning:

Zoning District boundaries were provided by Terra-Map as an Auto-CAD file. The file was then converted by UVLSRPC to a PC-ARCINFO coverage. The source for the data was the Town of Hanover's official zoning map. Minor revisions were made to the coverage based on discussions with the Town of Hanover Planning and Zoning office staff. The zoning boundaries were redrafted onto UVLSRPC's GIS base for Hanover and a second version of the coverage was created.

Surface Water:

The area occupied by the Connecticut River and the mouth of Mink Brook was excluded from the developable land area. Other surface waters were not excluded as the Zoning Ordinance

allows surface water area to be included in calculating lot size. The surface water coverage was developed from 1:24000 USGS digital line graph data provided through GRANIT.

Land Currently Protected From Future Development:
Publicly-owned conservation land and privately-owned land protected from development by conservation easements or development restrictions were deducted from the land area available for future development. The 1992 GRANIT conservation land layer was used to identify conservation lands. One large parcel (132 acres) to the west of Goose Pond which was not identified in the GRANIT layer was also excluded from the developable acreage.

The islands in the Connecticut River were assumed to remain undeveloped regardless of ownership.

It has been pointed out a number of times that some small, recently protected parcels are not included in this database and that in some cases the boundaries are not accurate. These omissions may be balanced by the fact that many parcels protected by conservation easements allow limited development. Updating and correcting the conservation lands database is beyond the scope of this build-out analysis.

Other Excluded Lands:
Certain lands were considered to remain in public or quasi-public use. These were identified as tax exempt lands as shown in the Town's Assessor's data. Lands excluded from acreage available for future residential use included publicly-owned land currently used in the provision of facilities and services such as the Public Works Department or Town Offices. Cemeteries and church sites were excluded. Several Town-owned land "slivers" were also excluded.

Not all tax-exempt lands were excluded. For example, lands currently receiving tax exempt status due to ownership by private educational organizations or religious institutions were not assumed to remain unavailable for residential development indefinitely. It is acknowledged that the determination relative to which lands to include as developable and which to exclude was by necessity somewhat subjective, and, like many components of any build-out analysis, relied on the professional judgment of the analyst.

Residential vs. Nonresidential Land Area:
The Town was analyzed in fifty-one sections. These sections were then clumped into 6 sections for data reporting purposes. It was assumed that in the following zones RR, SR-I, SR-2, SR-3, GR-1. GR-2 and F zones, the acreages which are currently coded by the Assessor's office as either commercial or industrial would remain in their current uses; the same with the remaining land being developed as residential. For the purpose of the build-out, the RR zone was divided into four sections RRI, RR2, RR3 and RR based upon existing land use and transportation patterns to facilitate reporting results in smaller blocks. Although land use in the F zone is restricted to seasonal dwellings by special exception these zones were included in the build out study and figures were run for these areas using the current minimum lot size.

Development in the BM, B, OL, and NP, districts was assumed to eventually become entirely nonresidential and were not therefore included in this analysis. The Natural Preserve zone is non-

developable. However, an attempt was made to estimate the current number of existing residential units in these zones and add them into the build out total. It is the understanding of the analyst that the Institutional District may be developed to include additional dormitories. However, further specific study of Dartmouth College's plans is beyond the scope of this build-out analysis.

District	**% of development estimated to be commercial or industrial at build-out**
BM	100.0%[1]
B	100.0%[1]
OL	100.0%[1]
I	100.0%[1]
NP	0.0%[1]
F	0.0%[2]
RR	2.4%[2]
SR-I	0.0%[2]
SR-2	0.1%[2]
SR-3	0.3%[2]
GR-l	6.9%[2]
GR-2	3.8%[2]

Note 1: These percentages are based on certain assumptions regarding future land use patterns which are described above.

Note 2: These percentages are based on actual existing land use (according to Assessor's data) where the percentage of existing commercial and industrial acreage is assumed to remain the same.

Nonresidential development was also assumed to be allocated evenly across lot classes within each district.

Existing and Future Roads:

The area that would be taken up with future road rights-of-way associated with the projected potential growth was deducted from the land area available to be developed. Figures were based on an earlier study conducted for the City of Lebanon, a neighboring community with similar residential land use patterns. Percentages were derived by comparing the percentage of land in Lebanon currently devoted to road rights-of-way to the actual average lot size of developed lots. For each range of average lot sizes, an average right-of-way percentage was identified and then assigned to districts with a minimum lot size falling within that range.

Lot Size	Deduction for Rights-of-way
<3 acres	25%
3 to <5 acres	12.5%
5 to <10 acres*	7.5%
10+ acres	3.7%

*No Hanover districts in this category.

