

Town of Woodstock Master Plan

Woodstock Planning Board

Revised Master Plan Adopted by the Woodstock Planning Board on:
April 12, 2021

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Introduction

The purpose of a master plan, as set forth in New Hampshire statutes, is to show, as fully as possible, the planning board's recommendations for the desirable future development of a town. State statutes further provide that a town may not enact a zoning ordinance until the planning board has adopted, as a minimum, the goals and objectives and land use parts of a master plan. As of this writing, the Town is not pursuing zoning.

Having a master plan to guide development makes good sense – and good local government. Woodstock, like many towns in New Hampshire, has faced and will continue to face pressure from development which has stressed and will continue to stress our local community facilities and utilities and which has in the past and could continue to change the character of the town. We've met previous needs with improvements to our infrastructure which can be seen in the improvements of Water and Sewer facilities and the growth of our Police and Fire Departments. We now face new concerns and new challenges. In the absence of sound long range planning, the project-by-project review of development proposals may lead to long range results that are contrary to what the town intends or desires. Master planning can avoid such results by balancing all of the competing interests in a community and by providing an overall "policy umbrella" to guide the project-by-project decisions by which a town is developed.

Another reason for having a master plan is that it provides a resource document which explains the community's development policy. Good local government requires sound, rational, responsible decision making and an openness that allows the decisions to be understood, analyzed, discussed, and evaluated by the public. Everyone in town will not agree on development policies, but everyone deserves the right to know what the policies are and why they exist. The master plan document details those policies.

This report is an update of the Woodstock Master Plan, which was originally adopted by the Woodstock Planning Board in December 1987, and revised in 2003 and 2014. Woodstock continues to evolve and change. State and Federal requirements resulted in the adoption of a "Floodplain Development Ordinance" and a "Shoreland Protection Ordinance". In 2001, at Town Meeting, voters requested that a Telecommunication Ordinance be drafted. This ordinance was developed by the Planning Board and approved by the voters at the 2002 Town Meeting. The purpose of updating this master plan is to make sure that we, as a community, remain current with development realities within our town and present a sound foundation for planning policies.

Master Plan Goal and Objective Summary

Master Plan Objective

To develop a plan that documents local history, identifies natural resources, and makes recommendations for land use, according to RSA 674:1-4, and is adopted according to RSA 674: 6-7.

Master Plan Goals:

1. Provide a tool to describe the historic character and unique natural environment of the Town of Woodstock, NH.
2. Set forth the future vision of the community.
3. Provide a method to monitor and guide growth:
 - Growth and change is inevitable, however, excessive growth or development may not be compatible with the desires of the community. We intend to assist in maintaining the town's desired identity as a small town tourist destination with abundant natural wilderness and resources.
 - Growth and change will be directed towards maintaining the "small town charm" and preserving the character of Main Street, N Woodstock, as well as the unique identity of the various areas of our community described herein.
 - Growth and change will be reviewed to ensure that it does not overly tax our infrastructures and that it adheres to DES regulations and our Shoreland Protection Ordinance, to protect and maintain our quality of life and our environment. More detailed evaluation of groundwater and aquifers is essential prior to any significant development.

Chapter 1

Goals and Objectives

1. Support and provide an economic base such that existing businesses can survive, prosper and continue to provide employment opportunities and job stability. Develop a good working relationship between the municipality and the commercial sector. Be responsive to the needs of local businesses to the maximum extent possible given financial constraints and complementary responsibilities to the residents' needs and environmental considerations.
2. Encourage the continued growth of the community's primary industries consisting of tourism, recreation, skiing, and other service-related businesses, and to maintain and provide the infrastructure necessary to allow these industries to thrive.
3. Maintain and enhance the characteristics of the Town of Woodstock along with its present and past histories. Direct opportunities to appropriate locations where compatible uses exist; where change is welcomed; and/or needs can be most efficiently met.
4. Assure that change or development occurs at densities compatible with topographical and geographical constraints to ensure that ecological resources, roadways, and/or infrastructure needs can be accommodated in the public's best interests.
5. Preserve sensitive areas such as wetlands, waterfronts, floodplains, and forested areas, to ensure that environmental preservation is prioritized over economic development in these areas, preserving the natural beauty of our town and ensuring that the quality of life we currently enjoy will be maintained for future generations.
6. Welcome ideas and respond to them in a constructive manner by analyzing them with the residents' best interests in mind. Seek input and be open to advice from residents and professionals to ensure that sustainable choices are made for our future.
7. Recognize that Woodstock is a community that accepts mixed uses throughout and hosts a diverse residential and economic base. Provide guidance that creates a balance between economic, residential, and ecological needs such that the Town of Woodstock continues to provide value for all residents and visitors without compromising its unique natural character and beauty.
8. Extend water and sewer service and other infrastructure to serve the majority of our residents and businesses as efficiently as possible, with a view towards creating redundancy in infrastructure where possible.
9. Facilitate future technology expansion throughout the town.

Chapter 2

History

Woodstock today is a product of over 250 years of interaction among people, land and events. Where and why families settled in Town, how they earned a living, and what contributions they made to the Town are all important factors in understanding the social and economic character of our community. This chapter is intended to provide a sense of the character of the Town of Woodstock and its development as influenced by people who have settled here and the bountiful natural resources. Serious work in research and compilation has been undertaken by individuals concerned with creating a permanent record – Ida Sawyer, Fred Brown, and Frank Moore, to name a few. Their work, along with Fran Belcher's Logging Railroads of the White Mountains and J. Willcox Brown's, "Forest History of Mt. Moosilauke," provides the basis for this chapter. We hope that what follows is an adequate portrayal of the major phases and influencing factors in Woodstock's development.

