

Chapter 3

Natural Resources



Chapter 3

Natural Resources

1.0 INTRODUCTION

Gorham's natural resources support the community's economy, tax base, recreation, quality of life, and water supply. The environment created by Gorham's system of natural resources serves both residents and visitors. The type and distribution of the town's natural resource base also influences the location and type of development that takes place within the community. Some areas of the community are better suited for a particular use than others, based on the natural resources that are present there. The information provided in this chapter will allow Gorham to determine compatible future uses for certain land areas, and significant resource areas that are not currently protected.



With substantial portions of the community in municipal, state, or federal ownership, development activities are concentrated in a smaller area of the community, and need to be sensitive to the resources that are present in these developing areas. Gorham does not exist in isolation. It is hoped that this chapter will alert residents of Gorham to the importance of the natural integrity of the entire region, and their role in this natural system.

2.0 CLIMATE

The primary characteristic of Gorham's climate is the ability for conditions to change very quickly. A large range of temperatures and conditions can be experienced in a single day, and are guaranteed over the course of a year. The area also experiences great differences between the same seasons from year to year.

During the warmer half of the year most of the precipitation comes from showers and thunderstorms. Frontal precipitation in the colder season is occasionally supplemented by coastal "Northeasters" which can bring a strong wind and heavy snowfall, and on occasion, rain or sleet. On average, 160 days per year receive 0.01 inch or more of precipitation in Gorham. The number of days with 1.00 inch or more averages 6 per year. Gorham receives an average of 41.73 inches of precipitation annually.

Summers are very comfortable, with afternoon temperatures mostly in the middle and upper 70's. Nighttime temperatures usually drop to near 50°. The number of days with 90° or higher has ranged from none to 15 in a season. Only one summer in five tends to reach 95° or higher.

Winters are cold, with a December through February normal mean of 18.0°. The winter of 1933-34 was the coldest, with an average temperature of only 11.4° . The lowest recorded temperature, 44° below zero, occurred on the 30th and 31st of December, 1917. The greatest number of days with temperatures at or below zero was 63 in the winter of 1943-44 and the least was 17 in 1931-32. The average dates of the first and last seasonal zero occurrences are December 7 and March 14.

Seasonal snowfall varies widely from the 99 inch average. Only 45.0 inches fell in the 1948-49 season while 1943-44 brought 147.0 inches. The winter of 1958-59 had 250 inches of snowfall recorded with an all time record of 300 inches being measured in 1968-69. Though large season to season differences are the rule, no significant trend toward either snowier or less snowy winters is apparent.

Based upon the occurrence of the freezing temperature, 32°, Gorham's "growing season" for susceptible tender vegetation averages 110 days, from May to September.

Land Use Implications

Gorham's climate has a direct impact on the landscape. Here are a few items to consider related to the climate in Gorham.

- 1) With precipitation distributed evenly throughout the year Gorham has the ability to replenish its many ponds, streams, and aquifers. This sustains the health of the surface waters and recharges groundwater reserves.
- 2) The variety of seasons contributes to the character of the region, and the variety of recreational and economic activities available. Air pollution threatens the character of our seasons, and the quality of our water. Recognition of the role local activities have on the global problem of climate change will help to preserve these distinct seasons and the industries and character they support.
- 3) Snow storage or "dumping" in sensitive areas can have a negative impact on the natural systems in Gorham. Snow removed from streets and parking areas should be stored away from wetlands and water bodies. This will allow for a higher rate of filtering out of pollutants and infiltration of water as it melts.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the impact of the climate on Gorham and the land use implications. This section will be used to identify the specific actions for Gorham to take upon completion of the master plan.

- 1) Join the Clean Cities Program administered through the US Department of Energy.
- 2) Pursue the use of alternative fuels in town vehicles and the school bus fleet.
- 3) Encourage carpooling and alternative modes of transportation (biking, walking, public transportation) to reduce automobile emissions in the region.
- 4) Work with local industries in the region, and promote alternative modes of transportation to reduce emissions.

3.0 TOPOGRAPHY

Topography describes surface features of the land in terms of shape, relief and relative positions of natural features. Topography is usually expressed as elevation (height above mean sea level) and slope (change in vertical distance over horizontal distance). Gorham's topography is a mixture of various terrain features. Much of the town is steep and hilly with some exposed bedrock, but some of the town contains flat river valley areas.

Topography affects several natural processes, such as climate, drainage, erosion, wind patterns and vegetative growth, in turn affecting man's activities. Valleys act as transportation corridors which traditionally influences development patterns. This is evidenced by Gorham's settlement in the Androscoggin River Valley.

Elevations in Gorham are greatest in the southern portion of town, but high peaks flank the town borders on all sides. The town ranges in elevation from 740 feet above sea level as the Androscoggin River enters Shelburne to 3,000 feet on Mount Madison. Low-lying river valleys cross the center of the community carrying the Androscoggin River, Moose River, and Peabody River. The river valleys are also closely followed by the major transportation routes through the community US Route 2 and NH Route 16.

High peaks are prevalent around the perimeter of Gorham. The slopes of Mount Madison, the northern terminus of the Presidential Range, extend into the southern portion of the community. Pine Mountain is also located in this area south of the downtown. The Mahoosuc Range extends into Gorham from the northeast, with the town border crossing this range near the summit of Mount Hayes. The northwest section of Gorham contains the slopes of the Crescent Range and Sugar Mountain.

Table 3.1
TOPOGRAPHIC FEATURES OF GORHAM

Location	Elevation (in feet)
Buttress of Mount Madison	3,000
Mount Hayes	2,555
Pine Mountain	2,404

Land Use Implications

Gorham's topography plays a major role in the location and impact of future development in town. Here are a few items to consider related to Gorham's topography.

- 1) River valleys are often the easiest areas to develop, and a majority of Gorham's development exists in the river valley. These areas also contain all of the floodplain areas, most of the surface water bodies, and critical wetlands. Minimizing the impact of development in these areas is critical to the quality of both surface and sub-surface waters.
- 2) Development at higher elevations on the high ridges and lower hills in Gorham presents a different set of challenges and impacts. Without thoughtful site design, these areas can greatly impact the scenic character of the community and disrupt scenic views. Access to these areas also provides an opportunity for increased environmental impacts (erosion, increased runoff rates, longer roadways, and fragmentation of habitat to name a few).
- 3) The variety of topography within Gorham contributes to wildlife habitat and recreational opportunities. Ensuring connections between these distinct areas will ensure the continued health of the organisms using them.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the topography in Gorham and its land use implications. This section will be used to identify the specific actions for Gorham to take upon completion of the master plan.

