

2017 REVISED MASTER PLAN

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ARTICLE 1. INTRODUCTION & VISION

Groton's Master Plan (the "Plan") is the cornerstone of the community's growth and land management strategy. An underlying assumption of this Plan is that residential¹ growth will continue to occur in Groton and that business uses² will require Special Variance and Site Plan review before any activity is undertaken. The over-arching goal of this Plan is that all development, whether residential or business, only occur in the locations and patterns that support the Vision and Principals of this Plan while avoiding the negative impacts that can be associated with unwanted and unmanaged growth. (See Section 3.2 Land Suitability & Co-Occurrence Mapping, sub-section 3.2.1 Finite Resources)

This Plan, then, is a policy document for planning, now and for the future. It sets the framework for the implementation of specific policies, regulations and zoning, along with the granting or denial of applications under consideration by the Planning and Zoning Boards and the Selectman. As town officials execute their respective duties, they should address if their decisions are in keeping with the letter and spirit of the Visioning Statement, the Principals, the Goals and Objectives, and the body of the Plan.

The Plan is also a reference document. It contains charts (based on resident survey responses); documents and maps (please refer to Appendices). With the supporting text in the body of the plan addressing such topics as: current land use/features, future development, environmental, cultural, and historical preservation, community tax base and roads, it is intended to help our community meet change responsibly, guiding its growth in an orderly, constructive manner.

The body of the Plan is comprised of these parts:

- Sections that consider the Profile of the town, existing physical, economic, and historical/social conditions as well as questions/predictions and implications or trends,
- Underpinned by the Vision Statement and the Principals, each plan section has a Goal and a set of Objectives addressing the Towns highest priorities,
- Implementation, creating an Action Plan. This section of the master plan is dynamic and should be reviewed and modified as needed to re-align goals, set priorities and to measure the progress made on the implementation actions.

In terms of laying out Groton's plan, the Vision Statement and Principals precede all supporting components.

Section 1.1 Vision Statement and Principles

The state statute that empowers communities to prepare master plans, RSA 674:2, instructs the inclusion of a vision section that serves to direct the other sections of the plan. While the local planning board drafts

¹ Residential is defined to mean single-family housing

² Business usage is defined to mean non-residential activity in nature, including commercial, industrial or professional services. A **business** is an organization or enterprising entity engaged in commercial, industrial or professional activities. The core differences among each form of business is the first deals with retailing already manufactured products, the second focuses on production of goods, and the third offers a service.

the content of the Vision Statement, state statute notes "...it shall articulate the desires of the citizens" and include guiding principles for the physical and socio-economic development of the community.

The Vision Statement and the Principals that follow reflect the desires of the entire community and what the residents have identified as important to their identity and future well-being. They were fashioned by the Planning Board after several engagement formats, including a resident workshop held on August 15, 2012, input from townspeople during public meetings and responses to surveys sent by the Planning Board in 2013 and 2015. They also reflect analysis by the Planning Board, in consultation with planning consultants, of the charts, documents and maps included in or attached and incorporated as Appendices.

1.1.1 Vision Statement

To shape Groton's future by guiding growth and development in a manner that ensures the preservation and protection of the town's:

- ❖ *Quiet small town rural character³*
- ❖ *Environment and natural resources*
- ❖ *Forested expanses of undeveloped space*
- ❖ *Water resources*
- ❖ *Diversity of plant and wildlife and*
- ❖ *Beautiful mountain ridgelines and other special vistas*

In implementing this Vision, the following Principles will serve all Town Officials, both elected and appointed, as guidance when making their decisions.

1.1.2 Principles

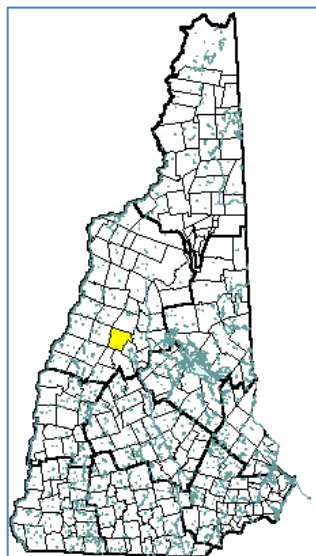
- a) **Land and Groton's natural resources are finite and are our community's most basic resource. The use of land determines to a large extent the character and quality of life in Groton.**
- b) **The rate, location and type of growth and development affect not only the community's physical appearance but also drives expansion of public services and infrastructure.**
- c) **Each parcel has distinct carrying capacity. Some are more suitable for development while other parcels are unsuitable, development leading to negative environmental and/or aesthetic impacts. The variables that determine the suitability of a parcel for development include, but are not limited to slope, soil characteristics, topography, water resources, wildlife and plant habitat and productivity of soils, as well as neighborhood character along with consideration for noise, fire and public safety and health.**

³ Rural character may mean different things to different people. To some it may be a small town quality, single-family homes, and a place in which families can enjoy healthy outdoor recreation. To others it may mean an unspoiled environment with rich wildlife habitat and non-fragmented forests. For Groton residents it is a combination of the two. Clearly, what it isn't, according to the responses documented at the Community Planning Workshop of 2012 and other engagement formats, is noise, obstructive and glaring artificial light, high-density development, pollution of the environment and natural resources, or destruction of viewsheds, ridgelines and other special vistas that enhance the desirability and livability of our community.

ARTICLE 2. COMMUNITY PROFILE

Section 2.1 Statistical Snapshot

The Town of Groton is located in Grafton County. Rumney borders it on the north, Plymouth on the east, Alexandria and Hebron on the southeast, Orange on the south and Dorchester on the west.



Groton is one of 48 New Hampshire communities with a population under 1000. According to the 2010 Census, the median age is 48.5, with 19.2% of the population over 65. As of 2010, there were 436 total housing units, a significant increase since 1987 when total housing units were 316.8 Based on New Hampshire standards, Groton is sparsely populated (593 in 2010) but has a rather large land area (40.7 square miles). Forests dominate Groton's landscape.

NH Route 118 serves Groton on the west along with two state maintained paved routes that include Hall's Brook Road and part of North Groton Road. North Groton Road from Hall's Brook Road to Route 118, River Road and Sculptured Rocks Road are

the other paved town roads. Numerous private dirt roads connect to these local roads and are maintained by the land owners. Two areas of Groton are not connected to the main area of the Town. River Road, which is accessed from NH Route 118 in Dorchester and Groton Hollow Road, which is accessed from NH Route 25 in Rumney.



The Town House, located on North Groton Road houses the Town Offices, Community Meeting Room and the Police Station. These town facilities were moved to the Town House after the previous buildings in south Groton were severely flooded in 2005.

2.1.1 MUNICIPAL SERVICES

Type of Government	Selectmen
Floodplain Development Regulation	Adopted 3/14/2000, revised 2007
Zoning Ordinance	2007- zoned Rural Residential
Zoning Ordinance Amendment	2015 Large Wind Energy Regulations
Subdivision	Adopted 12/17/1987, revised 2003, 2012, July 9, 2014
Site Plan Review	Adopted February 29, 2012
Excavation Regulations	Adopted September 15 2010
Master Plan	1987, revised 2007, 2017
Capital Improvement Plan	No
Hazard Mitigation Plan	2007 Plan Update, Adopted May 15, 2014
Boards and Commissions	
Elected:	Selectmen, Planning, Zoning, Library, Cemetery
Appointed:	Conservation Commission

2.1.2 ROADS

TRANSPORTATION

The road network and associated rights of way comprise approximately 39.546 miles of public and 14.968 miles of private roads.

No public transportation is available in Groton.

2.1.3 EMERGENCY SERVICES

Police Department	Full-Time Chief, Part-time Officers
Fire Department	Hebron/Rumney - Volunteer
Emergency Medical Service	Hebron/Rumney - Volunteer
Nearest Hospital(s)	Distance
Speare Memorial, Plymouth	13 miles
Dartmouth-Hitchcock, Lebanon	37 miles

2.1.4 (US Census Bureau) DEMOGRAPHICS

Total Population	Community	County
2012	591	89,181
2010	593	89,118
2000	458	81,826
1990	318	74,998
1980	255	65,806
1970	120	54,914

Demographics, American Community Survey(ACS) 2010-2014

Population by Gender

Male: 329, Female: 308

Population by Age Group

Under age 5	19
Age 5 to 19	70
Age 20 to 34	69
Age 35 to 54	246
Age 55 to 64	131
Age 65 and over	102

Comparison of Population Change Against Surrounding Towns										
County	Town	1960	1970	1980	1990	2000	2010		Numeric chg 00-10	Percent chg 00-10
Grafton		48,857	54,914	65,806	74,929	81,740	89,118		7,378	9.00%
	Alexandria	370	466	706	1,190	1,329	1,613		284	21.40%
	Dorchester	91	141	244	392	353	355		2	0.60%
	Groton	99	120	255	318	456	593		137	30.00%
	Hebron	153	234	349	386	459	602		143	31.20%
	Orange	83	103	197	237	299	331		32	10.70%
	Rumney	820	870	1,212	1,446	1,480	1,480		0	0.00%
	Plymouth	3,210	4,225	5,094	5,811	5,892	6,990		1,098	18.60%
Prepared by N.H. Office of Energy and Planning, Mar. 22, 2011										

2.1.5 (ACS 2010-2014) HOUSING

Total Housing Units	465
Single-Family Units, Detached or Attached	342
Units in Multiple-Family Structures:	
Two to Four Units in Structure	7
Five or More Units in Structure	0
Mobile Homes and Other Housing Units	116

2.1.6 (ACS 2010-2014) ANNUAL INCOME (Inflation Adjusted Dollars)

Per capita income	\$29,308
Median family income	\$61,250
Median household income	\$44,583
Median Earnings, full-time, year-round workers	
Male	\$36,923
Female	\$36,042
Individuals below the poverty level	17.3%

2.1.7 EDUCATIONAL ATTAINMENT, population 25 years and older

High school graduate or higher	75.1%
Bachelor's degree or higher	14.0%

2.1.8 (NH Dept. of Education) EDUCATION FACILITIES

Schools students attend:	Grades K-12 are part of Newfound Area (Alexandria, Bridgewater, Bristol, Danbury, Groton, Hebron, New Hampton)	SAU 4
Career Technology Center(s):	Plymouth Applied Technology Center	Region: 5
Nearest Community/Technical College: Lakes Region Community College		
Nearest Colleges/Universities: Plymouth State University & Dartmouth College		

Source Information & Notes

Information found in this Table, unless otherwise noted, was derived from the Economic & Labor Market Information Bureau, NH Employment Security, 2013. Community Response Received 6/15/2012; <http://www.nh.gov/nhes/elmi/htmlprofiles/pdfs/Groton.pdf> and from the Town of Groton. US Census - 2010

Section 2.2 Implications, Goals and Objectives

An understanding of demographic characteristics and trends is vital to effective planning and management in any community. The total population of a community, as well as the unique characteristics of particular segments of the population, and the rate of growth, can have significant implications relative to the demand for municipal services, housing and transportation needs.

The Planning Board has considered the information in Groton's Community Profile along with the results of Groton's 2012 Community Planning Workshop and 2014/2015 survey responses before recommending the following Goals and Objectives:

2.2.1 Housing Goal

To encourage housing consistent with the small town, rural character of Groton while also considering a range of residential living opportunities.