The Peeling Grant

The granting and settlement period of Woodstock was probably very similar to that of other central and northern New Hampshire towns. Settlements in the state were initially concentrated in the Seacoast area, and later extended up the Connecticut and Merrimack River Valleys. Until the early part of the eighteenth century, Native Americans of the Abenaki tribes were seen as hostile obstacles to any serious settlement. The French and Indian War and other defeats pushed the Native Americans north and removed this significant threat. As the first half of the eighteenth century proceeded, the claiming of land as part of a territory was of paramount importance. Benning Wentworth, who served as Royal Governor of New Hampshire from 1741 to 1767, conducted a very energetic land-granting enterprise. In fact, partly because of Wentworth's expansion activities, New Hampshire was the fastest growing colony from 1761 to 1775. The booming timber trade between Britain and the colonies also prompted the inland movement. In 1763, Wentworth issued a charter to Eli Demerit and 92 other proprietors for some 25,000 acres of land which was called Peeling. At the same time, grants were issued for Warren, Coventry (Benton), and Landaff (including present day Easton). No settlement occurred and the land would change hands, once in 1771 when it was re-granted as Fairfield to a second group and again in 1773 when it was re-granted as Peeling to some of the original proprietors. Lack of good roads was one key factor delaying settlement. Meetings of the proprietors were held in Dover, New Hampshire to discuss laying out the lots and other business. The first road into the area was cleared in 1793, and the town was laid out in 200-acre lots in 1794. Peeling was officially incorporated in 1800 and the first annual meeting was held in town that year. The population of Peeling at its official beginning was 82.

Clearing the Land: Part One

The 1800-1850 period represented the "breaking-in" phase. By 1810, the population had grown to 210 as more families bought or claimed lots. At that time, the land was blanketed with a dense, virgin forest. Some land began to be cleared for homes and farming. Since much of the land in Woodstock has steep slopes, most families settled along the river or near Elbow Pond, the only other near-level area in town. The major activity of the early settlers (and the dominant economic activity) was subsistence farming. Gradually, as the population increased, blacksmiths and cobblers set up shop. Woodstock's many mountain streams powered small mills.

The lumber, shingles, clapboards, and lath produced at mills on Jackman, Hubbard, Eastman, Gordon Pond, Russell Pond and Moosilauke Brooks met local needs for many years. There were also small gristmills and a textile mill. By 1854, there were 15 active mills. Practically every stream in town has been the site of more than one mill. Other activity at mid-century included a starch factory on Eastman Brook, a growing tannery operation

at Mirror Lake, and lead mining in the Mt. Cilley region. Another part of Town took on the name of Potato Hill (south of Mt. Cilley, along Glover Brook) because of predominance of that crop. Corn, rye, wheat, hops, and hay were some of the other crops raised at this time. Many families kept sheep, cattle, and pigs.

The First Baptist Church of Peeling was established in 1812. Later, the Church would split for theological reasons and to better serve the different parts of Town – one to serve southern Peeling, Thornton, and Campton, another for the northern part of Town and Lincoln.

It is well documented that Mt. Cilley was the site of a major settlement beginning in 1824 and lasting until about the Civil War. Though the land was not easy to work and winters were harsh, settlers made a determined effort to carve a small civilization out of the woods. About 15 families cleared the land, built homes and a school, set up mills on nearby streams, and farmed. The road up from the Daniel Webster Highway was often difficult to travel and was a tenuous link to the rest of the sparse civilization. There were a number of factors which contributed to the community's abandonment including an increasing sense of isolation from village activities in the valley and the town's reluctance to maintain the four-mile stretch of road. The excellent soil and promise of a better life in the West also probably influenced the decision of some of the Mt. Cilley families to move on. The upland community was reportedly abandoned around 1865, and by 1920, forest had reclaimed the land.

Woodstock

In 1840, the townspeople decided to change the name of their town from Peeling to Woodstock. The cause of the change is unknown. Through the middle part of the 1800's, North Woodstock and Woodstock were quiet little villages. Stagecoach travel provided limited, though regular, contact with the southern part of the state. To the northeast, a small community was growing up in Lincoln along the Notch Road, though the mill part of the town did not yet exist.

By 1870, Woodstock had 405 inhabitants; Lincoln had 71. While the population would drop slightly over the next 20 years, Woodstock was about to enter a new and very important phase of its development.

The Resort Era

The phenomenon of the White Mountains as a vacation and travel area began in earnest in the last decade of the nineteenth century, as more and more people from the Boston area began to flock to the mountains. The clean air, cool mountain breezes, and mineral springs were elixirs to the health and spirit of weary city-dwellers. And Woodstock was the perfect setting – a small quiet community surrounded by mountains. To the east is the spectacular Franconia Range, and looming on the west are Kinsman Ridge and Mt. Moosilauke. Franconia Notch commands the views to the north. Mountain streams are plentiful, and the drops and pools of Agassiz Basin were a favorite spot to visit. This natural beauty and the coming of the railroad set the stage for the explosion of the tourist industry. For Woodstock and other White Mountain towns, this "drawing to the mountains" was the first major influence which helped to shape their character. It set Woodstock apart, on a path that it is still on today.

The Pemigewasset Valley Railroad (PVRR) was extended to North Woodstock from Plymouth in 1883 thus providing a quicker, more convenient way for more families to travel. The two villages became well known as summer resorts. The era of the grand hotels was underway with the Mountain View, the Deer Park, and the French Hotels all built in the mid-1880's. Other hotels of the period included the Russell House, the Alpine, the Three Rivers House, the Fairview, the Greenleaf, and the Maplewood. Some of the existing houses were converted to more modest boarding houses. Some of the better-known establishments were Fern Hill Farm, Osceola Lodge, the Birches, Seven Gables, and the Homestead. In addition, people enjoyed summers enough in Woodstock to build cottages and return year after year with their families. Many of these summer residents were very active in a variety of community activities.

The tourism era brought cultural, economic, and physical change. Woodstock would come alive each spring for four to six months. New businesses and services developed to attract and then cater to visitors. Year-round residents found work in providing lodging, food, tours, and other activities. The income from summer jobs was important to many families to support them through the winter months.