- 1) Consider a ridgeline development ordinance to limit the impact of developments at higher elevations.
- 2) Pursue land protection opportunities that create corridors of contiguous open space between the currently protected lands.

4.0 SLOPE

Slope is the amount of rise or fall in feet for a given horizontal distance and is expressed in percent. A 6% slope means that for a 100-foot horizontal distance the rise or fall in height is 6 feet. Given Gorham's location within a mountainous terrain, slopes of greater than 25% exist on the sides of some hills, and slopes of 15% and greater are the majority in the town. See Map F for an analysis of slope in Gorham. The slope of the land can have a great effect on development, and percent slope can greatly impact the economic and physical feasibility of development. The steeper the slope, the more it will cost for septic systems, driveways, foundations, etc. Additionally, as the slope increases so does the potential for an increase in erosion, stormwater runoff, and nutrient movement. Poor soil conditions combined with steep slopes can present significant development constraints.

Slopes in Gorham have been placed into four categories on Map F: below 8%, 8 - 15%, 15 - 25%, and greater than 25%. Generally, slopes over 25 percent are considered undevelopable. Slopes between 15 and 25 percent are difficult and costly to develop. Slopes between 8 and 15 percent are generally considered the upper limits for practical development.

Land Use Implications

Slopes within Gorham also play a major role in the location and impact of future development in town. Here are a few items to consider related to slopes in Gorham's.

- 1) The majority of Gorham is covered in slopes greater than 15%, which are considered difficult and costly to develop. This will have an effect on the future development pattern of the community.
- 2) As steeper slopes are developed, costs increase for both the property owner and the community. Construction and maintenance of roads becomes more costly on steeper slopes. Problems with erosion, stormwater runoff, and non-point pollution are also increased.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the topography in Gorham and its land use implications. This section will be used to identify the specific actions for Gorham to take upon completion of the master plan.

- 1) Review site plan review regulations to ensure they reduce the impact of development on steep slopes.
- 2) Gorham's regulations, relative to erosion and sediment control, should be revisited to ensure that they are following the most current "best management Practices" (BMPs).
- 3) Consider adoption of a steep slope ordinance to protect the slopes and ridgelines in the community.

5.0 GEOLOGY

Bedrock Geology

As the name implies, bedrock geology is concerned with the underlying rock or ledge. Formed hundred of millions of years ago, Gorham's bedrock is composed mostly of igneous rocks such as granite, and metamorphic rock such as schist. The metamorphic rock was formed under heat and pressure from many layers of mud, sand, and silt. It was later uplifted by the earth's internal forces. The youngest bedrock in Gorham was formed during the Carboniferous Age, some two hundred million years ago. Being the least eroded of all the bedrock in the region, these rocks make up the rugged, scenic areas of the White Mountains.

Surficial Geology

Surficial geology includes all of the deposits above bedrock. The surface layer of weathered material (i.e. soil) is not included in the study of surficial geology (for information on soils in Gorham see Section 6 of this chapter). Surface deposits are unconsolidated, loose conglomerations of rock fragments. These surface deposits in Gorham are the result of glaciation. As the glaciers advanced the bedrock was scraped and gouged, and this material was picked up and carried along in the glacial ice. This glacial advance, or scraping, did not drastically alter the topography of the area. The profiles of the mountains appear much as they did before the Ice Age. However, the glaciers did have an impact on the valleys.

As the climate warmed and the ice retreated, it deposited two major types of material—till and glacial outwash deposits. Till is composed of a mixture of soil and rock fragments that were scoured loose by the moving ice, carried for a distance, and then deposited directly as the melting ice released its unsorted contents. It is generally highly compacted and contains many large angular stones and boulders. Glacial melt waters also deposited material, but the moving waters actually sorted the material and deposited like sizes together along glacial streams or in glacial pools and lakes. These are outwash deposits. They are the stratified sand and gravel deposits that line the Androscoggin, Peabody, and Moose Rivers. Outwash deposits are important economically for mining purposes, but they also serve as major groundwater-recharge areas.

Land Use Implications

Gorham's geology has an effect on land use decisions and impacts future development in the community. Here are a few items to consider related to the geology in Gorham .

- 1) The use of outwash deposits in commercial sand and gravel operations could alter the performance of these areas as groundwater recharge areas. As material is removed and the geology is altered, water will not be filtered and stored in the same manner. This could result either in a reduction in the amount of water available to future generations, or in its quality as less filtering is available.
- 2) The impacts of sand and gravel operations are often also cited as concerns. Increased truck traffic, noise, erosion, and airborne particles often create problems for abutters, and should be mitigated.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the geology in Gorham and its land use implications. This section will be used to identify the specific actions for Gorham to take upon completion of the master plan

- 1) Gorham should consider adopting earth excavation regulations (NH RSA 155:E).

6.0 SOILS

Soil is the portion of the surface of the earth that supports plants, animals, and humans. There are over 1,000 different soils in the Northeast with over 70 of them represented in Gorham. Soils information is an intricate part of a natural resources analysis because it provides a wealth of data concerning the capability of land to support various land uses. Soils differ from one another in their physical, chemical and biological properties. Soil properties which affect its capacity to support development include depth, permeability, wetness, slope, susceptibility to erosion, flood hazard, stoniness, among others.



The Soil Survey

Soil scientists from the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) have collected soil information for Gorham. As they walked the land, they regularly sampled the soil to depths of 40 inches or more, and each soil was examined for characteristics such as color, texture, structure, etc. From this information, lines were drawn on aerial photographs outlining the boundaries of the different soils. Numbers were placed within each mapping unit to identify the type of soil found.

One important note in using a soils map is that changes from one soil to another are not usually abrupt, but are gradual. Thus, the line on the map represents a transition zone rather than an absolute boundary. Because of the scale of the map, mapping units are not 100% pure. On-site soil investigations are necessary for determining exact soil boundaries.