2.2.2 Housing Objectives

1. Enact an ordinance compliant with RSA 674:71 – 73 to authorize, by Conditional Use Permit, an accessory unit in single-family homes with such restrictions and requirements as are allowable pursuant to the law and suitable to maintain the stated Vision and Principals of this Master Plan. There are many important societal benefits associated with the creation of accessory dwelling units.
2. Study the advisability of writing a Capital Improvement Plan along with planning tools such as impact fees to generate adequate funds to cover the costs of the new infrastructure that new residential growth necessitates
3. Monitor the conversion of Groton's many seasonal houses into year-round homes to ensure compliance with building, health and safety requirements
4. Consider cluster style housing, particularly where a conservation easement is placed on a portion of the land to create permanently protected open space and recreational opportunities

2.2.3 Transportation Goal

To seek to serve the special transportation needs of the senior population, youth, the economically disadvantaged and the disabled, including both everyday needs and emergency disaster transit requirements.

2.2.4 Transportation Objectives

To improve transportation opportunities in a manner consistent with population and demographic changes of the Town by:

1. encouraging ridesharing
2. supporting efforts to secure services and funding for paratransit and elderly transportation
3. Working with nearby jurisdictions and non-profits forming partnerships that provide for the special transportation needs of the senior population, youth, the economically disadvantaged and the disabled

ARTICLE 3. LAND USE

Section 3.1 Natural Features/Resources

Groton has a total area of 40.76 square miles (26,085.17 acres) of which approximately 40.71 square miles is land (26,056.36 acres) and 0.05 square miles is water (28.81 acres). Large blocks of contiguous forestland, owned publicly and privately, several high peaks and earth product and water resources characterize the Town. These features are important to the Town's economy, recreational opportunities, rural character and beauty. They are even more significant for the role they play in long-term viability of the wood-products industry, for wildlife and fish habitat and for clean source waters flowing into the Newfound and Baker River Watersheds, as well as the State's fifth largest waterbody, Newfound Lake.

3.1.1 Managed Forests – Preserved vs. Permanently Protected

Far too often communities assume that forestland once held for timber, pulpwood and other forest products will continue in that status indefinitely, failing to recognize that development is a real possibility. While it is true that most forestland is preserved under current use, that status provides only temporary conservation of open space.

To have a complete understanding of whether the Town can expect to benefit from the vast forestry holdings into the future, it is important to recognize the difference between lands preserved through current use versus lands permanently protected. Often used interchangeably, preserved open space does not mean the land is permanently protected by legal means. "Permanently protected" is understood to mean that the parcel is conserved by easement which prohibits development, yet allows various uses of the land, including timber harvest and agricultural uses except on tracts that are ecologically significant.

However, open space preserved under NH RSA 79-A performs a wide range of community and ecological services. Open space, as a general term, includes natural areas such as wilderness, parks, greenways, river corridors, waterways, wetlands, woodlands, working forestlands and other undeveloped spaces that may have conservation values which support native species, maintain natural ecological processes, sustain air and water resources, and contribute to the health and quality of life of people and wildlife. Open spaces in Groton provide opportunities for recreational, aesthetic and other quality of life benefits, as well as, contributing significantly to the identified values and priorities voiced by Town residents.

According to the real estate assessments for the Town of Groton 19,380.598, acres or approximately 74.2% of the land in the Town is now being taxed under the provisions of New Hampshire RSA 79-A "Current Use Taxation." Some of this acreage are land blocks represented by the tracts of forestland discussed more fully below, some are smaller areas individually owned by Town residents and out of state investors. Because so much of Groton's land is now preserved under current use, but not permanently protected, it is important for Town officials to set objectives that will help secure Groton's open space for generations to come.

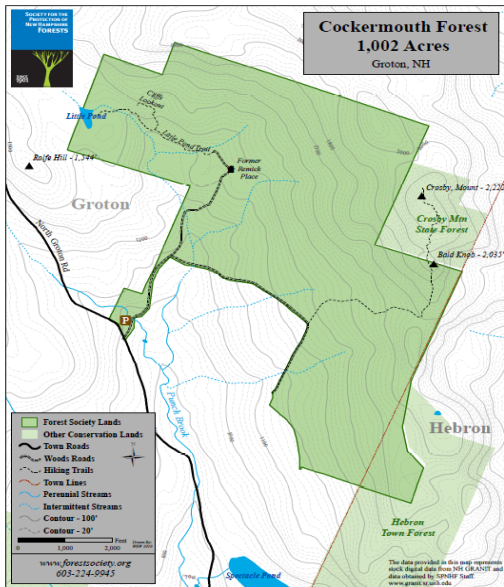
WHAT IS CURRENT USE? NH RSA 79-

A states: "It is hereby declared to be in the public interest to encourage the preservation of open space, thus providing a healthful and attractive outdoor environment for work and recreation of the state's citizens, maintaining the character of the state's landscape, and conserving the land, water, forest, agricultural and wildlife resources. It is further declared to be in the public interest to prevent the loss of open space due to property taxation at values incompatible with open space usage. Open space land imposes few if any costs on local government and is therefore an economic benefit to its citizens".

3.1.1.1 Privately Owned, Permanently Protected

Cockermouth Forest

The name “Cockermouth Forest” has historical significance, bearing the Town’s name of origin from 1760 to 1790, and reflecting the river that flows west to east through it. William B. Wadsworth, who donated the land in 1992 to the non-profit, Society for the Protection of New Hampshire Forests (SPNHF), first came to the area to attend Cockermouth Boys Camp. Of the 1002 acres, 29 are within neighboring Hebron, establishing a significant wildlife corridor to Spectacle Pond, Hebron’s Town Forest, Flint Memorial Forest (in Hebron, owned by SPNHF) and the Cockermouth River.



While SPNHF retains timber-harvesting rights, the lands are permanently protected and open to the public for skiing, snowshoeing, fishing, hunting and hiking. Supporting critical wildlife habitat, the property is a favorite for many in the region, offering modest to strenuous hikes, incredible views and numerous opportunities for observing wildlife year-round. Visitors can choose to explore Little Pond and the views from the nearby cliffs or trek up to Mount Crosby and Bald Knob

with views of the White Mountains, Squam Lake, Lake Winnepesaukee and Newfound Lake. Access to the Forest is from Groton Road.

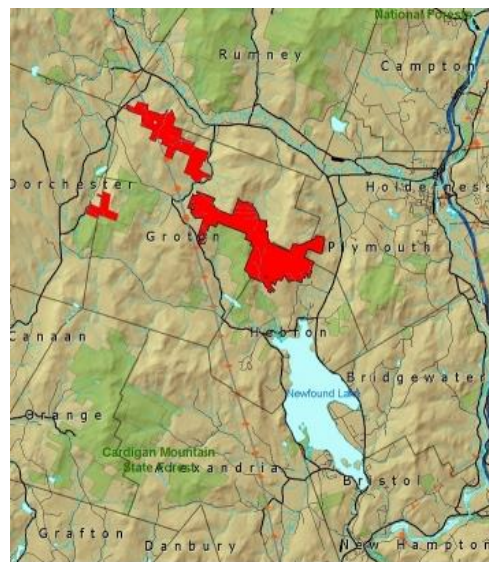
As of the close of 2017, SPNHF was in negotiations to add Map 6, Lot 21, approx. 204 contiguous acres, to the Cockermouth Forest in Groton.

The Cardigan Highlands -- Forest Legacy Funded

In April of 2015, the Groton Hollow tract (3,342 acres) was added to the February 2012 Bailey Hill and South Branch portions (1,758 acres) of the Cardigan Highlands project. Secured by a grant from the Forest Legacy Program, a federal program of the U.S. Forest Service, the conservation easement is held by the NH Division of Forests and Lands. The land is protected from development while allowing the property owner, Green Acre Woodlands, to continue to own and manage the forests for sustainable timber production.

West Central Groton – Forest Legacy Funded

Located within one of the State’s largest relatively unfragmented blocks of forestland south of the White Mountain National Forest this 900 acre plus project protected important habitat for wildlife species that require large interior forest areas. As of year-end, 2017, Mourning Dove Holdings, LLC, owned the property (Map 2, Lot 48).



Cardigan Highlands-Green Acre Woodlands

Lands conserved through the Forest Legacy Program protect private forestlands threatened with conversion to non-forest uses, yet the land remains open to the public to enjoy recreational opportunities.

Cross Reservation

A drive up Province Road toward the headwaters of the Cockermouth River in Groton brings you to the Cross Reservation, protected into perpetuity, thanks to a generous donation of a conservation easement. Jim Cross has been working with foresters and the Natural Resources Conservation Service over the past 35 years to manage his 72-acre property primarily for wildlife habitat. The results of that collaboration complement the already rich biodiversity of the headwaters area.

The old pastures are each bounded by stone walls or free flowing streams, buffered by brushy, uncut borders. Apple trees grow in three of the four pastures, offering fruit for the wildlife.

Since the early 1980s, a series of small patch cuts have been carried out in the forested part of the property. These canopy openings encourage diversity in the plant community, providing the saplings and shrubby thickets of a regenerating forest required by species like ruffed grouse and woodcock.

A large beaver dam across the main stem of the Cockermouth River has created a forest of standing dead trees providing nesting sites for birds. Blue herons are regular visitors, perhaps attracted by the growing population of native brook trout behind the dam. Below the dam, two unnamed streams join the Cockermouth on the property as it flows down toward the Sculptured Rocks Natural Area and into Newfound Lake.

The obvious value this land has for wildlife is the reason Cross decided to protect it by donating a conservation easement to the Society for the Protection of New Hampshire Forests (SPNHF).

3.1.1.2 Publicly Owned, Preserved Lands

The ownership and management of state-owned lands in New Hampshire have a long history of tradition with clear direction provided by state law (RSA 227-G and 227-H). It is within this framework, subject to any future legislative change, that the use and management of state land is defined and carried out.

State Owned Reservations

State lands under the jurisdiction of the Department of Resources and Economic Development (D.R.E.D.) are referred to as "reservations" by state law. RSA 227-G:2 defines "reservation" as public land under D.R.E.D. including, but not limited to: state forest, state park, natural area, historic site, geologic site, recreation trail, memorial area, fire tower, wayside area, heritage park, resource center, agricultural area, state forest nursery, fish pier, administrative facility, information center, demonstration forest, certain islands, and lands under lease to the department. Every parcel of DRED lands is placed into one of four major categories based on general land use: agricultural lands, conservation easements, forestry lands, and recreation lands. These categories are used for tax purposes under RSA 216-A:3a, 227-H:12 and 227-H:17:

- *Agricultural Lands* - are lands leased for agricultural purposes and which are eligible for taxation by local assessing officials as provided by RSA 72:23-I(b), as amended.
- *Conservation Easement Lands* - are privately owned lands where partial interest is deeded to the state for protecting the land from development. These lands are often subject to public access rights.
- *Recreation Lands* - are lands that have or plan to have developed recreation and/or administrative facilities or provide moderate to high tourist attraction or user interest.
- *Forestry Lands* - are lands not a part of a developed recreation or administrative area that support multiple uses not associated with developed recreation.