Clearing the Land: Part Two

Railroads and industrialization nation-wide were responsible for the rising demand for North Country timber during the late 1800's. The extensive logging of softwoods all around Woodstock and soon to be in the upper reaches of the Pemigewasset (Pemi) Valley would change the face of the landscape. While the history of logging and the lumber industry is too involved to be recounted here, some discussion of the influence and impacts is valuable.

Up until the 1870's or so, lack of good transportation and adequate timber supplies to the south had prevented any significant change in the predominantly local lumber industry. The comings of the railroads, improvements in sawmill technology, and the aggregation of forest land into a few vast holdings brought changes to the area. The extension of the PVRR was not only a boon to the Town's growing popularity as a summer resort, but it represented the final ingredient necessary for extensive clearing of the forests. From this main line, others would be extended eastward into Thornton Gore, and the Pemi Wilderness, northward to Johnson and westward to Lost River and Elbow Pond. J. E. Henry and family constructed an extensive rail system in the Pemi Wilderness and built a large sawmill and many homes and shops in Lincoln. Later, pulp and paper mills were built. The effect of the Henry operations (and those of later owners) on the land and the economy of the area was significant, though the influence was undoubtedly more direct and lasting on Lincoln than on Woodstock. At the time, Woodstock had a definite community structure and a new economic force in its resort popularity. For a time in the early 1900's however, both North Woodstock and Woodstock Village experienced an influx of hard-working men who constructed railroads in virgin forests, cut "low to the stump" thousands of acres of land, built sawmills and repaired machinery, and tended horses and engines. The Gordon Pond Railroad (GPRR) and the Woodstock-Thornton Gore Railroad (W-TGRR) enabled timber harvesting in the northern and southern ends of Town. Both railroads operated for about the same length of time, Gordon Pond from 1910-1916, and the Woodstock-Thornton Gore from 1906-1913. Approximately 30,000 acres in the Kinsman-Moosilauke region were cut and the timber hauled out by the GPRR. A successful campaign in 1912 to buy and preserve the Lost River Reservation in Kinsman Notch was a strong public response to the magnitude and impact of an operation of this scale. During this period, the logging operations of Livermore, Thornton, and Woodstock and the related mill operations caused a rapid increase in the population of Woodstock Village, where the W-TGRR joined the mainline.

The Twentieth Century

Work in the mills and in the woods throughout Town brought in new types of people, quite different from the periodic visitors, local farmers, and hotel operators, but equally important in the life of Twentieth Century Woodstock. The active period of timber harvesting drew to a close, with the clearing of the land and passage of the Weeks Act by Congress in 1911. By 1917, most of the tracts were purchased by the federal government to create the White Mountain National Forest. Very little seems to remain as a reminder of the logging phase of Woodstock's history. The National Forest is perhaps the strongest legacy. The multiple-use principle which guides federal land management provides Woodstock and other towns with a beautiful and useful natural resource. The forest, under different ownership and used for different purposes today, continues to shape the economic and cultural development of the Town.

The story of Woodstock as it passed through the coming of the automobile, the Depression and World War II, continued urbanization, advances in technology, and the social changes of the last two decades requires a better collection of facts, figures, and stories. The closing of the paper mill in Lincoln affected the economy and job market of the entire region. Although there was not a mass exodus of residents and the population remained

quite stable but became more dependent upon the tourism/recreational industry.

Once Loon Mountain opened in 1966, the tourism-based economy extended into the winter months providing seasonal income for families during both the summer and the winter months. Woodstock experiences two short periods of time with fewer employment opportunities; once in the fall between fall foliage and the beginning of the ski season, and again in the spring between the end of the ski season and Memorial Day.

Visitors to the area now enjoy a range of accommodations including the Victorian era hotels and inns, the cabins and motels built in the 1940-1970's, the more recent new construction or conversion chain motels and hotels, camping, seasonal homes, and the condominium complexes.

During the 1960s, Loon Mountain Four Season Resort was developed and I-93 was completed, providing jobs, economic stability, and new business opportunities. The boom of condominium housing developments in the 1980s came along with this shift in economic base. In addition to the provision of more services to residents and visitors, more recreational opportunities including the addition of a municipal playground, the construction of a new municipal office building, fire station, expansion of water, sewer and solid waste facilities, construction of a cooperative school campus, as well as improvements to Fire, Police, Public Works, and Medical Emergency services took place.

The Twenty-First Century

People of retirement age are now starting to look for homes and areas with access to recreational activities and service amenities. Second homes are being utilized in all seasons, although the overall year-round population is not growing by any appreciable amount. With the conversion of the Alpine Village Resort main building into the Ray Burton Commons senior housing development, and the considerable improvements to Cascade Park and Soldier's Park outdoor recreation areas, Woodstock is meeting the needs of all age demographics.

Growth is being realized in the telecommunications industry with the continuing trend to add updated equipment to the telecommunication towers within our community and with the extension of our telecommunications network into previously unserved areas.

In recent years, Woodstock is again seeing steady economic growth, with an increase in new residential construction, as well as commercial development. Ice Castles has moved to Woodstock, and several businesses along Main Street have extended services or reopened under new management, creating new employment opportunities and enticing visitors to our shops and restaurants. Infrastructure is being extended up Lost River Road, and a new affordable housing development is planned, fulfilling our need for workforce and young family housing. (Ref: Selectmen's Report in Woodstock Annual Report.)

Woodstock will continue to strive to keep up with advances in technology, environmental protection initiatives, and desirable economic opportunities, while retaining the rural small town charm that makes Woodstock a desirable location both for residents and visitors in terms of both available services and purity of its natural environment.

Advances in technology need to include good access to high speed internet for all residents and businesses.

Chapter 3

Natural Resources

A. Woodstock Soils

The *State of New Hampshire Department of Environmental Services* rules regulate soil and slope restrictions for building lots. Because of these rules, soil properties are an important part of community planning.