Lot Class - Water and Sewer Service Areas:
In several zoning districts, the minimum lot size varies with lot class. According to the Zoning Ordinance, lots served by both municipal water and municipal sewer are Class 1 and can be developed at the highest density. Lots with either municipal sewer or municipal water are Class 2. Class 3 lots have on-site wastewater disposal and water and require the largest lots. The Town Public Works Department identified all lots which were either currently or could reasonably be connected to Town water and sewer under the Town's regulations. A coverage of these water and sewer service areas was developed by UVLSRPC and overlaid with the Terra-Map parcel data.

It should be noted that the scope of this analysis did not include study of line sizes or overall water or sewer system capacities relative to the future population possible under current zoning.

Natural Limitations - Steep Slopes, Wetlands. Soils:
UVLSRPC created a coverage of slopes over 25% using 1:24000 USGS topographic maps. The Town's zoning ordinance states that ".each lot shall include lands with slopes less steep than 25% whose total area must be at least 75% of the applicable minimum lot area requirement." In each of the six study areas the total area occupied by slopes over 25% was calculated. In the event that this represented more than 25% of the total area of any (of the original 55 clusters) the amount of developable area was reduced by the difference. It was assumed that development could be configured in a way that all land area would form lots meeting the minimum lot size with a house site not located on the steep slope.

No exclusions were made for wetlands as Hanover's regulations allow wetlands to form part of the minimum lot size. It was assumed that development could be configured in a way that all land area would form lots meeting the minimum lot size with a house site not located within the wetlands conservation setback. It was also assumed that each lot so configured would contain 4,000 contiguous square feet of area suitable for a sewage disposal system in compliance with the Town's Subdivision Regulations.

Lands Subject to Flooding:
Lands subject to flooding are described as either being part of the floodway or of the floodplain. Floodway areas are generally the main channel of the waterway and some areas immediately adjacent. Floodplains are the more expansive flat areas where flood waters spread out. Hanover's floodplains are primarily adjacent to the Connecticut River and Mink Brook. The Town's Flood Damage Prevention Ordinance defines the Floodplain District as limited only to the A zones shown on the Flood Insurance Rate Maps (FIRM) maps. The Flood Damage Prevention Ordinance prohibits development in the floodway unless it can be proved that no increase in flood levels would result from that development. It was assumed that such determinations were unlikely and so development in the floodway would not be allowed. Accordingly, floodway areas were excluded from the total buildable acreage.

Dartmouth College:
For the purposes of this study Dartmouth College facilities were not included, nor were any projections made regarding future growth of the college including numbers of students and availability and number of college housing units.

Open space developments, PRD's and retirement communities:
This study does not estimate the potential number of multi-unit developments such as those listed above. According to the Hanover Planning and Zoning Office only 3 small Open Space developments have occurred over the past three to four years. (Two seven-unit and one five-unit). Because the nature of such developments is lot specific, it is beyond the scope of this analysis.

ANALYSIS

Residential Units:

The projection of the number of housing units in the Town of Hanover at full build-out was based on the assumption that all land available for residential development, after taking into account the factors discussed above, would eventually be developed at the maximum density permitted by the current Zoning Ordinance. The breakdown of land use by type of residential structure (single family, duplex or multi-family) within each zoning district was assumed to remain at the existing figures and to be allocated evenly across lot classes. The results indicate a future with 6,692 single family homes, 180 residential units within duplexes, and 242 multi-family units. Seasonal dwellings account for 485 (of the total) units with majority anticipated in the "Forestry" zone.

Housing Type	Units based on 1990 U.S. Census	Units Estimated at Build-Out	Numerical Increase	Percent Increase
Single Family	1,944	6,289	4,345	224%
Duplex	133	180	47	35%
Mu1ti~Family **	236	242	6	3%
Other	23	0	(23)	0%
Total	2,336	6,711	4,375	187%

Note 1: Although only seasonal units are allowed by special exception in the 'F zone, they were included in this study because of the potentially large number of units which could exist under the current regulations. At full build-out approximately 563 units could exist in the F zone. Based on the Assessor's data, currently 157 units are coded as single family. For lack of better data (at the time that this analysis was done, neither the Assessor's office nor the Planning and Zoning Office could estimate which units were seasonal) regarding seasonal units, 50% of the these existing units (78) were assumed to be seasonal. Subtracting the estimated 78 year round units from the total build-out units we assume a total of 485 units to be seasonal at full-build out.

Note 2: College dormitories were not included in the build-out analysis and are not included under multi-family.