Soil Condition Groups

The over 70 soil mapping unit soils found in Gorham can be broken down into 7 natural categories or groups:

Group 1-Wetland Soils

These are poorly and very poorly drained soils that are wet most of the year. The water table is at or near the surface 7 to 12 months of the year. See Section 8 Wetlands for more information.

Group 2-Seasonally-Wet Soils

Included in this group are moderately well-drained soils that have a water table 1 to 1 ½ feet below the ground and where the soil is wet from late fall to late spring.

Group 3-Floodplain Soils

These soils are subject to periodic flooding. Their formation has been the result of sediment deposited from past floodwaters. The areas of flood plain soils are concentrated in small areas along the Androscoggin River.

Group 4-Sand and Gravelly Soils

These well drained to excessively well-drained soils are formed in sand and gravel deposits. This group often has economic value and is found within aquifer areas.

Group 5-Shallow to Bedrock Soils

This group of shallow to bedrock soils is the dominant soil type in Gorham. These soils have formed on a thin layer of glacial till which is underlain by bedrock. Steep slopes with exposed bedrock are common in some of these soils.

Group 6-Compact Till Soils

The soils in this group are well drained and have formed in compact glacial till. A hardpan layer is generally found about 2-3 feet below the ground surface. Water moves down-slope on these soils over the hardpan layer and comes to the surface as seep spots.

Group 7-Deep Loose Till Soils

This group consists of well-drained sands or loamy soils that have formed in glacial till. The water table is commonly more than four feet below the ground and bedrock is more than 5 feet below the surface. The soils contain many angular stones of varying sizes.

Land Capability and Lot Size

Each soil-mapping unit found in New Hampshire has been rated for its ability to support a residential or commercial lot, based on a formula that has water quality as its primary concern. Potential pollution sources considered were septic systems, lawns, and impermeable surfaces. The assessment of suitability was based on a report by the NHDES entitled “Environmental Planning For Onsite Wastewater Treatment in NH”. The formula, which uses nitrogen loading as its benchmark for pollution, was applied to each soil type and a minimum soil based lot size was determined for each mapping unit. Lots on the best soils that are capable of utilizing the most nutrients onsite, require a 35,500 square foot lot, which is the minimum. As the soils decrease in their ability to utilize nitrogen, the lot sizes increase.

Land Use Implications

The soils within Gorham play a major role in the location and impact of future development in the community. Here are a few items to consider related to soils in Gorham.

- 1) Soil characteristics such as depth, permeability, wetness, and slope can be used to evaluate land to determine development suitability and dwelling unit densities.
- 2) Locating new development in areas without water and sewer infrastructure requires taking a much closer look at the ability of the soils on the lot to handle a well and septic system

discharge. Soil information should be used as a determinant of what constitutes an environmentally sound building lot to prevent degradation of the environment and negative impacts on abutting property owners.

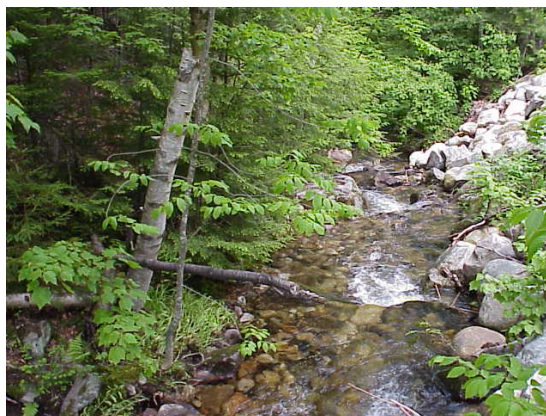
Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the soils in Gorham and their land use implications. This section will be used to identify the specific actions for Gorham to take upon completion of the master plan.

- 1) Base lot sizes in the rural areas of town (not served by water and sewer) on land capability. A flexible, soil based lot-size regulation should be adopted.
- 2) Evaluate future sewer and water line extensions on the land capability of the area being included and the desired development pattern for the community.

7.0 WATER RESOURCES

Water is our most precious natural resource. Water moves continuously in an inter-dependent fashion known as the water cycle. All water is involved in this cyclical movement that continues indefinitely. With increased land use and human activity, the water cycle can become damaged. Humans not only take water out of the cycle (drinking water, for example), but can also put polluted water back into the cycle (such as polluted runoff). However, with good planning and conservation, plentiful clean water should be available for all uses.



Watersheds

Surface water is precipitation that does not soak into the ground, but runs off into streams, ponds, lakes, and rivers. On the average, 1/3 of the annual precipitation in Gorham is “runoff.”

Watersheds are the catch basins for all precipitation falling from the sky. Rain or snow falling within the confines of a watershed’s interconnected ridge crests, or high points, eventually becomes surface and groundwater.

A watershed is usually associated with a particular river or stream that it feeds. For example, Moose River and Moose Brook drain the western half of Gorham to the Androscoggin River. Each tributary of the Moose River has a smaller sub-watershed of its own that contributes to the Moose River – Moose Brook Watershed. While groundwater flows may follow the same

watershed boundaries, it is not assured and determining accurate groundwater flow can be an expensive and difficult task. See Table 3.2 for Gorham's watersheds.

Watershed location is very important for a community to consider in its planning efforts. Quite often a particular watershed lies entirely within a single community, while larger watersheds almost never do. Gorham's primary source of municipal water is Icy Gulch in Randolph. Water resources management in a community up-watershed may have a substantial impact on the water resources of a neighboring community down-watershed. The watershed approach to water resources planning is important because watersheds are the main units of surface and groundwater recharge. The size and physical character of the watershed has a large influence on the amount of water that ultimately will end up as surface water and groundwater. Land use within a watershed may be an important factor in water quality, therefore, it is very important for communities to work together in order to plan effectively for protection of water resources. This is especially important in Gorham where all of the watershed originate outside of the community, and drain across the Gorham landscape and into the Androscoggin River. Fortunately, most of this watershed land outside of Gorham is under some form of land protection.

Map C and Table 3.2 summarize the 4 watersheds covering Gorham.