The Wisconsin glacial period, approximately 10,000 years ago deposited soils in two ways:

- by **till** - which is soil deposited directly as the glacier receded,
- and by **outwash** - which is soil flushed out during melt.

In general, the soils in the Pemigewasset River Valley between Rte. 3 and Rte. 93 are sandy outwash soils. These are good materials for construction of roads, building lots, and effluent disposal systems. Although natural erosion has uncovered ledge in some flood plain areas, in most cases, outwash covered the areas with deposits of sand and gravel and till is less common in these areas.

The areas west of Rte. 3 and east of Rte.93 are generally till deposits. In these areas large boulders and ledge are more likely to be encountered. Slopes facing north are likely to be hard packed (lodgment till); due to the fact that the glacier pushed soils from the north to the south. In these areas, ledge is usually close to the surface, and the soils are generally compacted. Southerly slopes and the areas between hills are usually well drained soils as these were deposited as the glacier receded (ablation till). These areas are better suited for building as the soils are less likely to be compacted, although cobbles and boulders will be prevalent. As a general rule, if one sees old stone walls, the soils will be till, and if walls are not present; the soils will be outwash.

As soil science is an extremely complex business, the above is very general. To find more specific information one can refer to *The Soil Survey of Grafton County Area, New Hampshire*. This publication is available through the United States Department of Agriculture at no cost.

Refer to:

<https://soilseries.sc.egov.usda.gov/screports.aspx>

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/data/?cid=nrcs142p2_053583

<https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

B. Water

1. Introduction

Due to latitude, climate, and relief, Woodstock and the northeastern United States are water-abundant areas. This means simply that periods of low or no rainfall, and thus low streamflow, are infrequent. More than enough water exists in rivers, ponds, lakes, and wells to meet normal needs.

Woodstock's rivers, streams, and ponds have long served a variety of economic, cultural and natural uses. The Pemigewasset River ("The Pemi") has transported logs, goods and people; the rivers and springs have provided abundant supplies of clean water for domestic and industrial use; the fast-flowing mountain streams generated power for countless mills. For many years, the Pemi carried away household and industrial waste. Following the Clean Water Act of 1971, a waste water treatment plant was established to manage residential water treatment, and commercial waste is treated before being

released into the town systems. The natural scenic attributes of Woodstock's waters continue to delight residents and visitors.

Aside from serving the valuable functions described above, the specific characteristics of our town's water resources provide certain limits on human activity. Examples of limitations include flooding, a natural occurrence which becomes a matter of safety and expense with human encroachment on the floodplain, the potential for groundwater pollution either directly through percolation or from poor surface water quality; and erosion and sedimentation which are products of careless alteration of slope, soil, and vegetation. The Woodstock Public Works Department monitors water usage and quality on an ongoing basis and will make recommendations if abnormalities are detected or infrastructure improvements are needed. (Ref: Woodstock Annual Report 2018).

Surface Waters

Rivers and Streams

Woodstock's mountain mass is bisected by the Pemigewasset River running southerly through Town, and Lost River/Moosilauke Brook flowing easterly from Kinsman Notch to join the Pemi in North Woodstock. Most of the land in Woodstock (all of the private land) drains into the Pemi (including a few thousand acres that drain via the Baker River). Some 2,000 acres on the western side of Kinsman Notch flow into the Wild Ammonoosuc, a tributary of the Ammonoosuc which joins the Connecticut River in Woodsville.

The Towns of Woodstock, Lincoln, and Franconia represent the headwaters of the Merrimack River. While this drainage area makes up less than four percent of the total Merrimack drainage area, the headwater is very important to the river as a whole. Compared to downstream areas, Woodstock's streams are fast flowing, with steep gradients and narrow channels. These characteristics have implications for flood hazards and water quality. In general, rivers and streams of headwater areas are more sensitive to changes or extremes in watershed conditions. However, since most of the drainage area is in the White Mountain National Forest, minimal alteration of this land is expected.

Woodstock has about 25 rivers and streams with a total length of over 100 miles. Most of the streams are a few miles in length. The rivers and streams are listed in the Table below along with the drainage area, stream length, stream order, and water quality classification. The Pemi is the dominant waterway, partly because most of the land drains into it, and partly because the river valley is the site of most human activity. The privately held land in town is located primarily along the Pemi, along Lost River/Moosilauke Brook, and at the confluence of the East Branch of the Pemi and the main stem in North Woodstock. Other major streams include Jackman, Glover, Gordon Pond, and Hubbard Brooks.

Because the Pemi represents the headwaters of the Merrimack, there is a good amount of data available on riverflow and runoff. Riverflow is one component of the hydrologic cycle and is the sum of precipitation falling directly on the rivers and streams, and overland and subsurface runoff. During dry weather, riverflow consists of drainage from groundwater storage. The steep slopes and soils of Woodstock produce fairly fast runoff, yet the vegetation moderates it a bit and aids in absorption and underground travel.