The results also present a significant proportional shift in the housing stock from multi-family to single family:

Housing Type	1990	Build-Out
Single Family/Duplex	89%	96%
Multi-family	10%	4%
Other	1%	0%

A note of caution should be issued regarding the US Census counts of multi-family units in Hanover. Evaluating the Census data, it seems that the census includes dormitories as multi-family housing. These units have been subtracted for the purposes of this study; however, if an analysis of Dartmouth College's housing units is conducted in the future it would be interesting to compare the two.

Two other factors made the projection of the future number of multi-family units somewhat problematic:

1. Multi-family dwellings are only allowed in the GR zone but density varies according to the number of units. For example, on a Class 1 lot in the GR District, a 4-unit complex would require a 17,000 square foot lot resulting in a density of 24 persons per acre, an 8-unit complex would require 25,000 square feet and result in a density of 33 persons per acre. In all other zones, rather than make a potentially erroneous assumption regarding the average number of units per multi-family housing structure, the land area required for each additional dwelling unit was treated as a lot size per unit.

2. A small amount of land is classified by the Town Assessor as multi-family in districts where multi-family housing is neither a permitted use nor allowed by special exception at this time. An attempt was made to incorporate these units into the total with the assumption that the grandfathered multi-family housing was developed at today's density standards for the district.

A further assumption was made that the number of multi-family units would not decrease, and that multi-family housing existing in districts where it is not now permitted would remain. Given that (in the absence of dormitories) multi-family residences represent a very small portion of the existing housing stock, the resulting numbers were not significantly higher than currently exist today.

Population:

If we assume that, as in 1990, at full build-out there was a 3.8% vacancy rate, and. 7.2% seasonal occupancy, and an average of 3.2[1] persons per household, we would have a future population of in 19,171 in Hanover. This would represent an increase of approximately 225% from the 5,868 residents reported by the 1990 Census. These figures do not include the Dartmouth College student population which, based on the 1990 Census and shown as "other persons in group quarters", was 3,344. Based on information from the Dartmouth College admissions office the current student population including both graduate students and undergraduate is approximately 5,400, of which approximately 2,800 live in dormitories, 165 live in college-owned fraternity houses, and 300 live in private fraternity houses, making a total of 3,265[2]. Other students are

[1] According to the 1990 census, the average person per household for Hanover is 3.9% - the highest in the UVLSRPC region. However, this figure includes the Dartmouth students in the total population. Given that we have not included residents of dormitories in this study but acknowledge that an additional 2,135 students currently live off-campus. In all likelihood the persons per household is probably somewhere between the regional estimate of 2.64 and the 3.9 as offered by the US Census, so this study opts taking a middle ground using 3.2 persons per household.

[2] Source: Dartmouth College Admissions Office and Dartmouth College Housing Division

assumed to live in private housing stock and would therefore be included with the population figures generated above. For the purposes of this study we make the assumption that the number of students in College housings units stays at today's count resulting in a build out population of 22,436.

The following 1990 population figures are presented for comparison:

Hanover	**9,212**
Lebanon	12,183
Keene	22,430
Hanover at build-out	**22,436**
Portsmouth	25,925
Concord	36,006
Burlington, Vt.	39,127

If the age structure of the community is assumed to remain the same, the school age population (5-17 years), which equals 16.4% of the total population, will increase from 964 in 1990 to 3,679 at build-out. Similarly, the special needs of those over 65 would be a factor. According to the 1990 Census people over the age of 65 represented 15.6% (920) of the population. At full build out this will result in approximately 3,500 senior citizens.

Care should be taken in comparing communities based on population alone. Each community has its own character, and different approaches to planning and zoning which result in different impacts associated with growth. A very different appearance and atmosphere can result from the same level of growth or population density under these different circumstances.

If the number of housing units in Hanover were to continue increasing at the rate experienced between 1980 and 1990, a rate of 10.5% for the decade, and no other factors changed, it would be possible to reach full build-out in approximately 100 years. Conversely, if we look at the number of units added to Hanover's housing stock during the 1980's, when only 250 units were added to the Town's housing stock, rather than the rate of growth, and assume that number to continue, build-out would not occur for many hundreds of years. UVLSRPC believes this figure is extremely low and that further research should be done using building permit data to confirm that this trend has extended into the 1990's.

The rate of population growth gives yet another option. However, according to the Census, the rate of population growth for the Town of Hanover between 1980 and 1990 was only 1%. Again if this trend were to continue it would take hundreds of years to reach build-out population. The 1996 population estimates prepared by the New Hampshire Office of State Planning suggest that this trend towards very low growth is continuing through the 1990's. In 1980, the Hanover population was 9,119 and in 1990, the population was 9,212, an increase of 1%. OSP estimates that in 1996 the population of Hanover was 9,218, an increase of much less that 1 percent. Again, UVLSRPC believes that this estimate is extremely low and does not include the 300 residents of Kendall, for example.