Table 3.2
Gorham Watersheds

Watershed	Drains To	Extent In Gorham (acres)
1-Berlin Tributaries	Androscoggin	5152
2-Moose River – Moose Brook	Androscoggin	8137
3-Shelburne Tributaries	Androscoggin	333
4-Upper Peabody River	Androscoggin	7054

Source: NH Department of Environmental Services

Surface Water

Gorham's main water course is the Androscoggin River. Streams are classified by the State using the Strahler method, where the highest year round streams in a watershed are first order streams, their juncture yields a second order stream, the juncture of two second order streams yield a third order and the junction of third order streams yield a fourth order. A listing of fourth order streams and higher is prepared and maintained by the New Hampshire Office of Energy and Planning, in Gorham this includes the Androscoggin, Moose, and Peabody Rivers and Moose Brook. As such, these are water bodies that are subject to the New Hampshire Shoreland Protection Act.

Stream Water Quality

Water quality problems in the Androscoggin River date back to before 1900 when sewage, industrial waste, and other pollutants were dumped directly into the river. In the early 1970's,

there were 28 outfalls in Gorham on the Androscoggin River, Moose River, Moose Brook, and Peabody River. Of these 27 were municipal sewers. There are now only 7 permitted outfall facilities in Gorham. See Table 3.5 in Section 9 of this chapter for additional information.

After the passage of the Clean Water Act in 1971, the federal and state government spent a substantial amount of money to upgrade municipal sewage treatment plants and other point sources of pollution during the 1970's and 80's. Since the 1987 Gorham Master Plan the conditions in the rivers have continued to improve, and the Androscoggin has been designated a Class B water body by the State of New Hampshire. Table 3.3 shows that the Moose River, Moose Brook, and the Peabody River are still Class B water bodies.

Table 3.3 Water Quality

Water Course	1987 Water Quality Report	2001-2003 Water Quality Reports
Androscoggin River	C	B
Moose Brook	B	B
Moose River	B	B
Peabody River	B	B

Source: NH Department of Environmental Services

Floodplains

Floods are a natural and normal occurrence in an area of high rainfall. During normal stream flow, water is carried in a river channel. But in times of high runoff, water rises over the banks and flows onto the floodplain. Floods only become a problem when man competes with nature for use of the land.

According to the Flood Insurance Rate Map for Gorham, prepared by the Federal Emergency Management Agency, there are a few areas of Gorham within the 100-year floodplain. These floodplain areas are mostly along the Ammonoosuc River. A 100-year flood plain is an area that has a 1% chance of flooding in any given year. See the Flood Insurance Rate Maps included in the Appendix at the end of this chapter for more detailed information.

Dams

In the state of New Hampshire there are over 4,400 dams registered with the Department of Environmental Services. Nine of these are in Gorham. The majority of dams in Gorham are related to hydroelectric operations, mill operations, and recreation.

Table 3.4 Dams

NAME	RIVER	TYPE	IMPOUNDMENT (Acres)	HEIGHT (Feet)	OWNER
Cascade Dam	Androscoggin River	Concrete	50	45	Great Lakes Hydro America
Gorham Dam	Androscoggin River	Timber Crib	34	31	Great Lakes Hydro America
Androscoggin River Dam	Androscoggin River	N/A	3	36	PSNH
Peabody River Dam	Peabody River	Earth	2.5	8	Town of Gorham
Moose Brook Dam	Moose Brook	Concrete	1	7.5	DRED
Brown Company Dam	Androscoggin River	Timber/Stone	N/A	21	Fraser Papers Inc.
Icy Gulch Reservoir Dam	Moose Brook	Concrete	1.25	18	Town of Gorham
Sulfite Storage Lagoon Dam	N/A	Earth	N/A	N/A	Fraser Papers Inc.
Wildlife Pond Dam	Moose Brook Tributary	N/A	0.5	7	Rober Kent

Water Supply

Aquifers

A large aquifer system is found in Gorham's river valleys. This is also the location of the most intense development in the community. The term transmissivity is used to categorize the ease with which water passes through a geologic material. Transmissivity quantifies the ability of an aquifer to transmit water, measured in cubic feet per day. According to the NH Department of Environmental Services, this aquifer system in Gorham is composed of three different degrees of potential water yield, or transmissivity (see Map D):

- Less than 2000 cubic feet per day
- 2000-4000 cubic feet per day
- Greater than 4000 cubic feet per day

The two highest yielding areas are located in the vicinity of the US Route 2 and NH Route 16 intersections on either side of the downtown area. As areas above the aquifer are further developed, buildings and parking areas will prevent water from recharging the aquifer. The placement of underground storage tanks and other potential pollution sources within the aquifer area also threatens the quality of this resource for future drinking water.

Wells

There is municipal water serving much of Gorham's population; however some businesses and many residents rely on drilled or dug wells for their water supply. Since 1984, every well drilled

in New Hampshire must be reported to the New Hampshire Department of Environmental Services (NHDES). Of the 82 wells reported in the town of Gorham to NHDES, 75 were drilled as new wells with about 5 of them drilled as replacement for an existing well. It should be noted that according to the NHDES Water Division, the NHDES well database is known to be incomplete. The NHDES estimates that it contains only an estimated 80% of wells drilled after 1984, even though those who drill wells (individual citizens, contractors) are required to report their activity.

Wells in Gorham range in depth from 12' to 1000' with the vast majority drilled in bedrock. A bedrock well makes use of a bedrock aquifer. A well drilled into a bedrock aquifer will be constantly filled with water that flows through cracks. Ten wells were drilled into a gravel aquifer which is more porous, and a well drilled into such an aquifer yields more water than one drilled into a bedrock aquifer.

There are several uses of wells in Gorham: domestic (serving one household); community (serving 25 or more persons); commercial or industrial, and agricultural. The majority of the wells in Gorham are domestic. There are 6 wells that are categorized as "test or exploration wells", and there are two wells that were drilled as "small community water supplies". The Town of Gorham operates two wells in the Libby Field area off of Bellevue Avenue. Both are gravel drilled wells that serve the public water supply of the community. There is a wellhead protection area around the two municipal wells. Municipal drinking water reservoirs, filled with water from Icy Gulch in Randolph, are located off Jintown Road. These reservoirs are within the protection of the Gorham Town Forest.