Woodstock's Rivers and Streams

| | Drainage Area 1 (Acres) | Stream Length (Miles) | Stream Order | Water Quality Classification |
|--|-------------------------------|-----------------------------|-----------------|------------------------------------|
| Pemi River Basin | | | | |
| Pemigewasset River (direct drainage) | 3,552 | 15.9 | 5 | C |
| No Name #1 | 164 | 1 | 1 | B |
| Burleigh Brook | 644 | 4.9 | 2 | B |
| No Name #2 | 340 | 1 | 1 | B |
| Hubbard Brook | 51336 | 15.5 | 3 | B |
| Leeman's Brook | 1,000 | 3.9 | 2 | B |
| No Name #3 | 600 | 2 | 1 | B |
| Glover Brook | 3,704 | 7.5 | 2 | B |
| Beaver Brook | 592 | .7 | 1 | A |
| Eastman Brook | 44 | 3.2 | 3 | B,C |
| Russell Pond Brook | 568 | 1.6 | 1 | B |
| Horner Brook | 332 | 1.6 | 2 | B |
| | | | | |
| Moosilauke Brook , (direct drainage) | 4,916 | 11 | 4 | B |
| Smith Brook | 468 | 1.4 | 1 | B |
| Pike Brook | 1,504 | 4.8 | 2 | B |
| Crooked Brook | 520 | 2 | 1 | B |
| Jackman Brook | 3,596 | 12.9 | 3 | B |
| Walker Brook | 2,304 | 7.9 | 3 | B |
| Gordon Pond & Falls Bk (Total M. Sub-basin) | 1,816 <u>15.124</u> | 7 | 2 | A,B,C |
| | | | | |
| Total Pemigewasset Basin | 32,000 | | | |
| | | | | |
| Baker River Basin | | | | |
| Baker River | 2,220 | 4 | 2 | B |
| | | | | |
| Wild Ammonoosuc River Basin | | | | |
| Wild Ammonoosuc | 948 | 1.75 | 3 | A |
| Beaver Brook | 220 | .75 | 1 | A |
| Oleson's Brook | 228 | 1 | 1 | A |
| Stony Brook | 404 | 2 | 1 | A |
| Underhill Brook | 304 | 1.2 | 1 | A |
| Stark Falls Brook | <u>104</u> | 1 | 1 | A |
| | | | | |
| Total Wild Ammonoosuc Basin | 2,208 | | | |

Drainage area includes only land within Woodstock

A river gauging station is maintained by the U. S. Geological Survey ~~at the former site of the old covered bridge~~ in Woodstock Village.

The flow of the river can vary widely over the course of a day, month, or year. Riverflow varies with rainfall, temperature, the pattern of storms during the year, soil moisture conditions, and other factors. Over the course of a year, the interaction between precipitation (rain and snow), spring melting, and the growth and loss of vegetation can be detected. ~~The spring flows coincide with leaf fall.~~ The river is at its lowest in January, February, July, and August. The winter months are typically low in precipitation and that which falls is stored in the snowpack. Though the rainfall is higher in the summer, vegetation consumes a good part of this source through transpiration.

While averages are important, it is the extremes which most often concern residents and local officials. The high flows bring streambank erosion, property damage, and hazards to human life. The low flows bring dry wells, reduced fishing and recreation, and a high potential for fire.

In the course of a year, there are occasions in which the riverflow exceeds the capacity of a stream or river channel. Thus, some land in Town is flooded every year. Land a few feet higher may be accustomed to flooding every two or five years. These are not extreme events, nor are they usually dangerous. They may result in some erosion, basement flooding, and septic system failure. Because of the concern for the significant impacts of larger flooding events, the federal government initiated mapping of flood hazard areas and a flood insurance program. One of the objectives of the federal effort is to guide land use activity to safer locations and, short of this, to ensure that activity which does occur on the floodplain is raised above the flood elevation levels or is flood-proofed. Woodstock has elected to join the Flood Insurance Program and has adopted the requisite ordinances. The Flood Hazard Areas as delineated by HUD represents the area of land that would be inundated by the 100-year flood (a flood that has one chance in one hundred of being equaled or exceeded in any given year. The Pemigewasset River Valley is the major Flood Hazard Area in Town. Narrower areas extend along Lost River, Gordon Pond Brook and Hubbard Brook. Flood Hazard Areas also surround Beaver and Elbow Ponds. The Town of Woodstock has adopted a Floodplain Ordinance which restricts development in floodplain hazard areas, and building permits are required for all development within these zones.

Major Ponds

Woodstock has four ponds: Mirror Lake in the southern part of Town, Russell Pond in the northeast, Elbow Pond in the center of town southwest of Mt. Cilley, and Beaver Pond in the far northwestern corner in Kinsman Notch. The first three are natural ponds, formed most likely as a result of ice-contact deposits of the glacial period. Mirror Lake, which drains into Hubbard Brook, is a town-owned pond surrounded mostly by private land and some National Forest land. All the others are in the National Forest, with the Elbow Pond tract a recent addition. Mirror Lake has a small amount of residential (year-round and seasonal) and recreation use along its southern shore. Russell Pond is the site of a popular White Mountains National Forest (WMNF) campground, with most of the roads and camping area along its eastern shore. This pond is regularly stocked with brook trout. The drainage area of all the ponds (including Mirror Lake) lies almost completely within the National Forest and is well protected against significant land use changes. Of course, National Forest management of these watersheds must be carefully monitored.

Woodstock's Ponds

| Name | Size | Depth | Inlet/Outlet | Shoreline |
|--------------|----------|----------------------------|----------------------------------|---------------------------------|
| Beaver Pond | 13 acres | 4' average 14' maximum | Beaver Brook/ Wild Ammonoosuc | wooded |
| Elbow Pond | 48 acres | 9' average 32' maximum | Glover Brook | wooded and swampy |
| Mirror Lake | 38 acres | 15' average 33' maximum | spring brooks/ no-name | wooded with some residential |
| Russell Pond | 41 acres | 33' average 74' maximum | no inlet/ Russell Pond Brook | wooded |

Groundwater

Another water resource important on a daily basis to Woodstock residents is groundwater. The North Woodstock Village water system was replaced by two gravel packed wells in lower Woodstock. Well #1 was installed in 1964, and well #2 in 1990. Each has a capacity of 450 gpm, at a depth of 50 ft. Lines go from Route 175 in lower Woodstock, across the river in lower Woodstock up Route 3 and out Route 112 to the tank. Water service is available along this entire route. This system provides fire hydrants and water to about half the town. The areas not serviced by town water are Route 3 south of Gray Hill Condos and Mirror Lake Road; Route 175 east of Rte 3 and south to where Route 175 crosses the Pemigewasset River, Route 175 south of Thornton Gore Road, Route 112 west of Lost Valley development and most of Sundance and Snow King Roads in Lost Valley. Beyond this personal use, groundwater also sustains the riverflow in times of low rainfall. As the Hydrologic Cycle illustrates, the distinction between groundwater and surface water is based on where a drop of water is located at any particular time. This means that the quality and supply of groundwater and surface water are interdependent.