This build out study can only suggest how important a detailed study of study of fiscal impacts and capital improvement needs associated with this potential population increase would be. That

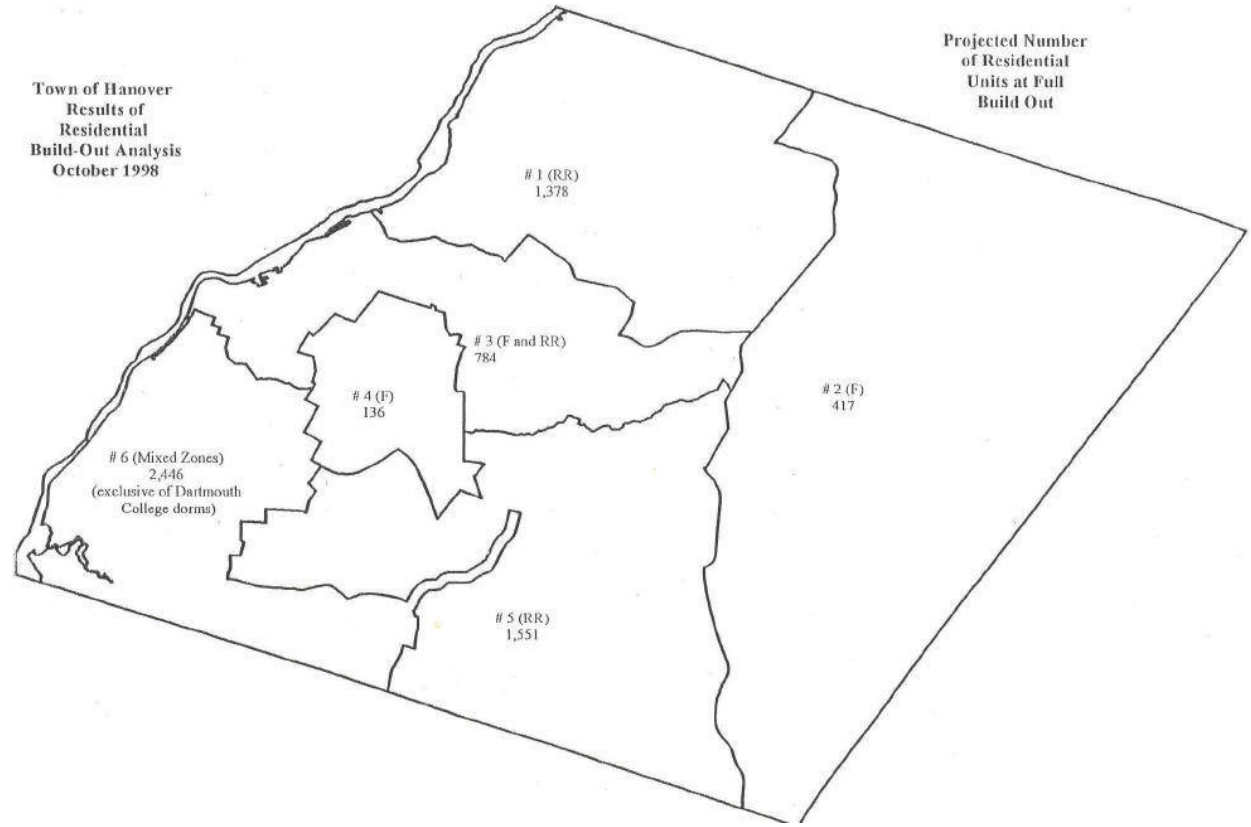
study is beyond the scope of this analysis. However, using the factor currently considered to be a standard in the transportation planning field, 8 vehicle trips per day per household, Hanover would see an increase in daily (non-dormitory) household trips from approximately 22,000 at present to approximately 49,784, more than double the current number of vehicle trips per day on its roads from local residential traffic alone. It was assumed for this calculation that half of the seasonal units would be occupied at any one time. Non-local traffic will continue to increase as the regional population grows and the vehicle trips associated with commercial growth within the Town would also be much larger than today.