Land Use Implications

The water resources within Gorham are abundant. Their protection will insure a healthy supply of potable water, healthy fisheries, recreation opportunities, and other benefits. Here are a few items to consider related to water resources in Gorham.

- 1) There is a direct correlation between activity within the watershed and the quality of lakes and ponds that are fed by those watersheds. All of the activities taking place on land will eventually impact both surface and ground water. This refers to both quality and quantity of groundwater. Mismanagement in the watershed will adversely affect the water bodies below.
- 2) Minimizing the amount of pollutants entering Gorham's waters will help avoid expensive future expenditures to treat and clean these waters.
- 3) Minimizing impervious surfaces in groundwater recharge areas will preserve the volume of the local water supply being stored as groundwater and in surface water bodies.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the water resources in Gorham and their land use implications. This section will be used to identify the specific actions for Gorham to take upon completion of the master plan.

- 1) Adopt local shoreland protection regulations that include increased buffer zones.
- 2) Consider the regional impact statute (NH RSA 36:54-58) when reviewing development proposals that may impact shared watersheds, and continue to work proactively with neighboring communities.
- 3) Partner with other organizations to routinely monitor the quality of existing water resources. The NHDES will provide training and equipment for such a program.
- 4) Improve the quality of stormwater being discharged into surface waters through treatment, or stormwater detention.
- 5) Pursue easements for buffers along the Androscoggin River.
- 6) Promote the use of permeable surfaces in the site plan review process.

8.0 WETLANDS

One of the most important, environmentally-sensitive natural resources in Gorham are wetlands. Little has been done locally to protect this important resource to date. The town may wish to consider standards above those at the state and/or federal level. The foresight to protect Gorham's wetlands now will help insure clean groundwater, ponds, and streams, and a more balanced natural system in the future.

There are many reasons why wetlands are valuable to the community. Some of those reasons are flood control, erosion control, pollution filtration, water supply, wildlife habitat, environmental health and diversity, recreation, and aesthetics. These are but a few of the important functions wetlands perform in helping protect the quality of water, land, and the community.

Wetlands perform all of these functions with no charge to society. Dams, tertiary sewage treatment plants, water purification plants, dikes, and other sophisticated and expensive man-made water control measures all try to copy what wetlands do naturally. Each acre of existing wetland provides significant benefits to Gorham.

Wetland Delineation

Wetlands are difficult to define and delineate. Words such as swamp, bog, marsh, lowland, and floodplain are often used, but are confusing and overlapping. In New Hampshire, the yearly water cycle causes tremendous variation in the level of water in the particular area. During the

spring, an area might have two feet of water on its surface while that same area in September may not have water on its surface at all. Any definition of wetlands must take this variation in water levels into account, and any delineation of wetlands requires the identification of the wetland-non wetland boundary on the landscape. For the purpose of this master plan, wetlands are defined as poorly and very poorly drained soils.

Wetland Soil Survey

A soil survey is a map on which the natural soil is identified and its distribution delineated. Boundaries of individual soils are plotted on aerial photographs after a soil scientist has traversed the land digging test holes in order to identify the soil, as discussed in Section 7 of this chapter. However, a few comments on soil drainage are necessary here.

One of the characteristics soil scientists use to differentiate soil is drainage. Drainage is broken into five categories:

- ❖ Excessively well drained – water is removed from the soil very rapidly.
- ❖ Well drained – water is removed from the soil readily, but not rapidly. The depth to seasonal high water table is generally more than 3 feet.
- ❖ Moderately well drained – water is removed from the soil somewhat slowly. The water table is generally within 3 feet of the ground surface for 3 months of the year.
- ❖ Poorly drained – water is removed from the soils so slowly that the water table is at or near the surface 7 to 9 months of the year.
- ❖ Very poorly drained – water is removed from the soils so slowly that the water table remains at or on the ground surface more than 9 months of the year.

Very poorly drained soils have a layer of muck, or peat, that overlies the mineral soil material (sand, silt, or clay). The layer of organic matter could range in thickness from a few inches to several feet, depending on the soil forming processes. Poorly drained soils are relatively better drained so they have only a very thin layer of muck and peat, if any at all.

In Gorham there are an estimated 53 different wetlands, larger than 3 acres in size, which have been identified. A wetland is defined as a contiguous area of poorly or very poorly drained soils. Poorly drained soils occupy about 522 acres and very poorly drained soils occupy 178 acres. Wetlands make up about 3% of Gorham's total land area.

Prime Wetlands

The State of New Hampshire allows communities to designate "Prime Wetlands." This designation means that the NH Wetlands Bureau, when receiving applications for dredging or filling wetlands, will pay extra attention to applications involving wetlands designated by the town as "prime." It provides an extra layer of protection at the state level. The First step in the designation process is an inventory and assessment of the town's wetlands using the "NH Method."

Submitting wetlands to the NH Wetlands Bureau for Prime Wetland status requires preparing a map of the wetland area, a vote at a town meeting, and submitting a prime wetlands application to the NH Wetlands Bureau for approval. Gorham has no Prime Wetlands designated at this time.

Wetland Permitting

Projects which impact wetlands in Gorham are regulated by federal and state regulations. The most comprehensive regulatory program is that of the NH Wetlands Bureau (NHWB). NH RSA 482-A authorizes the Department of Environmental Services (DES) to protect the State's wetlands and surface waters by requiring a permit for dredging, filling or construction of structures in wetlands or other waters of the state. RSA-482-A and the rules promulgated under that law require that projects be designed to avoid and minimize impacts to wetlands and other state jurisdictional areas. The impacts that are proposed must be only those that are unavoidable. It is the responsibility of the applicant to document these considerations in the application for a permit.

According to DES rules, each project that requires a wetlands permit is classified in one of three categories according to the type and potential square footage impact of the project – minimum, minor, or major. Many projects qualify for processing with the Minimum Impact Expedited application which may include repair and maintenance of a dock, installation of a culvert for driveway access to a single family house, or maintenance dredging of an existing pond.