Groundwater occupies the spaces among soil particles and rock fragments. The top of this zone of saturation is called the water table. While much of the groundwater tapped in New Hampshire is in surficial glacial deposits, fracture zones in bedrock also represent a groundwater source. A groundwater aquifer is a geological formation (bedrock, till, or sand and gravel) which transmits water. Physical characteristics of an aquifer determine the volume of water it may hold and the rate at which the water flows. An aquifer recharge area is an area on the land surface through which rainfall and runoff infiltrate to replenish an aquifer. A recharge area may lie directly over, close by, or at a distance from the aquifer it replenishes. Geology, soil, slope, vegetation, and land use are some of the factors which affect the ability of surface areas to recharge aquifers.

Sources of information on groundwater and aquifers in Woodstock include the USGS Water Resources Investigation, "Availability of Ground Water in the Pemigewasset and Winnepesaukee River Basins, Central New Hampshire," and Camp, Dresser and McKee's report for the Town, Water Supply and Distribution System Improvements. The USGS map indicates, at a scale of 1:250,000, the approximate location of aquifers of high, moderate, and low yields. The first two areas are delineated on the Water Resources Map. The high yield areas are located along the main stem of the Pemi, beginning about a third of a mile south

of the Route 175 bridge in North Woodstock and extending essentially along the Pemi's entire length. Another high yield area parallels the East Branch of the Pemi as it enters Town and joins the main stem. Aquifers estimated to produce medium yields of water extend from the high yield area along the East Branch west to the main stem and in between Gordon Pond Brook and Lost River. The major difference between aquifers of high and medium yield is thickness. The sand and gravel deposits of high-yield aquifers are thicker and have the potential to produce water in a quantity sufficient for municipal and industrial needs. The thinner deposits of medium-yield aquifers probably yield enough water for small municipal and rural residential use and commercial and light industrial use.

CDM performed tests at 14 sites in order to identify potential water supply sources. The results indicated that deeper sand and gravel deposits (50-80 feet) had better yields or flow-rates for municipal water supply than shallow deposits. Water at certain sites had levels of iron and manganese unacceptable as a public source. These tests identified the aquifer since developed between the Pemi and Route 175 to supply the Town of Woodstock and an aquifer along Lost River southwest of North Woodstock Village as potentially the most productive sites.

While information currently available indicates sufficient water to support the needs of the current population, Woodstock must further evaluate aquifers in order to ensure the quantity and quality of water resources prior to any significant development.

The current well system is robust enough to serve likely future development. Sewer systems may need expansion to support significant future development.

Wetlands

Wetland areas are typically identified by the coincidence of the following conditions: the water table is above or just below ground level; the soils are poorly or very poorly drained and have a layer of muck and peat; the vegetation consists of water tolerant species; and the land has minimal or no slope. Wetlands in Woodstock have not been specifically inventoried or studied. The best information currently available is the drainage classification of soils by Soil Classification System (SCS). This information is used to delineate wetlands on the Water Resources Map as poorly and very poorly drained soils. From the map, we can see that the wetlands are located along the river and streams and in slight depressions on terraces or upland areas. There are approximately 106 acres of wetland soils in Town, located in drainageways in the Lost River area and north of the Alpine property, on the floodplain and at the base of steep slopes in a few spots along the Pemi, and along an unnamed stream south of Mirror Lake that runs into the Pemigewasset.

The many and varied wetland functions make them important public resources. Though the value of a particular area depends upon its location within a drainage system, its size, vegetation, and other characteristics, wetlands in general perform the following activities:

- storage of floodwater and reduction of peak flows
- filtering biological and chemical pollutants
- settling-basin for sediments
- source of food, shelter, and breeding and nesting sites for wildlife
- recharge of groundwater aquifers
- home to unique and valuable plant and animal life
- recreational and educational resource

Preservation of these wetlands functions can, over the long run, reduce the likelihood of environmental problems (e.g. water pollution, drought, flooding, etc.) and can also reduce the cost to the public of correcting these problems.

Water Quality

The quality of a town's water resources is determined by natural factors of rainfall and drainage area characteristics and man's activities. Water quality is important since residents demand water that meets certain health standards for drinking and commercial and industrial uses need water that meets their processing requirements. Woodstock's surface water is considered to be of good quality. The state has classified surface waters into three categories of quality as defined in the Appendix. The table shows the specific chemical and physical standards that a river or stream must meet; the Pemi from the East Branch confluence to Hubbard Brook is Class C, as is the lower stretch of the East Branch. However, the existing quality of the water (as distinct from its legal classification) meets Class B standards. The drainage areas of the Town reservoirs (Gordon Pond Brook and Beaver Brook) are in the highest category (A - drinkable) because of their use as a public water supply. The rest of the streams are classified as, and meet the standards for, B (swimmable).

The Gordon Pond Brook Reservoir is a back-up water supply for fire protection and emergency use.

Mirror Lake has been classified as a mesotrophic lake by the NH Water Supply and Pollution Control Commission. This rating is based upon data collected in 1950 and a classification system that considers the amount of dissolved oxygen, aquatic plant growth, transparency, and other factors that contribute to the nutrient status of the water. Mesotrophic is considered to be in the mid-range between oligotrophic (nutrient-poor) and eutrophic (nutrient-rich, possible water quality problems). Since eutrophication is increased nutrient input, any activity in the watershed of a lake that increases nutrient input causes eutrophication. Land use changes can result in significant changes in nutrient runoff. Studies in New Hampshire have shown that phosphorus export from agricultural lands is 5 times greater than from forested lands, and urban areas may be more than 10 times greater. Stormwater runoff from these developed land areas is the major source of nutrients for most lakes. Other activities that contribute to eutrophication are lawn and garden fertilizers, faulty septic systems, washing with soap in or near the lake, erosion into the lake, dumping or burning leaves in or near a lake, and feeding ducks. (Ref. DES:

<https://www.des.nh.gov/organization/commissioner/pip/factsheets/bb/documents/bb-3.pdf>)

The state's water quality standards also apply to groundwater, yet lack of data has prevented any classification or comprehensive knowledge of existing quality. The Camp, Dresser and McKee study generally found good quality groundwater with a few instances of high iron or manganese. Instances of poor groundwater quality that exists for a limited time or affect a single well may be due to failed septic systems, contamination by road salt or natural sources of organic matter or other elements.