In the DRED, the Division of Forests and Lands are usually the named stewards of New Hampshire's reservations. Groton is fortunate to have the following State reservations partially or wholly within our Town:

- **Sculptured Rocks Natural area**

This 264 acre state recreation area offers hiking, fishing and cooling off in the many pools along the narrow, twisting “canyons” carved into the bedrock, a unique example of nature's powerful yet delicate artistry.

- **Province Road State Forest**

This 1,040 acre forest lies within Dorchester and Groton. It is open to the public for traditional outdoor activities.

- **Crosby Mountain**

While Groton Wind has dramatically affected the unique White Mountain views to the north, this State Reserve features strong directional views, from its 2,230 summit, encompassing an impressive lineup of high peaks to the east, south and west.

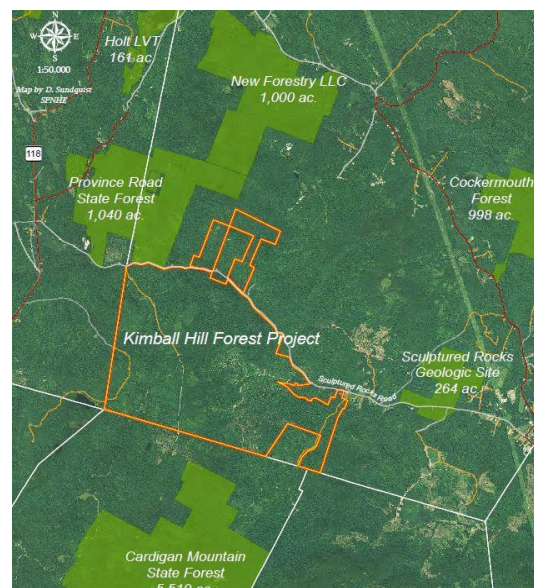
3.1.1.3 Privately Owned, Preserved Lands

Groton’s resilient forests are renewable resources that have been harvested several times over. Good forest stewardship recognizes that proper harvesting techniques can sustain the vigor, productivity, and diversity of these natural communities. However, there is no guarantee that forestlands, preserved by current use versus protected by easement, will remain in sustained production of timber, pulpwood and other forest-products. The region, in recent years, has seen significant housing development due in large part to commercial growth providing employment opportunities and the proximity to Newfound Lake and other recreation opportunities bringing retirees and second homeowners into the area. Development of all or part of the lands now preserved under current use is a real possibility, and without thoughtful planning, the many benefits provided by the privately held forestlands may well be lost. The largest blocks, in current use as of 2017, are described below.

Kimball Hill

Located in the southwestern portion of Groton, this 2,622-acre region, long a working forest, has a forest management history which has created young to middle-aged stands dominated by growing stock and small sawlog size classes. These young age classes offer a solid, long-term appreciation component. The forest is comprised of predominantly hardwood species (83% of total volume) with a species mix of northern hardwoods including the maples, birches, beech, and ash. There are also associated softwoods.

The property, consisting of several parcels, has topography moderate to steep, containing several high ridges. A primary ridge divides the area along a north/south line. Its namesake, the 1,682 ft. Kimball Hill, along with several unnamed peaks with elevations over 2,000 ft. make up part of the northern view shed of Newfound Lake.



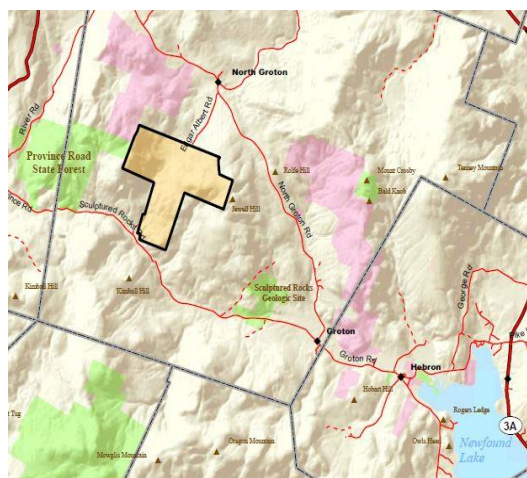
The Kimball Hill property is a NH priority focus area that contains high tier habitats and ranks as a conservation priority for the two-state Quabbin to Cardigan Conservation Collaborative. It encompasses miles of riparian habitat, including frontage along the south Branch of the Baker River, Atwell Brook, the Cockermouth River, and dozens of other smaller seasonal

streams or brooks. The 30 +/- acre open shrub-scrub wetland complex along the South Branch of the Baker River adds greatly to habitat diversity of the property.

The land, long held in current use, was owned (as of Oct 2017) by TimberVest Partners NH LLC a real estate investment firm specializing in owning and managing timberland-related investments (for a finite period), for investors seeking financial returns on asset (timber) appreciation. In October 2017, The Nature Conservancy, a non-profit, purchased the property with the intension of retaining a protective easement and re-selling the land as a wildlife refuge. NH Fish and Game has expressed an interest to add the parcel to their wildlife management holdings. If this transaction is completed Kimball Hill will be the first publicly owned, permanently protected land in Groton.

JH Treehouse, LLC.

This area encompasses approx. 1,139 acres and is comprised of seven individual lots – Map 2 Lot 81, and



Map 3 Lots 2, 4, 10, 11, 18, and 5. It is located just southwest of the geographic center of Groton. The property is “T” shaped with three mountain ridges occupying the boundaries, ranging in elevation from 2,060 feet above sea level in the northeast to 1,100 feet in the south. A long central valley runs north to south and topography varies, but is mostly moderate at the mid slopes and mountaintops with some steep sections on the upper slopes leading to the peak. The property has been managed for timber for decades. Soil composition is of a glacial till origin, predominantly well-drained, and supporting a northern hardwood forest type.

As of year-end 2017, JH Treehouse, LLC, owned the properties comprising this area. This domestic Limited Liability Company is purposed as a real estate investment group. It has looked to logging and other commercial development (the siting of a wind farm) in order to turn a profit for their investors. That focus will most likely drive the land use decisions. The properties have primary access from the class V Edgar Albert Road and secondary access points from several private roads, allowing for subdivision and other development potential.

Jewel Hill

As of year-end 2017 Auke-Jewell, LLC, a domestic limited liability real estate investment firm owned four lots (Map 4 Lot 11, Map 5 Lot 27, Map 6 Lot 112 and Map 6 Lot 657 totaling approx. 1339 acres) located in South Central Groton. The properties abut a portion of the JH Treehouse lots and have frontage on the Cockermouth River.

These lots have long been held as working forestlands, yet in December of 2013 the present owner signed a lease with Alpine Ridge Wind Farm LLC – the subsidiary of Juwi Wind. While the project was terminated and Juwi Wind exercised its rights to terminate the lease, effective as of June 13, 2014 with Auke-Jewell, the possibility of future projects and subdivision continues to exist.

3.1.2 Mountain Peaks

The northern part of Groton is set within sight of the White Mountain National Forest’s southern mountains, while the mountain peaks of the southern part overlook Newfound Lake and Mount Cardigan.

The highest point in Groton is 2,350 feet (720 m) above sea level. The area consists of two distinct ridgeline features known as Fletcher and Tenney Mountain, which are separated by a valley known as Groton Hollow. Both ridges are northeast/southwest oriented and range in peak elevation from 1,850 (Fletcher Mountain) to 2,350 (Tenney Mountain) feet.

Located southwest of Tenney Mountain and northwest of Newfound Lake, from its ledgy summit of 2,230 ft., Mt. Crosby, a State owned reserve, features strong directional views encompassing an impressive lineup of high peaks on the distant horizon that begin with Mt. Moosilauke to the Sandwich Range.

Just south is a sub peak referred to as Bald Knob at 2,050 feet. From open ledges there are views in all directions, Newfound Lake to the south, the Belknap range to the SE and Mt. Cardigan and its many spurs to the SW. Around the corner other vistas look north to the southern White Mountains beyond the slopes of nearby Tenney Mountain.

Other ridge features in Groton include Kimball Hill (at 1,682 feet), Jewel Hill (2,060 feet) and Bailey Hill (1,820 feet) and Powers Hill (at 1,965 feet).

3.1.3 Earth Products

Groton's earth mineral resources include deposits of sand and gravel which are extracted commercially. Sand and gravel operations are important resources that provide locally available construction aggregate for roads and other development activities. At the same time, earth excavations can be a disruptive land use, creating dust, noise, fumes, and truck traffic. Excavation activities may cause erosion and sedimentation, fuel spills, and exposure of the Town's surface and water table, which will in turn result in contamination. Thus, it is important that excavation operations be performed with care.

Groton's excavation regulations and state law RSA 155-E regulates earth excavations. These provisions provide a local review process by the Planning Board to ensure adequate standards and safeguards exist to minimize environmental impacts. Additional controls, namely directing the location of sand and gravel excavations, can be obtained through zoning. One provision in state statute RSA 155-E allows a town with identified US Geological Survey aquifers to protect those resources by prohibiting any excavation that may substantially damage a known aquifer.

Responsible excavation operations can provide Groton with a valuable resource for local use, while also meeting other Town goals of preserving rural character, aesthetics and the environment.

3.1.4 Water Resources⁴

3.1.4.1 Groton's Watershed

The New Hampshire Watershed Boundary Dataset (NHWBD) is a geographic information system (GIS) comprised of a nested hierarchy of drainage divides interpreted from 1:24,000-scale topographic contours as presented on 7.5-minute USGS quadrangle maps. These features are delineated and digitized by the Natural Resources Conservation Service (NRCS). In looking at digitized mapping from the system, it is

⁴ The Planning Board acknowledges the guidance provided to us from the Newfound Lake Region Association and the Baker River Watershed Association. ***EVERY ACRE COUNTS: THE NEWFOUND WATERSHED MASTER PLAN*** and the ***BAKER RIVER WATERSHED MANAGEMENT PLAN*** are regional environmental planning efforts with the goal of protecting the water resources of the 63,150 acre Newfound Watershed and the 136,581 acre Baker River Watershed. Through strategies that balance future growth with natural resource protection, *each Watershed Plan* is designed to guide future planning and regulatory initiatives.

evident that Groton lies fully within the Merrimack River watershed and shares land mass in both the Baker River and Newfound watersheds.

What significance does this delineation have? Planning choices we make; where and what type of development we approve, will have an effect on Groton, impact Newfound Lake, the Baker and Newfound Rivers and may ultimately affect the Merrimack and beyond. This is because a watershed is that area of land, defined by ridge tops, topography generally controlling the directional flows of all surface waters.

Since much of Groton is steep to very steep sloped, rain events will affect the height and velocities of streams and rivers causing their erosion potential to intensify. Along with loss in the vegetated area between the water body edge and the upland, removal of the natural forest canopy and increases in impervious cover associated with development, and the consequences can be devastating. Loss of habitat, excessive siltation and sediment transport, change in water temperature and flooding will most certainly alter aquatic and terrestrial life, reduce groundwater re-charge depleting the available water supply and result in property damage.

3.1.4.2 Groton's Surface Waters

Groton's important surface waters encompass miles of riparian habitat, including frontage along Spectacle and Little Pond, numerous other small ponds, wetlands and bogs, the south Branch of the Baker River, Halls and Clarks Brook, the Cockermouth River, Atwell and Punch Brook and dozens of smaller seasonal streams or brooks.