Another type of project common to the North Country is wetland impacts due to logging. These projects are permitted through a notification process that must be filed at the same time as the “Intent To Cut” forms provided the operation is conducted in accordance with the publication, “Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire.”

Since 2000, 19 of the projects in Gorham impacting wetlands were forestry notification projects, and required no permit. All other projects required permits. The town conservation commission, by state law, has a 40 day period within which to submit comments to the Wetlands Bureau. The Gorham Conservation Commission attempts to communicate its opinion on each application submitted in Gorham.

In the case of projects impacting more than 10,000 square feet of wetland, applicants are now asked to propose mitigation to offset wetland loss. Mitigation can be through creating or restoring wetland or protection of an upland buffer by conservation easement. One such project has occurred in Gorham. Stoney Brook Development, Phase One and Phase Two, located off of Route 16 in the southern portion of Gorham, disturbed greater than 10,000 square feet of wetland and required mitigation.

Land Use Implications

The wetland resources within Gorham play a major role in the location and impact of future development in the community. Here are a few items to consider related to wetlands in Gorham.

1) The health of Gorham's wetlands is critical to the function of natural systems within the community. If they are destroyed or degraded Gorham's water resources (quantity and quality) will suffer, and important wildlife habitat will be lost.

2) It is important to point out that small wetlands (under three acres) are usually not shown on the USDA Natural Resource Conservation Service (NRCS) Soil Maps.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the wetland areas in Gorham and their land use implications. This section will be used to identify the specific actions for Gorham to take upon completion of the master plan.

1) A Prime Wetlands Study could be pursued, and any proposed Prime Wetlands should be certified by the NH Wetlands Bureau.

9.0 POINT AND NON-POINT SOURCE POLLUTION

Within every watershed, the uses of the land and of the water have the potential to impact water quality. Water pollution can occur from two major sources: point and non-point. Point source pollution is one that can be linked to a specific pollutant or discharge point that can be identified and physically located. Non-point sources are more difficult to document, trace, or identify since there is generally not a specific point of discharge. The NH Department of Environmental Services should be contacted relative to the current status of individual sites.

Point Sources, Ground Water

In New Hampshire, NH DES regulates industrial and municipal discharges and privately-owned wastewater management and wastewater treatment facilities which may have a potential impact on water quality due to a direct discharge to groundwater. A groundwater discharge permit is required for such activity. Currently there are no permitted groundwater discharges in Gorham.

Point Sources, Surface Water

A pipe discharging waste into a stream is an example of a point pollution source. Since the Clean Water Act of 1971, most discharges have to be treated prior to discharge and all discharges require a National Pollution Discharge Elimination System (NPDES) permit. DES issues NPDES permits after review and approval. There are seven NPDES permits issued in Gorham. Table 3.5 lists the currently permitted outfalls.

Table 3.5 Permitted Outfall Facilities

Identification #	Name	Waterbody	Status	Type
655-017	Fraser NH LLC	Androscoggin	Active	Major
655-018	Fraser NH LLC	Androscoggin	Active	Major
655-022	Fraser NH LLC	Androscoggin	Active	Major
655-023	Fraser NH LLC	Androscoggin	Active	Major
01009271	Gorham Wastewater Treatment Facility	Androscoggin	Active	Minor
0000388	PSNH Gorham Hydro Facility	Androscoggin	Active	Minor
NHG640002	Gorham Slow Sand Water Filtration Facility	Moose Brook	Active	General

Source: <http://www.des.state.nh.us/gis/onestop/>

Potential Non-Point Pollution Sources

General and specific land use practices that are widespread throughout the study area can impact water quality. Some potential sources are the result of temporary or short-term land uses that require disturbing the soil, such as logging, construction, or agriculture operations. Others, such as stormwater runoff may be short in duration, but are continuous in nature. Non-point sources are more difficult to quantify than point sources because they impact water quality through unmonitored, intermittent, or incremental contamination and their impacts may be felt only over a long period of time. Other sources include waste disposal facilities (septic systems, landfills, junkyards, etc.), highway maintenance (sand, salt, and snow dumping), and hazardous waste.

Buffer strips along ponds and streams intercept and store surface runoff, allowing it to infiltrate rather than continue off site as runoff. This can reduce impacts from a variety of pollutants including phosphorus, sediment, pathogens, nitrates, and pesticides. A buffer's capacity to tie up pollutants depends on its width. The wider a buffer is, the more removal of pollutants occurs. A 100-foot buffer is recommended for infiltration.

Land Use Implications

Point and non-point pollution sources have an adverse effect on the community. Their presence threatens both the immediate and long term health of the community. Here are a few items to consider related to pollution in Gorham.

- 1) Pollution contaminates soils and impacts water quality in the community. This results in damage to the environment and the need to engage in expensive treatment processes.
- 2) The recreation and tourism value of Gorham's natural resources is directly linked to their health and the absence of pollutants.

3) There is a direct correlation between impervious surfaces and increased non-point source pollution. Reducing impervious surfaces will reduce runoff rates and increase filtering.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the existing and potential threat from pollution sources in Gorham and their land use implications. This section will be used to identify the specific actions for Gorham to take upon completion.

- 1) Adopt impervious surface limits in the site plan review regulations, and encourage the use of pervious structures for areas like overflow parking lots.
- 2) Reduce the required road widths for new development.
- 3) Promote the use of Low Impact Development (LID) regulations that help manage non-point pollution and stormwater drainage.
- 4) Promote Best Management Practices (BMPs) to reduce nonpoint pollutants from industrial, commercial and residential developments.
- 5) Require maintenance plans for industrial, commercial and residential developments.
- 6) Continue to monitor and document all underground storage tanks in Gorham.

10.0 FOREST & AGRICULTURE LAND USE

History of Agricultural Lands in New Hampshire

In 1880, 64% of New Hampshire's land was in agriculture. Today less than 15% remains in farming. Traditional agricultural activity in New Hampshire is at its lowest level in history. New Hampshire ranks 49 out of 50 in the level of agricultural production in the U.S. One reason for this is that land suitable for agriculture is also excellent for development. Agricultural land is gently sloping, open, and scenic. The agricultural land that remains undeveloped adds a special rural character to the town while at the same time providing habitat for local wildlife. According to the New Hampshire Department of Agriculture the face of agricultural operations in New Hampshire is changing quickly. Niche markets including specialty crops and herds, customized farm products, and small scale operations are redefining agriculture

In short, traditional agriculture and agricultural land uses in New Hampshire and Coos County have declined substantially over the years. Land once used by small, non-mechanized farms has reverted back to forest land or has been developed. Miles of stonewalls in mature forest stands

are testimony to an agricultural heritage in New Hampshire that has been lost over the past several decades. Gorham has certainly been part of that trend.