The public effort to maintain and restore water quality has sought to treat wastewater and to control the drainage of potential pollutants into surface water and groundwater. Point sources of pollution include wastewater treatment plants, paper mills, and electrical generating plants. These facilities are required to obtain a permit that sets a limit on the characteristics of discharged waters. The Pemigewasset is classified as an "effluent-limited" segment which means that the water quality standards will be met by requiring secondary treatment of wastewater as defined by the EPA. Town treatment plants have discharge limits (see below).

Non-point pollution sources refer to runoff which occurs over an area of land and is more dispersed on origin than an outfall pipe. Runoff from village streets, construction sites and timber operations, and leachates from landfills, dumps, and failed septic systems are examples of non-point source pollution. The variety of possible non-point contaminants and the difficulty of locating them make these pollution sources

more difficult to control than point sources.

Refer to Town of Woodstock Annual Report, and EPA Consumer Confidence Report: https://www.woodstocknh.org/sites/woodstocknh/files/uploads/2017_woodstock_ccr_0.pdf

The Shoreland Protection Ordinance governs how and what type of activity may be undertaken in proximity to bodies of water under its protection.

Treatment Plant Discharges

As of 2020 the septic treatment plant is at 50% capacity midweek and at 60% capacity on weekends. The plant is capable of processing 340,000 gal/day. Current use on weekdays is 170,000 gal/day and on weekends is 200,000 gal/day. The Town is allowed to develop to 80% capacity or 270,000 gal/day before expansion is required.

Vegetation

The kind of vegetation that is native to an area is primarily influenced by climate, topography, and soils. Sugar maple, yellow birch, and beech -- the key species of the predominant northern hardwoods -- cover the lower and middle slopes of Woodstock. Other major species include red maple, white birch, oak, hemlock, and white pine. These trees and others associated with the northern hardwood type usually grow on sites that are moderately well-drained or poorly-drained.

At lower elevations, the well-drained soils of the valley provide good sites for stands of white pine. The higher elevations (above 2,500 feet) and cooler temperatures of the peaks encourage an intermixing of spruce-fir among the northern hardwoods. Red and white spruces and balsam fir are common along the ridges and in pockets. Major hardwood species include sugar and red maples, yellow and white birches, oak, beech, and white ash.

The pattern of residential uses bordering and intermingling with transitional and older stands of forests provides vegetative diversity and edges. Lawns, gardens, shrub growth, and abandoned agricultural fields support different wildlife species than the forests. The variation provided in the village areas and along the main roads is also visually pleasing.

It is appropriate to mention here the existence of the Hubbard Brook Experimental Station. In 1955, the U.S. Forest Service established within the White Mountain National Forest this outdoor laboratory for research in forest ecology and watershed management. The Experimental Forest contains the entire drainage area of Hubbard Brook (7,500 acres) and lies within the towns of Woodstock, Thornton, and Ellsworth. The system of rain and stream gauges, water quality testing, and other ecosystem data provide the background for a cooperative research program by the Forest Service and several major universities. The research activities, in general, are intended to lead to a better understanding of the implications of land use changes on the natural environment. Some of the better known projects have documented the effects of various forest cutting practices on stream flow quantity and quality.

Wildlife

Wildlife is an integral part of the natural environment and is often considered to be an indicator of the health or "naturalness" of an area. In Woodstock, wildlife is important to hunters, fishermen, and the rest of us who note with curiosity and care the seasonal migrations of favorite animals. Abundant, good quality habitats -- providing food, water, and shelter -- are important to sustaining healthy wildlife species.

Game species found in town include gray fox, red fox, white-tailed deer, snowshoe hare, black bear,

raccoon, beaver, and fisher. Other species that have been spotted (or tracks observed) include bobcat, mink, otter, muskrat, and moose. The Hubbard Brook Experimental Forest has inventoried the resident mammals, birds, reptiles, and amphibians.

Russell Pond and Mirror Lake are stocked by the NH Fish and Game Department with a variety of trout -- brown, brook, lake, and rainbow.

The diversity and abundance of wildlife species is related to land use practices. To the extent that land development in Woodstock increases the number of acres in agriculture or open space, maintains sizeable parcels, and protects the quality of water, food, and other critical resources, then habitats and wildlife populations can be diversified and maintained.

Refer to : <https://www.wildlife.state.nh.us/wildlife/species-list.html>
<https://www.wildlife.state.nh.us/habitat/types.html>
<https://www.wildlife.state.nh.us/maps/wap/woodstock8x11habitat.pdf>
<https://www.wildlife.state.nh.us/maps/wap/woodstock8x11scoring.pdf>