Rivers and Streams. In the southern part of the town lies the deep valley of the Cockermouth River. This river has a number of tributaries, the largest of which are Atwell and Punch Brooks. The river begins near the western boundary of Groton and proceeds southeast across the Town, flowing into Hebron. It is one of the principal inlets of Newfound Lake, the longest (9.5-miles from its headwaters to Newfound Lake) and second largest river, contributing 34.5% of the stream flow into the lake. Because of this hydrology, the Cockermouth has the potential to directly impact the water quality of Newfound Lake.

The watercourses that are part of the Baker River basin, originating in or flowing through Groton, include Halls and Clark Brooks, and the South Branch of the Baker River. Both Halls and Clarks Brook flow north before emptying into the Baker River in the Town of Rumney. Halls Brook winds around Bailey Hill, while Clark Brook courses from Groton Hollow. The South Branch of the Baker is a 15.6-mile-long river passing through western Groton. The river rises in the town of Orange on high ground north of Mount Cardigan. It flows north through the towns of Groton and Dorchester, enters Wentworth, and drops rapidly to the Baker River.

Ponds. Spectacle Pond, lying on the eastern border, and Little Pond, just east of the central part of the Town, are the two most significant small surface ponds in Groton. Spectacle Pond straddles the town lines of Groton and Hebron, dividing its waters, with 25 acres in Groton and 28 acres lying in Hebron. Historically two separate ponds, the low lying area was flooded in the mid 1800's for logging operations, effectively creating one long pond. In November 2011 site and concrete work to construct a spillway, rebuild a dam and reconstruct a dike was necessary to bring the two structures impounding this waterbody in compliance with NHDES 100-year flood requirements. Access to Spectacle Pond is off N. Groton Road, providing public entry to a boat ramp for non-motorized watercraft. Access to the Hebron side is by boat only.

Little Pond, with a unique 9-acre bog surrounding its undeveloped shoreline, can be reached through a trail that climbs through the Forest Society's eco-reserve section of the Cockermouth Forest. Visitors can explore Little Pond and the views from the nearby cliffs. The rugged ridgeback overlooking Little Pond

supports an uncommon red oak – pitch pine, rocky ridge natural community. This gem presents a great opportunity for wildlife viewing.

3.1.4.3 State Regulation

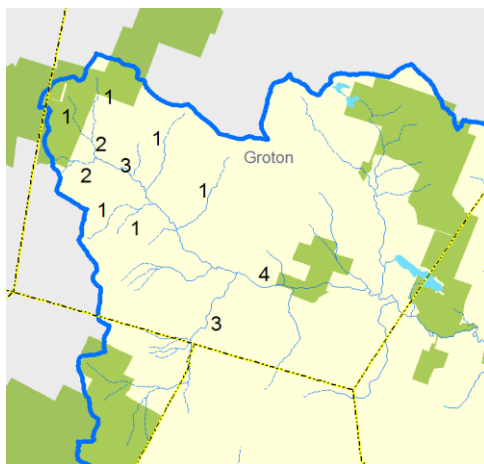
Managed and regulated by the State, surface waters are prescribed by common law as great ponds. These public waters are held by the State in trust for the people of New Hampshire, and generally include:

- Tidal waters
- Lakes and ponds greater than 10 acres
- Navigable rivers

The Department of Environmental Services (DES) maintains a Consolidated List of Water Bodies which catalogs all water bodies jurisdictional under RSA 483-B, the Shoreland Water Quality Protection Act (“SWQPA”, formerly the Comprehensive Shoreland Protection Act or CSPA, Effective Date of Enactment: 1991. Revised: 2008).

In Groton, both Spectacle Pond (an impoundment of more than 10 acres) and that portion of the Cockermouth River from the junction of Atwell Brook east to Newfound Lake (a Fourth Order river) are protected under the SWQPA

Furthermore, streams are typically classified according to



Strahler’s Stream Ordering System, which assigns a hydrography stream order. In general, streams of higher order are larger than those of lower order. Rivers are examples of higher order streams. The size of a stream is one parameter used to determine the amount of protection or buffer size that is desirable for the water body.

The image to the left shows that part of Groton in the Newfound Lake Watershed. Displayed is the stream order of the Cockermouth River and its tributaries.

The SWQPA establishes a 250-foot area of land, scored on tree diameter, for ensuring the protection of a vegetated buffer on the waterfront. Additional restrictions within the Waterfront Buffer include a prohibition on use of chemicals within 25 feet of the shoreline. Low phosphorous, slow release nitrogen fertilizer may be used from 25 feet to 50 feet back from the shoreline. In addition, rocks, stumps and tree root systems must be left intact in the ground, unless the Department of Environmental Services (DES) specifically approves the removal. The CSPA also impose restrictions on the area within 150 feet of the shoreline (the so-called "Natural Woodland Buffer") by limiting impervious surfaces and requiring minimum amounts of unaltered areas as a percentage of lot area.

3.1.4.4 Options to Regulate

In addition, communities also have four options to regulate development for shoreland and riparian purposes:

Option 1: They may rely solely on the state’s SWQPA to protect the specific types of surface water bodies that fall under the jurisdiction of the SWQPA; or

Option 2: They may elect to adopt regulations that extend protection to the streams and surface water bodies that are not covered by the SWQPA; or

Option 3: The municipality may adopt more stringent regulations than the minimum standards of the SWQPA as provided for under RSA 483-B:8; or

Option 4: The municipality may elect to develop separate stream corridor (watershed) regulations to protect the riparian buffers along first, second and third order streams and rivers within the community leaving the SWQPA or a more stringent local shoreland ordinance to regulate the lakes, ponds, and higher order streams and rivers within the community.

3.1.4.5 Water Resources Summation

Watercourses and ponds are dynamic features and require thoughtful planning when a new road, stream crossing or development is proposed. Retaining native vegetation along Groton's streams, rivers, wetlands and ponds, is a cost-effective management strategy to maintain water quality and protect rich wildlife habitat and corridors. Buffers also slow out-of-bank flood flows, stabilize bank undercutting and mitigate erosion by filtering and absorbing sediments and nutrients from runoff. Additional positives include the protection of groundwater recharge necessary for drinking water supplies that otherwise would be reduced by the impervious surfaces associated with development.

3.1.5 Special Vistas, Scenic Areas, and Ecological Resources

New Hampshire's Office of Energy & Planning issued Technical Bulletin 10, *Preservation of Scenic Areas and Viewsheds*. It recommends that all scenic areas important to a community are identified and the planning officials incorporate specific policies into the zoning and subdivision regulations to protect those areas.

The bulletin says "special vistas, views and scenic areas contribute significantly to the quality of life, add to the value of property, and enhance the desirability and livability of a community."

In this context, protecting views may be considered an extension of the concept of promoting the general health and welfare of a community and region. This enables communities to develop standards and to impose reasonable restrictions on development within a designated view protection area. Such restrictions can be carried out through the adoption of zoning ordinances under RSA 674:16, which regulate building height, lot coverage, density, setbacks and open space.

Communities are also authorized to adopt innovative land use controls under RSA 674:21 that may include, among other planning techniques: cluster development, performance standards, the purchase of development rights, and donations. Local officials are encouraged to use these innovative land use control techniques as a means of assisting in implementing the goals and objectives of their community, including the preservation of scenic resources and special views.

Section 3.2 Land Suitability & Co-Occurrence Mapping

3.2.1 Finite Resource

Land is a finite natural resource. Each parcel is the sum of a mix of natural resource characteristics making any given parcel or region valuable as buildable land, as habitat, as a source of food or timber, as an element in local and regional hydrology, as a scenic resource, etc. How land is used can determine to a large extent the character and quality of life in Groton. The rate, location and type of growth and development will affect Groton's physical appearance, quality of life and also drive expansion of public services and infrastructure. Depending upon the many characteristics that may come into play, poorly situated or improperly controlled development can:

- Adversely affect land resources both in the short term (soil erosion, unsuitable water table) and long term (groundwater pollution, septic system failure, increased runoff pollution);
- Generate increased costs for public services;
- Prevent the optimum utilization of land, especially critical in terms of prime agricultural and productive forest lands, commercial development and affordable housing;
- Dictate future land use patterns that are unmanageable both financially and environmentally;
- Contribute to flooding and flood hazards through encroachment on flood plains and wetlands;
- Isolate large tracts of land, precluding their use in the future;
- Fragment or destroy wildlife habitat and movement corridors
- Alter or even destroy Town-wide character and neighbor quality
- Adversely affect resident health, safety and property values

Properly planned and directed development, on the other hand, can accommodate the range of necessary uses in locations and on suitable parcels, which will avoid the negative impacts mentioned above.

3.2.2 Suitability Explained

Development suitability refers to a lands capacity as appropriate or least suitable for various uses, including residential build-out or business development. While almost all land can be developed or otherwise used if enough money and effort is applied, the suitability concept seeks to identify those areas most appropriate to accommodate future growth with minimum impact on the parcel's mix of intrinsic characteristics.

How then should suitability be determined? A strictly economic approach would look at development suitability from a "highest and best" use (determined by the market) evaluating a parcels ability to support build-out efficiently, i.e., at the lowest economic cost with the highest economic return. Location may be a key consideration, and a suitability analysis would focus on parcel size, accessibility and the availability of utilities.

Typically not considered with a purely economic approach are the environmental, social and cultural attributes of the land. A Town-wide GIS-based land analysis, however, can consider a broad range of attributes assisting land planning officials to identify important resource values.

GIS (Geographic Information Systems) refers to a system where geographic characteristics are stored as a data-set of spatial information which can be analyzed and visualized (mapped). Co-occurrence mapping is created when more than one of the geographic characteristics comprising the data-set are overlaid, one on another, and are "co-located." This process helps land planning officials to identify resources that should be protected or undergo only low density or restricted future development.

Land with less environmentally and culturally sensitive values, where development would not have a serious impact, can be identified as more suitable for higher density future development. When performing the suitability analysis using co-occurrence mapping as a decision-support tool, the landscape becomes the sum of the co-located data-set. Moreover, the interrelationships between the lands attributes are stressed, rather than each feature being treated as a separate characteristic of the landscape.

The Planning Board hired a professional to update mapping and analysis previously compiled. The updated maps represent a Geographic data-set from digital versions of mapped data available from the state's geographic information library at GRANIT, a program of the University of New Hampshire. Additional data was provided by federal agencies, including the USGS and NRCS, as well as state agencies such as the N.H. Fish and Game Department and the N.H. Department of Environmental Services. Other data, such as tax parcel information, was obtained from Groton's Tax Assessors.

The maps inserted below show the results of Groton's mapping application. Each resource feature has a numerical value of 1; the scoring in the legend and the presence of lighter or darker colors in the map reflect where resource features co-occur. Areas with darker colors typically represent more natural resource features, higher sensitivity to development and higher conservation value.

The second data-set (social, cultural, and resident identified values) is represented by the analysis of the Community Planning Workshop of 2012, survey responses received by the Planning Board in 2013 and 2015, public hearings, and external documentation along with advice from state and local officials who know the legal requirements that form the basis for community planning. Arguably, some of the issues in the second data-set are subjective, yet fully capture the viewpoints of Groton's residents.

This grouping includes characteristics such as rural and neighborhood character, dark skies, noise limitations, recreational opportunities, special places, and historical/culturally significant areas and characteristics. These are not reflected on mapping but are included in **Appendix A**.