Existing Agricultural Land Use in Gorham

Traditional agricultural land use in Gorham today is minimal, since there is only one full time farming operation. Gorham has one remaining dairy farm, but no land is currently being tilled for corn, grain, or other row crops.

The agricultural land in Gorham is most commonly open fields that may be “idle”, meaning kept open by “brush hogging” or mowing every year or two, but not producing a crop. No inventory of new niche market agricultural operations exists for Gorham, but there is an opportunity to encourage growth in this small, but critical land use as a technique for preserving agricultural lands and the community’s character.

Land Use Implications

Gorham’s agricultural resources and activities have an effect on land use decisions and impact the character of the community. Here are a few items to consider related to agriculture in Gorham .

- 1) Preserving the possibility of farming in the future adds to the sustainability of the community. If agricultural resources are covered with homes and businesses they will not be viable options for producing goods locally in the future. This could become a necessity if global food distribution systems change.
- 2) There is an economic benefit when produce and products are generated locally, and the land does not require the high level of Town services that development demands.
- 3) Agricultural lands add to the visual and habitat diversity of the landscape, and contribute to the character of the community.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the status of agriculture in Gorham and the associated land use implications. This section will be used to identify the specific actions for Gorham to take upon completion.

- 1) Pursue protection of the limited agricultural land that remains through outright purchase, purchase of easements/development rights, and donations.
- 2) Require open space developments in areas involving agricultural land. Concentrate all the development on the non-agricultural land areas.

3) Make all of Gorham's land use regulations "farm friendly" and support non-traditional agricultural operations (small scale, seasonal, organic, specialty or "niche markets").

Forest Lands

According to SPNHF report New Hampshire's Vanishing Forests (2001) four tree farms exist in Gorham with a total acreage of 4,203 or 20% of the town. Forestland has many uses. Timber harvesting is the most obvious use, but other uses and functions include recreation, wildlife habitat, water quality protection, open space, scenic enhancement, etc. These are all important uses for the people of Gorham, both from a quality of life and economic standpoint.

Forest Planning

From a planning perspective, woodlands are not just a source of wood products, or yield tax revenue. The forest industry also provides many area jobs. Woodlands also play an important role in providing areas for outdoor recreation, wildlife habitat, and scenic enjoyment. They play a role in the water quality of Gorham's ponds and streams. All of these uses are sustainable, and each can co-exist. Timber harvesting, while having dramatic visual impacts in some cases, is rather short-term. However, subdividing large woodland parcels into small lots for development can have a long term, nearly irreversible impact.

New Hampshire's Vanishing Forests (2001) found that while New Hampshire remains predominately forested, the amount of forest cover will decline to 80% statewide within the next 20 years, and of that, less and less will be committed to long term forest management in large tracts. Additionally, most landowners no longer rank timber production as their main reason for owning the land. Only 10% of the landowners include timber production as primary reason, with aesthetic enjoyment now more than 50% of the landowners' reason for owning the land.

It was found that parcels of land 500 acres or more are the most common for long term forest management due to economies of scale. With regard to the short-term impacts of logging, the town has a built in mechanism to monitor logging operations – the notice of 'Intent to Cut.' Once an 'Intent to Cut' is filed, it is reviewed to determine if the logging operation is going to impact sensitive or critical natural resource areas, such as wetlands, deer yards, fragile biotic communities, etc. Landowners and foresters could be educated to the need to carry out logging operations in a manner sensitive to important natural resources. It could also help to identify logging operations that are planned on areas used for recreation such as paths and trails. Steps could then be taken to work with landowners and foresters to temporarily close or re-route trails during the logging operations.

Land Use Implications

Gorham's forest resources have an effect on land use decisions and impact the character of the community. Here are a few items to consider related to forest lands in Gorham.

- 1) Forest resources provide habitat, erosion control, water filtering, improved air quality, and temperature regulation. These resources also pay their own way in terms of Town services because of the little they demand.
- 2) Responsible harvesting of forest resources supports the local economy, and provides access to local forest products. The working landscape contributes to the character of the North Country.
- 3) Clearcutting and disregard of BMPs can result in erosion and non-point source pollution that creates problems for abutters and the community.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the status of forestry in Gorham and the associated land use implications. This section will be used to identify the specific actions for Gorham to take upon completion.

- 1) Gorham should consider having a licensed forester inspect all logging jobs to insure compliance with wetland and erosion and sediment control regulations. The forester could also inspect the sites relative to the amount of timber harvested. This may increase the amount of tax revenue from logging in Gorham, and provide an opportunity to educate loggers on Best Management Practices (BMPs) to use on site.
- 2) The minimum lot size in zones with valuable forest resources should be examined. Subdivision of land into small units makes logging difficult.

11.0 CONSERVATION LANDS

Conservation areas are those lands protected for the foreseeable future through outright preservation by governmental or conservation organizations, or through conservation easements. Gorham has a great deal of land in conservation since it contains the White Mt. National Forest, and other large parcels.

**Table 3.6
Gorham Conservation Lands**

Property	Management	Acres
White Mountain National Forest	US Department of Agriculture, Forest Service	5,798
Moose Brook State Park	NH Department of Resources and Economic Development	744
Paul T. Doherty Memorial Town Forest	Town of Gorham	1,116
Drew Easement	Society for the Protection of New Hampshire's Forests	251
Mascot Mine Natural Area	NH Department of Resources and Economic Development	10
Appalachian Trail Tract	US Department of the Interior, National Park Service A/T	50
Gorham Water and Sewer Department	Town of Gorham	49
Libby Pool	Town of Gorham	18
Potter Easement	Unknown	26.62
Total		8,036
Percent of Total Land Area in Gorham		39%

Source: GRANIT - http://granitweb.sr.unh.edu/clv_phase1/viewer.jsp

The information for conservation lands in Gorham shown in Table 3.6 and Map H most likely does not include all protected land in Gorham. Determining specific lands in Gorham that are protected is not an easy task, since information on easements, etc. is not necessarily readily accessible.