Chapter 4

Present Land Use

1. Approximately 76% of Woodstock's land masses are national forest. In addition, a considerable portion of Woodstock is unavailable to future growth or reuse given its natural features: i.e. steep slopes, wetlands or flood plain characteristics. Woodstock is further divided by natural river ways such as the Pemigewasset River and Moosilauke Brook, Concord to Lincoln Rail Line, Interstate 93, Route 3, Route 175, Route 112 West, and Route 118 roadways. It is estimated that only about 6% of Woodstock's geographic area is available for non-forested recreational uses, residential or commercial allocations.
2. These natural features and given topological features become a base and may influence future growth throughout the town. For example, the presence of Interstate 93 and location of its exits can, and most likely will, play a substantial role in neighborhood characteristics. Growth will follow transportation networks as well as flow in the direction of existing areas with the potential for infrastructure improvements or expansion. Growth in areas requiring substantial infrastructure investment will most likely be limited.
3. The Town's resident population has remained relatively stable in spite of the substantial addition of housing units since the late 70's and early 80's. The housing stock nearly tripled yet the population remained virtually unchanged. Until more recent years the bulk of that new housing stock was second homes occupied seasonally. A growing number of individuals are retiring or semi-retiring here. They work out of their home with occasional trips to an office elsewhere and/or commuting elsewhere. The population has decreased slightly in recent years, and there is a corresponding upward trend in median age of the population (now over 40), with an increase in the over 65 age group and a decrease in population under age 30. [To review – seems that more people have moved up here more permanently since the pandemic started]
4. The primary economic base is still the hospitality industry supporting winter and summer recreational activities both natural and manmade including services related and ancillary to the tourism/ski industry. Main St North Woodstock has become a more viable business area attracting and hosting complementary tourism services and businesses. The growth in the tourism/ski industry continues to provide opportunities for many area businesses.
5. Limiting factors when considering future economic opportunities would be the lack of infrastructure adequate to support a particular use. Further infrastructure expansion may not be a viable option unless the associated costs are offset by the growth.
6. Affordable housing for local residents remains an issue. Future development may take this need into consideration.
7. Woodstock will experience direct and residual impacts from projects of regional interest nearby: i.e. the expansion of Loon Mountain (commercial) and Cannon Mountain (state park) ski areas These expansions can have a positive impact for Woodstock if well planned. It is important to keep informed of and monitor projects of regional importance.

Chapter 5

Future Land Use

Throughout the majority of the town, commercial and residential properties are interspersed.

Main St North Woodstock - consists of the area from the Lincoln town line on Route 3 (near Fay Wayside), Main St. to the junction of Route 175, the residential streets to the west of Main St. including School, Center, Bell, Young, Paradise, as well as Route 112 East to the Visitors Center.

The predominance of the housing stock is in this area of the community, as are the majority of retail and food service businesses. Commercial and residential uses traditionally have existed side by side. It is important to keep both perspectives in mind when considering growth and change in use of properties. It will be imperative to assure that the small town charm and quality of life are maintained in a manner that is beneficial for both residential and commercial users of properties.

Route 112 West. – consists of the School Street intersection west to the Easton (on Rte 112) and Warren (on Rte 118) town lines. Woodstock Town Offices are located within this area, and it is a logical direction in which to expand commercial growth of the Main St North Woodstock area. There is a substantial amount of forested acreage unavailable for growth, while some open spaces will be the focus of plans for future growth and change. We must be aware of impacts on the environment, infrastructures, and quality of life when we consider future land use changes in this area of the community.

Area Along Route 3 South of 112 Between the Two Villages - this area consists of a narrow strip of land along Route 3 bordered on the west by the National Forest and on the east by the Pemigewasset River and flood plain areas. A number of excavation businesses and a race track operate within this section of town. There are environmental and topographical considerations to keep in mind when considering future land use changes. Traffic patterns, environmental impacts, and quality of life maintenance must be considered when reviewing proposals for changes within this area.

Mirror Lake Road - This is an environmentally sensitive area of our community hosting the Hubbard Brook Ecosystem. Important environmental research is conducted within this watershed and forest. We must protect and support the integrity of their ongoing research, maintaining primarily rural, residential and lake front uses.

Route 175 consisting of Route 175 Intersection with Route 3 Green Bridge to Thornton Town Line including So. Station Rd. area. Route 175 is predominantly rural residential. It hosts an Interstate 93 exit - Exit 31 with undeveloped parcels in close proximity to the National Forest, the scenic Tripoli Road, and a predominantly rural residential neighborhood. It is important to keep in mind the quality of life and environmental impacts of any changes in this district.

Woodstock Information Weblinks

1. **Historic Topographical Maps - <http://docs.unh.edu/nhtopos/Moosilauke.htm> (not sure which this was – some options below...)**
http://whitemountainhistory.org/uploads/1816_carrigain_pdf_NXPowerLite_.pdf
http://whitemountainhistory.org/uploads/1902_national_pdf.pdf
<https://naturalatlas.com/map/@44.024051,-71.721497,15z>
<https://www.google.com/maps/@43.9745663,-71.7789493,12.01z>
2. Hubbard Brook Ecosystem Study including Mirror Lake Ecosystem - www.hubbardbrook.org/
3. Lincoln/Woodstock Chamber of Commerce - <https://westernwhitemtns.com>
4. Peeling - <http://whitemountainhistory.org/Peeling.html>,
http://whitemountainhistory.org/uploads/Peeling_compressed_use_this_9pm.pdf
5. NH General information - <https://www.unionleader.com/nh/> (Is this accurate?)
6. NH Fish and Game, includes information on game species available, seasons permits, hunter education and regulations - www.wildlife.state.nh.us/
7. NH state laws and regulations links
<https://www.nh.gov/glance/constitution.htm>,
<http://gencourt.state.nh.us/rsa/html/indexes/default.html>
<http://gencourt.state.nh.us/rules/default.htm>,
<http://www.des.state.nh.us/>
<https://www.nh.gov/osi/> - includes planning statutes
8. NH Department of Transportation
<http://www.state.nh.us/dot/>
<https://www.nh.gov/dot/traveler/index.htm>
9. NH Governor's Website - <https://www.governor.nh.gov>
10. NH Parks and Recreation - <http://www.nhparks.state.nh.us/>
11. Online population - <https://www.census.gov/quickfacts/NH>
12. New Hampshire Economic and Labor Market Information Bureau - <http://www.nhes.state.nh.us/elmi/>