3.2.3 Geographic Data-Set

The following information, while modified and updated for Groton, was excerpted from a study of natural resources made for the Newfound Lake Region Association in 2014 titled Newfound Lake Watershed Master Plan: GIS Technical Report.

The **Natural Resource Features**⁵ in Groton's analysis are grouped as follows, and are presented below with brief descriptions and accompanying maps:

Surface Water Resources

- Riparian Buffers

- Wetlands

- Floodplains

Drinking Water Resources

- Sand & Gravel Aquifers

Steep Slopes & Highly Erodible Soils

- Steep Slopes

- Highly Erodible Soils

Wildlife Habitat

- Wildlife Habitat Quality

Most Productive Farming & Forest Soils

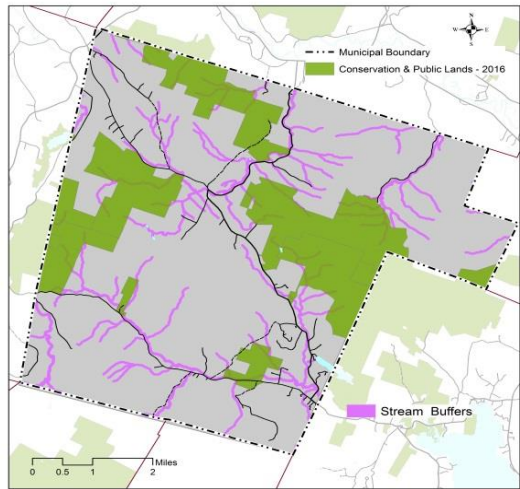
- Prime Agricultural Soils

- Most Productive Forest Soil

⁵ High-resolution map inserts are provided throughout this section for the reader's convenience. Copies, sized 8 x 11 are attached as **Appendix B**

3.2.3.1 Surface Water Resources

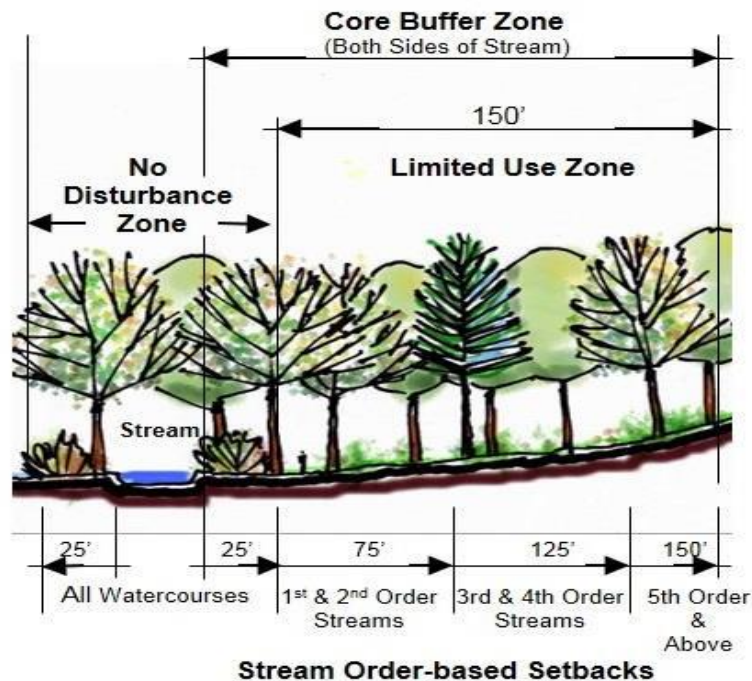
Riparian Buffers are vegetated corridors along streams and rivers that play a critical role in filtering sediment and nutrients before they enter the water ecosystem. These buffers also act as wildlife movement corridors along water features, which are often home to unique natural communities.



Riparian Buffers

It should be noted that the NH Wildlife Action Plan (NHWAP) uses a 300' buffer in its habitat modeling while the Center for Watershed Protection (CWP-<http://cwp.org/>) employs a tiered buffer model based on stream order. The CWP Model requires a buffer of 75' for order 1 and 2, 125' for order 3 and 4, and 150' for stream order 5 and above (typically larger rivers). The 150' buffer is also applied to all lakes and ponds. These distances are more than adequate for maintaining water quality if kept in a natural land cover condition. However, wildlife corridors along riparian buffers need to be wider, on the order of 300'.

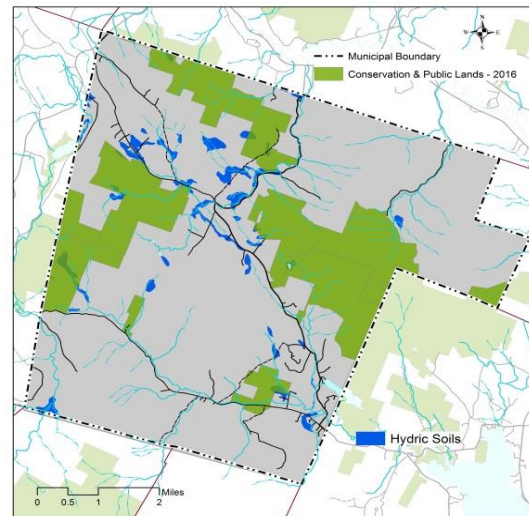
The graphic below shows how the CWP tiered buffer concept works. Note that the intent is to maintain a 25' no disturbance zone on either side of a watercourse. The limited use zone extending out to 150' in the case of higher order watercourses is also intended as a natural storm water “filter strip”, but may be devoted to light human uses such as non-motorized trails.



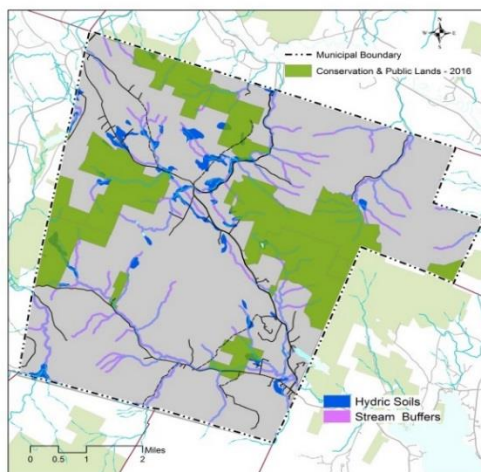
Headwater streams highest in the watershed are Order 1; where two Order streams combine, the watercourse becomes Order 2. Two Order 2 streams combine to make Order 3, and so forth down gradient.

Wetlands offer multiple benefits including floodwater storage, biological purification, and important wildlife habitat for a number of species of plants and animals. Wetlands are delineated for Groton's mapping using hydric soils – poorly-drained and very poorly drained soils – based on mapping from the NRCS. Both soils types are strong indicators of jurisdictional wetlands per state and federal regulations.

The term jurisdictional indicates that State and Federal laws regulating wetland uses and impacts exist, providing some level of protection from development.



Wetlands

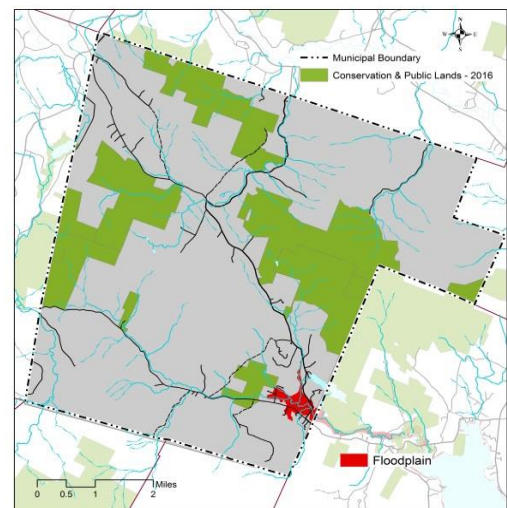


Wetlands & Riparian Buffers

The map to the left displays hydric soils, mapped wetlands and riparian buffers in Groton. Note how the pattern of wetlands across the study area is somewhat concentrated in certain areas, especially associated with watercourses.

Floodplains provide floodwater storage and transit, and are home to unique natural communities.

The map to the right displays the location of all 100-year floodplain areas in Groton as determined by floodplain insurance mapping originally developed by USGS. Typically 100-year floodplains are found in close association with larger streams and rivers such as the Cockermouth River.

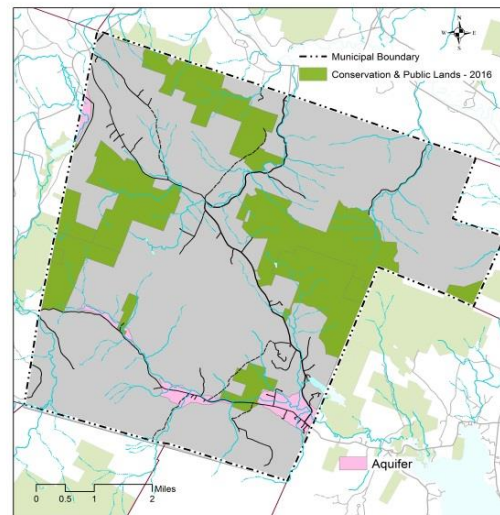


100-Year Floodplain

3.2.3.2 Drinking Water Resources

Sand & Gravel Aquifers exist in Groton, because of sediment deposition in major the river valleys following the last glacial age. As opposed to bedrock aquifers, these surficial deposits represent one of the most important groundwater resources in the state, and have been developed for high-yield municipal water wells in many communities. The entire land surface overlying the aquifers represents a **primary recharge zone** with obvious implications for groundwater quality and quantities depending upon land cover and land uses occurring on this recharge zone.

Due to the nature of materials and the thickness of an aquifer, some areas indicate greater potential flow (transmissivity) of groundwater water to a well, and therefore a greater water supply productivity. These zones are also most prone to the rapid movement of contaminants that find their way into the groundwater, and therefore retaining natural land cover and non-commercial/industrial land uses is important. The map to the right shows the aquifer zones in Groton. Note the large formations in the Cockermouth River valley.



Sand & Gravel Aquifer

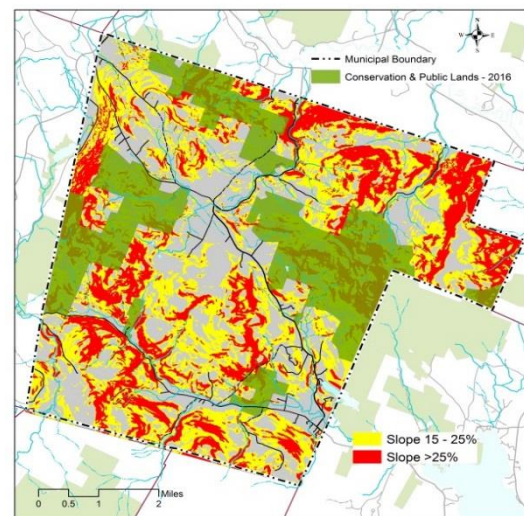
3.2.3.3 Steep Slopes & Highly Erodible Soils

Steep slopes limit the natural capability of land to support development in two ways. First, land areas with steep slopes cause a higher volume and velocity of surface water runoff, increasing the likelihood for erosion. The resulting sedimentation affects both the immediate site and lower lying areas. Secondly, soil depth is thinner on steep slopes, decreasing the capacity of the land to filter septic system effluent.