Current Use

NH RSA 79A allows landowners to place certain types and sizes of land in a tax abatement program based on their current land use. Table 3.7 shows the current distribution of acreage in Gorham in current use. This acreage is approximately 45% of the total land area in Gorham.

Table 3.7 Current Use

Current Use Category	Acreage
Farm Land	25.5
Forest Land	9,282.59
Unproductive Land	8
Wetland	0
Total	9,316.09
Percent of Total Land Area in Gorham	45%

While current use reduces the burden for landowners, land can be taken out of current use with payment of a penalty. Therefore, it does not provide absolute assurance of continued open space. The penalty is 10% of the assessed value of the lands. Under state law, towns can vote to have all or a portion of the money collected for taking land out of current use to be placed in a conservation fund administered by the Conservation Commission. Over 120 towns in the state have voted to do this in order to provide a source of revenue for conservation studies, and land protection efforts. Gorham has not taken this step.

Land Use Implications

Gorham's conservation lands have an effect on land use decisions and impact the character of the community. Here are a few items to consider related to conservation lands in Gorham .

- 1) Conservation lands provide habitat, recreational opportunities, and protect critical natural resources. These resources also pay their own way in terms of Town services.
- 2) Conservation lands contribute to Gorham's character as a community, and support its quality of life.

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the conservation lands in Gorham and the associated land use implications. This section will be used to identify the specific actions for Gorham to take upon completion.

- 1) Increase efforts to secure conservation easements on undeveloped land with significant natural resources.
- 2) Pursue conservation easements, or other forms of protection, on lands adjacent to permanently protected parcels in order to preserve contiguous corridors of undeveloped land.
- 3) Partner with other conservation based organizations working in Gorham and the region to increase funds, access a wider audience, and pursue land protection efforts that will benefit the community and the region.

12.0 WILDLIFE RESOURCES

According to the NH Fish and Game Department, many of the 420 species of animals and birds in the state can be found within the North Country. The diverse habitats of Gorham include wetlands, upland hardwood and softwood forest. The better known mammal species include moose, white-tailed deer, black bear, rabbit, squirrels, woodchucks, eastern coyote, beaver, muskrats, raccoons, otter, mink, bats, possum, red fox, fisher, and bobcat. Amphibians such as the spotted salamander, newts, toads, tree frogs, bullfrogs, and the morning spring peeper are

typically found at the water's edge. Reptiles include four types of turtles, and 11 species of snakes including the garter, milk snake, and black racer.

Nearly 200 species of birds can be found in their various habitats in the area including hawks, 25 species of warblers, many different species of finches, owls, and flycatchers. Many different types of waterfowl reside in the area including Canadian geese, mallards, blacks, wood ducks, and mergansers. Blue heron can often be seen in streams and wetland areas. Newcomers include the turkey vulture and the wild turkey.

Endangered/Threatened Plants and Animals

Not all of New Hampshire's wildlife is thriving. The NH Fish and Game Department maintains a list of endangered or threatened animal species in New Hampshire. Migratory birds including the bald and golden eagle and osprey do pass over the area from time to time. According to the New Hampshire Natural Heritage Inventory, a variety of rare plants, vertebrates, and natural communities are found in Gorham. Though their exact locations are generally not revealed for obvious reasons, their basic locations are available through the Natural Heritage Inventory. One species that is well known in Gorham are the bats found in the Mascot Pond Mine.

Hunting

The northeast is an excellent area for recreational hunting and Gorham's community of recreational hunters is strong. Gorham's natural resources currently support big game, such as deer and moose, and smaller game such as beaver, mink, hare, grouse and woodcock. The White Mountains partridge and woodcock are the most predominant small game species.

While not on a major flyway for migratory birds, Gorham does offer suitable habitat for both short-term migratory waterfowl, and for resident birds. Some areas within Gorham have been identified as deer wintering areas. These are areas that were mapped by the NH Fish and Game Department using aerial photography, and are identified as those areas having a thick evergreen cover. The mapping of these wintering areas or "deer yards" as they are sometimes called, is over 15 years old and needs updating to account for logging, development, and regrowth.

Fishery

The rivers in Gorham also contain a wide range of fish species. The New Hampshire Fish and Game Department, Region 1 – Lancaster, NH, keeps records on predominant fish species found in the largest ponds and brooks organized by town. In the town of Gorham, fish species data are available for the Androscoggin River, Moose Brook, Moose River, and Peabody River.

According to the Fisheries Biologist at the New Hampshire Fish and Game Department, Gorham's fish population includes blacknose dace, brook trout, brown trout, fallfish, golden shiner, lakechub, longnose dace, longnose sucker, rainbow trout, and slimy sculpin.

Land Use Implications

Gorham's wildlife resources have an effect on land use decisions and are impacted by them as well. Here are a few items to consider related to wildlife resources in Gorham .

- 1) Habitat is easily fragmented by new development. This disrupts the landscape and impacts wildlife movement and survival.
- 2) Wildlife resources are critical to many recreational activities that support open space conservation (i.e. hunting, fishing, and bird watching).

Potential Actions

There are an array of possible actions the Town may want to consider pursuing as it evaluates the status of wildlife in Gorham and the associated land use implications. This section will be used to identify the specific actions for Gorham to take upon completion

- 1) Protect areas that are known to support or have the potential to support important wildlife.
- 2) Preserve corridors between habitats and protected open space to facilitate the movement of animals in the region and locally.
- 3) Provide opportunities for the public to learn about local wildlife and potentially view it.

13.0 SUMMARY

The primary focus of this Chapter is to identify the natural resources in Gorham, recognize the role they play in giving the town its character, and decide what strategies would best maintain that character. Most of the community's resources are interconnected, and any change to one can have a significant impact on the others. As the population increases, demands on many of these resources will increase, possibly to the point of threatening the quality and quantity of the resource. It is the goal of this Chapter to help develop a balance between development and resource protection within Gorham.