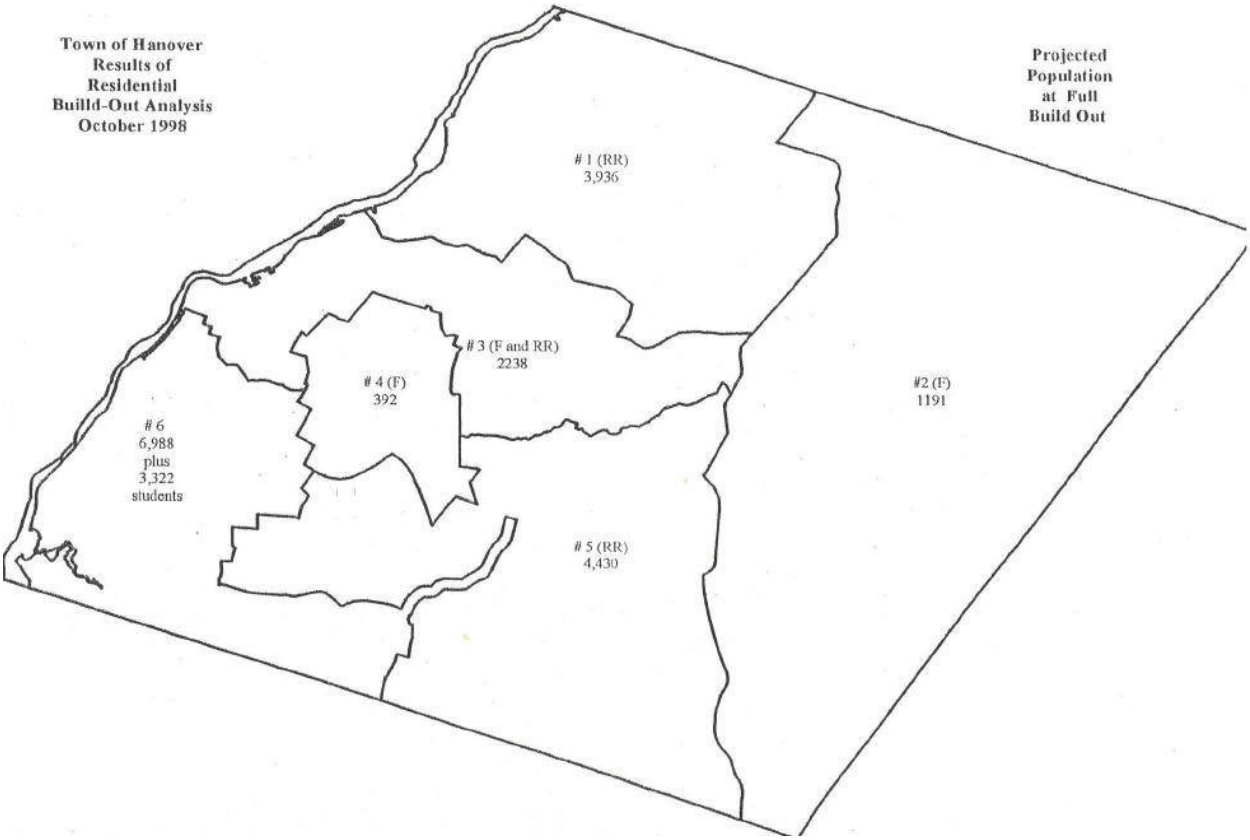
UVLSRPC is currently looking at water and sewer service area maps provided by the Hanover Department of Public Works to estimate the potential number of units which may be served by Town water or sewer at full build-out.

CONCLUSION

In addition to enabling a view of the future of the community as permitted by current regulations, this build-out analysis also provides a framework to easily compare the effects of alternative land use plans, such as various water and/or sewer service area alternatives, changing a zoning district, or density requirements within a district. The effects of additional environmental characteristic zoning overlays on the growth of the Town can also be easily evaluated. This type of analysis enables local officials in the community to preview and consider the potential impacts associated with a change before making that change. It will also be of assistance in reviewing the need for and subsequently planning certain types of capital improvement.

It may be desirable to use the framework established with this analysis to test different sets of assumptions. For example, a different proportion of residential to commercial use within mixed-use districts would result in a different total number of dwelling units, and a different number of school age children, and so on. It should always be kept in mind that a build-out analysis is a model based on a set of assumptions. A different “crystal ball” will yield different results.


Town of Hanover
Results of
Residential
Build-Out Analysis
October 1998
Projected Number
of Residential
Units at Full
Build Out
1 (RR)
1,378
3 (F and RR)
784
4 (F)
136
2 (F)
417
6 (Mixed Zones)
2,446
(exclusive of Dartmouth
College dorms)
5 (RR)
1,551


Town of Hanover
Results of
Residential
Builld-Out Analysis
October 1998
Projected
Population
at Full
Build Out
1 (RR)
3,936
3 (F and RR)
2238
4 (F)
392
#2 (F)
1191
6
6,988
plus
3,322
students
5 (RR)
4,430