Slopes in excess of 25% gradient are rarely suitable as buildable lots due to limitations and elevated risks of severe land disturbance from siting roads and buildings. Slopes in the range of 15% to 25% are considered a cautionary zone, and require careful engineering design to mitigate impacts, especially storm water runoff and erosion.

Steep slope areas are also home to unique natural communities in certain places where nutrients have accumulated in pockets, or where cliffs and talus slopes have formed. Such formations also offer den sites for a number of wildlife species, and are important winter sunning sites for bobcats.

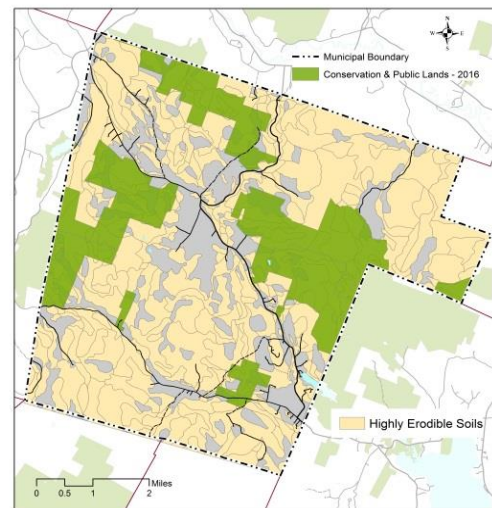
Slopes in excess of 25% gradient are shown in red in the map above and to the right. Note that much of the terrain within the Groton is classified as steep slopes and is also associated with highly erodible soils.



Steep Slopes

Highly Erodible Soils have been charted for erosion potential as part of a State program to identify land areas requiring special management and lot sizing (see **Appendix C for a chart**). These soils are known to erode rapidly and extensively if disturbed, due to their physical properties and slope conditions. Highly erodible soils are of great importance to water quality as they may cause adverse impacts from sediment and nutrient loading in lakes, ponds, and streams.

Of special concern are lands where steep slopes and highly erodible soils are both present. The map to the right shows slopes greater than 25% overlaid on the highly erodible soils. These areas should be of high priority for land planning officials, limiting or prohibiting development. Preservation of the natural land cover to ensure that headwater streams and other surface waters are not impacted by erosion can be secured by land conservation and zoning, subdivision and Site Plan regulations, and road design standards, etc.

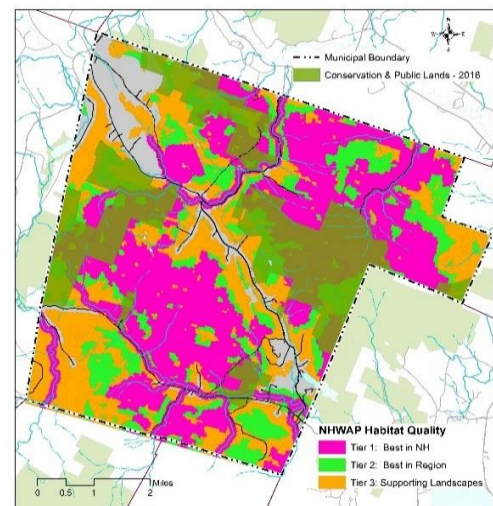


Highly Erodible Soils

3.2.3.4 Wildlife Habitat

Wildlife Habitat Quality is a component of the N.H. Wildlife Action Plan (NHWAP), which has mapped areas statewide for intrinsic habitat quality and condition. Tier 1 areas are considered the best in the state; Tier 2 areas are best in the bio-region; and Tier 3 is designated as supporting landscapes that act as a buffer to protect the integrity of the first two tiers.

The Town of Groton has a significant amount of highest-ranking to high wildlife habitat with rich biological diversity, high-value landscape, and low human influence. Loss of habitat is one of the biggest threats to species. Preventing and/or carefully planning and regulating the following uses can significantly protect habitat: motorized recreation use and future build-out, including residential and business; infrastructure build-out and the installation of renewable and non-renewable energy sources and communication infrastructure. Averting habitat destruction must be a priority for Groton decision makers.



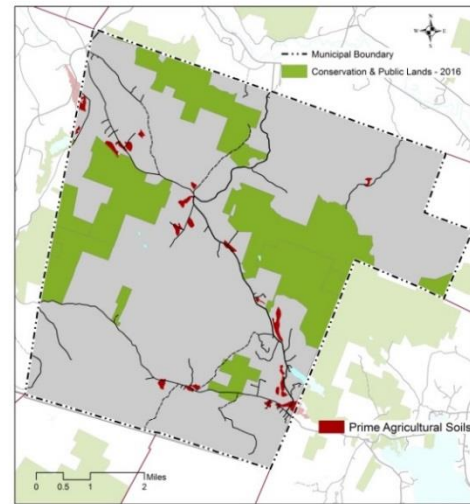
Habitat Quality

Habitats in Groton include a large amount of mixed pine/hardwood, northern hardwood-conifer, lowland spruce-fir and floodplain forests, grasslands, cliffs, rocky ridge or talus slope, wet meadow/shrub wetlands and peat lands. Many common species use these habitats including white tailed deer, moose, black bear, gray fox, and American crow, to name a few. The lowland spruce-fir habitat and dense hemlock forests provide prime deer wintering areas, which are critical for this common species to survive harsh winters.

3.2.3.5 Most Productive Farming & Forest Soils

Prime Agricultural Soils are scarce statewide, comprising only about 6.5% of the state's land area, and typically occurring in small and scattered pockets of soil. The 6.5% figure relates to two NRCS classes of agricultural soils: prime agricultural soils (the best soils), and soils of statewide significance (second tier but also productive), at 3.5% and 3%, respectively.

Prime farm soils are shown in maroon on the Groton map to the right. Most of these areas in Groton are already developed for non-farm land uses. Where productive farming soils still exist, it is important to consider the potential for future local food production as one of several conservation priorities in our Town.



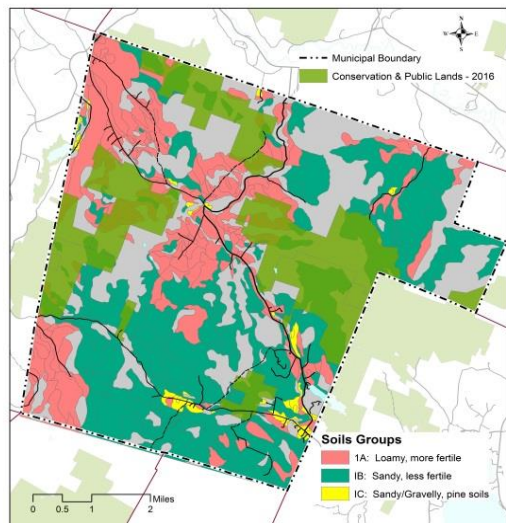
Prime Farm Soils

Most Productive Forest Soils provide economic income for the Town, while also providing timber harvests and sustainable income for both landowners and those working in the forest products industry.

The productivity of forest soils is an additional consideration for ecological significance since productive soils tend to exhibit more diverse natural communities and for recreational benefit, because most of these lands in Groton are open for hunting, hiking, fishing, and snowmobile use.

Annual Taxable Timber Harvest

A good measure of the economic benefit to Groton that commercial forestry provides is the stumpage value generated through the state Timber Tax Program (RSA 79: 10-12). Through this program the town is eligible to receive 10% of the stumpage value cut in the town. Between 2012 and 2016 the value of the timber tax for Groton was \$48,281.96.



Productive Forest Soils

The map to the left ranks soil groups in Groton:

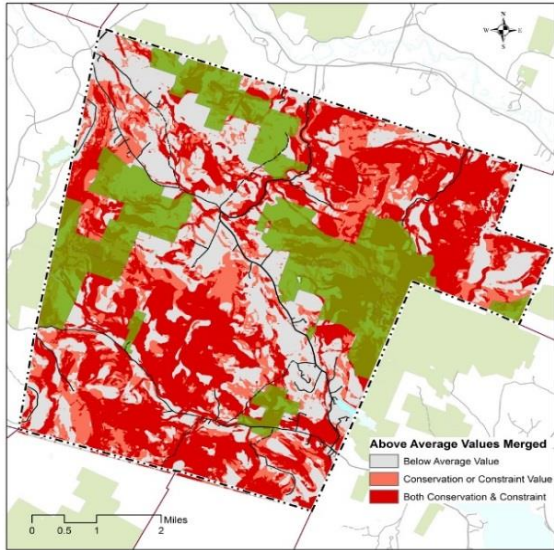
- 1A – Loamy, more fertile (in pink)
- 1B – Sandy, Less fertile (in dark green)
- 1C – Sandy/Gravelly, pine soils

3.2.4 Interpretation

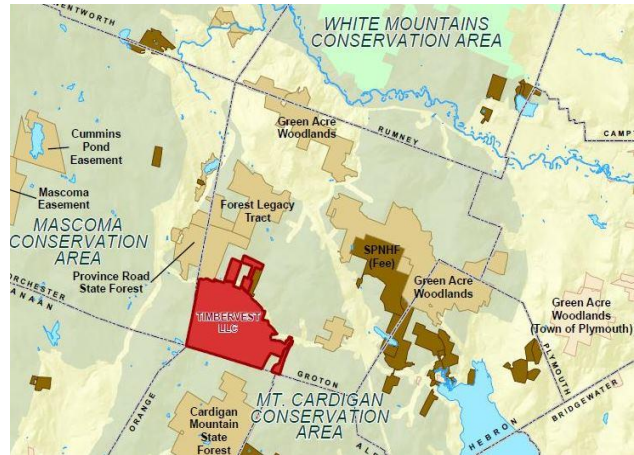
A review of the various natural resources highlighted in the previous section provides an idea of which factors are aggregating to co-locate. To assess how well the natural resource features considered in the analysis are currently protected from unsuitable development, the map on the next page shows the co-occurrence values overlaid with conservation and public lands in green. The green color is somewhat transparent, so the darker colors of the co-occurrence map can be seen, giving an idea of where high-value resources are conserved.

Generally, many of the high-elevation areas in the northeastern and southeastern section of Groton are protected by the holdings of SPNHF and Green Acre Woodlands. Groton's western side is well protected by Mourning Dove Holdings, Province Road State Forest and the Oct 2017 purchase of Kimball Hill by the Nature Conservancy. (See map below)

Only those resources in the Cockermouth River valley and the central area of the Town - Jewel Hill and JH Tree House properties - have no permanent protection. This area is of particular concern, with several tributaries draining directly into the Cockermouth River.



Areas of High Development Constraint and High Conservation Value



3.2.5 Summary of Natural Resources

In making decisions important to community planning and/or conservation planning in Groton, considering the existing level of resource protection is critical. **Table 1** on the next page summarizes the area of each resource feature, as well as its permanent protection as off year-end 2017. All finalized conservation transactions have been included in the analysis that the table represents. The statistics, of course, will change as more land comes under permanent protection.

The natural question when looking at resource protection figures is: *How much is enough?* One perspective is to consider how critical a particular resource is to the eco-system services (Eco-system services are community benefits provided by natural systems functioning at peak performance, such as clean water from forested watersheds, flood storage in floodplains and wetlands, etc.) provided for human use. Drinking water is an obvious critical factor. Prime forest soils may not seem as important as other resources, yet its economic value and many ancillary benefits prioritize protection and suggest sound planning for Groton's future. Finally, when thinking about water quality, several resource features deserve elevated attention, including protection of riparian buffers, wetlands, floodplains, aquifer areas, and steep slopes with highly erodible soils. Protection of these critical resources will yield the greatest benefits.

Summary of Natural Resources Extent and Protection Status -- 2016

Description	Total Acres	Percent Land Area	Acres Protected	Percent Protected
Slopes > 25%	6,693	25.7%	1,671	25.0%
Slopes 15% - 25%	9,077	34.9%	2,148	23.7%
Highly Erodible Soils	20,290	77.9%	4,830	23.8%
Aquifer	605	2.3%	25	4.1%
Floodplain	175	0.7%	1	0.3%
Wetlands (Hydric Soils)	634	2.4%	120	18.9%
Riparian Buffers	2,981	11.4%	563	18.9%
High Quality Wildlife Habitat				
<i>Tier 1: Best in State</i>	11,622	44.6%	3,249	28.0%
<i>Tier 2: Best in Bio-region</i>	4,510	17.3%	1,212	26.9%
<i>Tier 3: Supporting Landscapes</i>	7,061	27.1%	1,183	16.8%
<i>Total</i>	23,193	89.1%	5,645	24.3%
Productive Forest Soils	16,713	64.2%	2,738	16.4%
Prime Agricultural Soils	232	0.9%	5	2.2%

Section 3.3 Implications, Goals and Objectives

Preserving rural character and the Towns environment and natural resources is the highest priority for the residents of Groton, as is controlling rising taxes. Contrary to general belief, planning for development, balancing growth and preserving land does not automatically equate to a revenue loss for the Town or a failure to use land in its “highest and best” use. Development is a double-edged sword. It broadens the tax base, yet at the same time, it puts an increased burden on the tax base with the inevitable need for infrastructure and other community services. That pattern emerged from Groton’s 1997 Cost of Community Services study, (See **Appendix D**) concluding that the tax revenue from residential property was insufficient to pay for the services residents demand or need. In other community services studies during the same period, the findings confirmed that undeveloped open space and some business uses provided more direct income to the towns than they required in services, thus underwriting the costs of residences.

In addition, a 1999 study by the Society for Protection of New Hampshire Forests showed that open space could be a positive economic factor, generating 16% of New Hampshire’s jobs, 35% of state and local taxes, and 25% of New Hampshire’s gross state product through activities such as forestry, tourism, hunting, fishing, recreation, vacation homes, and agriculture. The forestry study compared the costs of open space land, business development, and residential development for 11 New Hampshire towns. For every tax dollar those towns earned, they spent \$1.08 on residential areas, \$.39 on business areas, and

\$.52 on open space areas. In other words, trees don't call ambulances, send children to school, or demand other town services.

3.3.1 Planned Development

3.3.1.1 Land Suitability Goal

Land planning decisions and Groton's growth should be made using a GIS-based land suitability analysis, which designates areas of the Town as appropriate or least suitable for residential build-out, business development or conservation/recreation.

3.3.1.2 Land Suitability Objectives

1. Co-occurrence maps should be used as key decision-support tools when approving and /or rejecting subdivision and other land use applications and appeals, permits and building applications
2. Town Boards and commissions should require applicants and appellants to identify a parcel's mix of natural resource characteristics in order to determine if the parcel, or parts thereof, should be developed, excluded from development or undergo only low density or restricted development
3. Land with less environmentally and culturally sensitive values, can be designated as more suitable for higher density development and/or low impacting business use (as long as the business is consistent with the character and aesthetics of the surrounding area)
4. All Town officials should support the Conservation Commission to conduct a Natural Resource Inventory (NRI) to establish conservation focus areas for future conservation efforts
5. As part of the NRI, Town officials should encourage and support surveying wetlands or other special areas to identify rare or threatened plant and animal species and exemplary natural communities
6. Town officials should encourage land owners to conduct detailed property inventories for exemplary natural communities, rare, threatened or endangered species and other wildlife habitat features

3.3.1.3 Town Growth Goal

To use traditional zoning and innovative land use controls under RSA 674:21 to promote planned, orderly development consistent with land suitability and the Vision and Principals of this Master Plan.

3.3.1.4 Town Growth Objectives

1. Promote a well-balanced land use pattern that is aesthetically pleasing and capable of meeting the stated community priorities of protecting Groton's small town rural character, its natural resources and scenic beauty.
2. Promote holding land in current use, however, since that status doesn't permanently protect land or prohibit future development, the Town should consider directing all or a significant portion of Land Use Change Taxes (LUCT) into a reserve fund for purchasing and permanently protecting land identified to have high conservation value.

3. Safeguard lands of natural, cultural/historical, and spiritual significance
4. Zone rural districts suitable for forestry and large lot (50 plus acres) residential development
5. Land use regulations should reflect the resident's preference to see Groton remain as a quiet rural residential community.
6. Preserve Groton's choice of zoning as Rural Residential Development, allowing uses of land non-residential by Special Exception only. When reviewing land use/development applications, particularly before granting a Zoning Special Exception or during subdivision and site plan review, the ZBA and Planning Board should consider land suitability, noise, character, aesthetics, architectural design requirements and preserving scenic sight-lines/views and vistas, ridgelines and mountain peaks.
7. Encourage subdivision applications, which provide flexibility to design a site plan which:
 - locates buildings on the best soils
 - avoids building on moderate and steep slopes
 - has a minimum of a 50% set aside of common open space placed in conservation easement
 - uses efficient roadway and utility patterns
 - preserves scenic views and retains natural site amenities such as vegetative buffers around water resources
 - avoids single point of ingress/egress roadways
8. Guide growth at a rate consistent with the Town's ability to absorb it, with minimal adverse effect on the Town's natural resources, infrastructure, services, and taxes.
9. Groton's present zoning, Rural Residential Development, allows uses of land primarily non-residential by Special Exception only. Research if this zoning should be amended and use of overlay zoning or district zoning designations should be established.
10. Consider establishing a position for a Land Use Enforcement Officer, designated to act under the direction, and as the representative, of the Planning, Zoning and Select Boards to enforce Groton regulations and zoning, including but not limited to building and driveway permits, subdivision, site-review, excavation, and zoning regulations.

3.3.2 Natural Features/Resources Goal

To preserve, protect and enhance the Town's environment and natural resources.

3.3.2.1 Forestry Objectives

1. Incentivize landowners, forest professionals and loggers to exercise best management practices before, during and after the timber harvest
2. Promote extensive connected forest habitats for plants and animals pressured by development
3. Promote rare habitats for a diverse array of plants, animals, and micro-organisms

4. Protect and enhance the natural benefits that open space/forests provide: clean water and air, natural ecological processes and habitat, flood and erosion control, and carbon sequestration to combat climate change.
5. Consider developing Forestry Protection Overlay Districts to help guide development where this resource is present.

3.3.2.2 Earth Products Objectives

1. Develop erosion and sedimentation control provisions for Groton's Subdivision Regulations
2. Require reclamation plans of all new gravel permit applications and existing permits as applicable
3. Evaluate the adequacy of current earth removal regulations and update and amend them as needed
4. Project where future excavations are suitable to occur and zone accordingly
5. Limit excavation or require extra safeguards when in close proximity to water resources and environmentally sensitive areas
6. Include in the permitting process consideration of visual impacts on residential sight-lines/views by earth products operations

3.3.2.3 Water Resources Objectives

1. Consider developing Water Resource Overlay Districts to help guide development where this resource is present. Examples include:

Wetlands Conservation overlay—this district would protect wetland resource areas and is defined by the presence of poorly and very poorly drained soils. It should define permitted uses that include forestry, agriculture, wildlife habitat development and conservation and open space area. This section should also reference Critical Wetlands that were specifically field located and mapped. Development is not permitted within the wetland area or within a 100-foot buffer around the wetlands. Aquifer Conservation District—this district would protect groundwater resource areas. It should define prohibited and permitted uses, establish specific standards for maximum lot coverage, drainage, and nitrate loading. It also requires a hydrogeological study for larger subdivisions and commercial proposals to evaluate the development's impact to groundwater.

Flood Hazard Areas—this overlay district is based on the model ordinance by the National Flood Insurance Program which Groton adopted at the March 2000 Annual meeting and all Maps and revisions/amendments thereto issued by FEMA. The article establishes standards for the site and construction of structures within the 100-year floodplain.

2. Develop separate stream corridor regulations to protect the riparian buffers along first, second and third order streams and rivers
3. Enforce the SWQPA regulations for the Cockermouth River and Spectacle Pond, both of which fall under its jurisdiction.

3.3.2.4 Steep Slopes Objectives

1. Consider implementing a Steep Slope Ordinance, setting out development/performance criteria which ensures the protection of the environment and abutting properties. The ordinance should also consider police, emergency vehicle and other public access requirements
2. Consider implementing a Steep Slope Ordinance, setting out the following application requirements:
 - Uses that will cause more than one acre of site disturbance must show the area subject to site disturbance in two-foot contours.
 - An engineering plan will be prepared by a professional engineer that shows specific methods that will be used to control soil erosion and sedimentation, soil loss, and excessive storm water runoff, both during and after construction.
 - A hydrology, drainage, and flooding analysis will be included that shows the effect of the proposed development on water bodies and/or wetlands in the vicinity of the project.
 - A grading plan for the construction site and all access routes will be prepared.
3. Consider implementing a zoning regulation that excludes areas with slopes greater than 25% as part of the land area required to satisfy the minimum lot size requirement.
4. Slope is the degree of deviation of a surface from the horizontal, measured and expressed in percent or degrees; rise over run. Revise the subdivision and site plan regulations to require applications and plot plans to clearly show the parcels gradient levels.
5. Consider implementing a Steep Slope Ordinance, setting out density restrictions which apply to all areas with a slope greater than 15 percent, as shown on the town's steep slopes map, and where the proposed site disturbance is greater than 15,000 square feet.

3.3.2.5 Special Vistas, Scenic Areas, and Ecological Resources Objectives

1. Groton should survey the Town's resources using either the Visual Resource Management strategy developed by the United States Bureau of Land Management, or a similar tool. Location of special vistas, scenic areas, and ecological resources should be shown on a Visual Resource Map
2. Consider implementing regulations in the form of Visual Resource Protection Overlays or a Zoning Ordinance which protects the scenic and ecological resources associated with lands characterized by high elevations, steep slopes, and visual sensitivity. The enactment should include application requirements, design criteria and performance standards.

ARTICLE 4. ROADS

Groton's roads are a mixture of paved and gravel ways, identified according to the state administrative classification system as the chart from 2017 indicates:

Class	Description	Lane Miles
0	Private Roads	14.968
II	Secondary Roads	16.578
V	Local Roads	22.968
VI	Local Not Maintained	6.554
TOTAL		61.068

The administrative classification system, presented in RSA 229:5 of the New Hampshire State Statutes, defines governmental responsibilities for construction and maintenance purposes, authorizing towns/municipalities to spend money to repair Class IV and V highways, not Class VI or private roads.

Appendix E sets out a listing of Groton roads and their classification.

A town's roads and highways are a means of access to work, shopping, leisure activities and home. They must also support access for first responders and fire/other emergency apparatus. They should allow the safe, convenient, and efficient movement of pedestrian, bicycle and vehicle traffic within and through the community, while discouraging through traffic on residential roads. Lastly, in planning for weather related and other natural occurrences, road construction should enhance storm water management, while the layout of roads should provide ingress and egress by connecting secondary roads wherever possible and practical. Roads that do dead-end, should not be longer than one thousand (1000) feet and must provide turn-around points and a cul-de-sac having an outside roadway diameter of at least one hundred thirty (130) feet, except where geographic constraints require an alternative design.

Section 4.1 Implications, Goals and Objectives

Existing and future road characteristics and conditions have important implications for the future.

- Access to a particular area via the roadway network creates the potential for development.
- Roadway maintenance and reconstruction expenditures usually represent a substantial item in the municipal budget.
- Significant bio-diversity and environmental damage, along with wildlife habitat can be destroyed/disturbed by a road network that results in fragmentation of land, disturbance of natural resources, and/or damage from erosion resulting from construction effecting steep slopes.
- Significant public safety issues and access for first responders, fire and emergency apparatus may occur if Groton's network of roads (private and public) are poorly planned, constructed and maintained.

The objectives below recognize the need to develop a transportation infrastructure for motorized and non-motorized users alike, which is safe, convenient, and accessible, while maintaining Groton's rural character.

4.1.1 Road Goal

To provide an adequate, scenic and well-maintained road system that will facilitate the safe movement of pedestrians and motorized and non-motorized traffic, and that will continue to provide access to existing land use as well as support future land use without causing bio-diversity destruction of plant, wildlife habitat or other environmental damage.

4.1.2 Road Objectives

1. To better manage road drainage and runoff issues and wherever possible and practical eliminate erosion by minimizing and controlling the number and location of future points of road entry/driveways (curb cuts) to said roadways.
2. To encourage and facilitate safe pedestrian and bicycle movement throughout the town.
3. To promote compatibility between future growth, land use and road expansion by:
 - encouraging housing and commercial development in areas which can be supported by the existing roadways, and
 - regulating Groton's road network to maintain and enhance the scenic and rural character of the Town by preserving existing stonewalls, requiring vegetative buffers and development set-backs, and perpetuating gravel surfaced roads and scenic/country lanes where appropriate.
4. To maintain and support, where practicable, Groton's plan and schedule of repairs, maintenance and improvements for the Town's roads and bridges, which includes adequate funding for personnel, materials, and equipment.
5. To seek to meet the current subdivision plan specifications regarding road construction while always prioritizing, where practical, the maintenance of Groton's rural character.
6. To seek to meet (D.O.T.) Department of Transportation standard specifications for road and bridge construction, according to the latest edition of the policy and procedures for driveways and other accesses to the state highway system, while always prioritizing, where practical, the maintenance of Groton's rural character.
7. To incorporate best management practices (BMP) for road construction, repairs, maintenance and improvements for the Town's roads and bridges.
8. To plan for weather related and other natural occurrences, road construction should enhance storm water management, while the layout of roads should provide ingress and egress by connecting secondary roads wherever possible and practical.
9. To ensure the safety of residents, roads that do dead-end, should not be longer than one thousand (1000) feet and must provide turn-around points and a cul-de-sac having an outside roadway diameter of at least one hundred thirty (130) feet, except where geographic constraints require an alternative design.

ARTICLE 5. HISTORICAL AND CULTURAL RESOURCES

A master plan tends to emphasize those factors that influence the physical growth and economic status of the town. Woven into the fabric of the community, however, are the historical and cultural resources that work to make the community a better and more enjoyable place to live and help to define a sense of place. This section was prepared in recognition that historical and cultural resources play a critical role in our town's identity and quality of life. Knowledge and preservation of these assets will make us more richly human in our private lives, wiser in our public choices, and inform future planning.

Section 5.1 Historical Overview

Settlement of the Town. Groton originated from the Cockermouth Grant given in 1761 by King George III to Governor Benning Wentworth. Charters for the settlement and improvement of the territory were granted to several proprietors: George Abbott followed by John Hale. However, the settlement of the Town did not comply with the charter requirements until 1770, under Phineas Bennett, James Gould, Ebenezer Melvin, Jonas Hobart, Samuel Farley and others.

The territory grew rapidly and by 1773 the population was 107, climbing to 178 by 1775. In 1776, the year of independence from Great Britain and the founding of the United States, Cockermouth was already moving toward a time of prosperity. The first sawmill was built in 1771, followed by one in North Groton and the first gristmill on Cockermouth brook. An iron foundry and a distillery were also in operation in the late eighteenth century. Groton was also an agricultural town with land used primarily for select crops, grazing sheep and forestry. The principal crops were corn, oats, potatoes, and buckwheat. A larger portion of the territory was managed as woodlots, mainly beech, birch, maple, ash, spruce, and hemlock, making lumber production an important industry through the nineteenth century (Child 1886:288-289).

Many of the earliest settlers came from Hollis, NH, a territory created by lands subdivided from Groton and Dunstable MA. That heritage led to renaming Cockermouth to Groton in December 31, 1796 with the act of Town incorporation.

By mid-19th century, Groton had a population of 776 with eight school districts and seven common schools. There were two villages. Groton was located in the southeastern part of the town on Cockermouth Brook, with three saw- and shingle-mills, a blacksmith shop, a doctor's office, and about 20 dwellings. North Groton, was on Hall's Brook, where a white clap boarded church (North Groton's Union Meeting House) shared by the Congregationalists and Baptists stood, along with a store, a machine shop, a saw- and shingle-mill, a blacksmith shop, and numerous dwellings. During this period, two mills opened along Clark Brook in Groton Hollow. B.P. Hard's mill, built in 1865, was manufacturing ice hooks, hoe handles, and framing pins, while Charles Spaulding operated a lumber mill that produced one million square feet of lumber per year.

As a thriving and productive Town in the nineteenth century, Groton's system of roads made commerce possible. Groton was a major mica-producing district in the county (Child 1886:289-290) and as one of the oldest pegmatite locations in New Hampshire, the Town's history as a mica and feldspar region for over 120 years was the flower of New Hampshire's mineral wealth.

By 1900 however, as with many hill towns, the population had dropped to around 500 (U.S. Census 1900a). By 1930 the population had declined to just over 200 people living in 41 dwellings, but farming and mica mining continued (U.S. Census 1930a).

Palermo Mine

The Hartford Mining company provided significant work for locals, after they opened and operated the first mine from 1878 to 1888. Later, the Palermo Mining Company of New York bought it, operating "Palermo Mine." until General Electric bought the mine in 1898, working it during the two World Wars. Known as the GE Mine, it produced muscovite, microcline and beryl. The name reverted to Palermo Mine when the Ashley Mining Corp. leased it from GE from 1945 to 1958.

Section 5.2 Public Buildings

Many Groton residents view the rehabilitation and continuing use of local landmarks as essential to the identity of the community. Architecture is a direct and substantial representation of history and place. By preserving historic structures, we are able to share the very spaces and environments in which the generations before us lived. Historic preservation is the visual and tangible conservation of cultural identity.

In addition to solidifying a community's past, preservation can help strengthen a community's present and future. Historic buildings help create vibrant, cultural settings that can be the centerpiece of community life: a place to gather, discuss and decide relevant policy and Town direction or a place to be entertained, learn and generally strengthen community ties.

Groton Town House. The Groton Town House has served the town as a location for town meetings and other gatherings, with the exception of a 5-year period between 1997 and 2002, since its completion as a meetinghouse in 1797. Prior to the construction of the meetinghouse, both town meetings and public worship were held at private houses, barns, or the tavern of Abraham Buell; the locations for these gatherings voted upon at town meetings.

The Town House as it exists today is a portion of the upper or gallery level which would have extended around three sides of the building to provide good views of the pulpit. In eighteenth-century meeting houses, the gallery pews were box-like enclosures that were privately owned, auctioned off to raise the funds necessary to erect the building.

Today, no collective memory or photos of the appearance of the original building exists, nor are there historical records to explain why the meeting house dimensions were twice changed. The conversion was achieved by removing the bottom of the meetinghouse frame and lowering the upper half to rest on the foundation. The second alteration of the building occurred in 1906-07 when one end was removed, shortening the town house by about twenty-one feet. Before the reduction, it had a floor plan measuring forty-two by fifty-three feet, as stipulated by vote of the assembled on December 22, 1794.

Yet during a record and structural examination in 1998 by James Garvin of the NH Division of Historical Resources, documentation and physical evidence left no doubt that Groton's meetinghouse was a once stately two-story structure, typical of meetinghouses built in thriving eighteenth century communities.

The reduced building remained in use until 1997 in essentially the condition in which it was left in 1906-7, and although "modernized" with privies in 1921 and electricity in 1940, the building continued to be heated by wood-stove. The meetinghouse ceased to be used for town meetings in 1997 because of noncompliance with present day fire code provisions, but these deficiencies were remedied. Because of its rarity as a building type and its symbolic association with over two hundred years of community life and government, the Groton Town House underwent a three-phase restoration/construction process and was returned to public service as a Town Meeting House. It now serves as Town and Police offices and continues as the site of debate, decision-making, and community gatherings for the people of Groton.

Schoolhouse No. 4. In June of 1995, the GHS bought the North Groton 1839 Schoolhouse No.4 to restore it. Architectural historians and preservation consultants advised the GHS how best to proceed, and for two decades, the cycle of fundraising and restoration continued.

During this time, the GHS collections of artifacts, genealogical files and photos grew. One of the most notable treasures is the church bell, weighing 1,000 pounds. Cast by Henry N. Hooper in 1858 in the iron foundry acquired from Joseph Revere, son of Paul Revere, the bell originally hung in the tower of North Groton's Union Church.

This modest, one-room schoolhouse served only a one- to three-mile radius when first constructed since that was all that a youngster could be expected to walk. While fulfilling its intended roll in education was

important, the school schedule was fashioned around harvest time and spring planting time. When in session, a single teacher taught academic basics to several grade levels of boys and girls, and managed duties of teaching and running the class-day by relying on the older children to fetch wood and stoke the stove that warmed the students. The very last class to graduate from School No. 4 in 1940 must have done so with bittersweet feelings, excited for their own futures, yet knowing their beloved school that had existed for 101 years was closing. Little did they know that School No. 4 would also have a future.

Section 5.3 Implications, Goal and Objectives

Groton's historical and cultural resources are but one part of the Town's total resources. Like many other nonrenewable assets, they are capable of being preserved or vanishing with a single action. The progression of time has already overshadowed many of Groton's historical and cultural resources. The buildings that have been preserved (Schoolhouse No. 4 and Groton's Town House), along with mining sites, cemeteries, artifacts, photos and documents embody the sacrifice and privation through which earlier generations created and bequeathed a valuable legacy to the present generation, they are all worthy of preservation. For the Town's benefit, the Groton Historical Society (GHS) has spearheaded all of the efforts, 'preserving Groton's past for the future,' helping to save our beloved Town House and restoring Schoolhouse No. 4 for use as a museum for the many donated artifacts, genealogical files and photos that enrich the Societies collections. The GHS also conducts programs promoting a wider knowledge of town and state history. Without this group, our historical knowledge, which is no more and no less than carefully and critically constructed collective memory, along with preserved physical structures and objects, would forever be lost to Groton residents.

5.3.1 Preservation Goal

To preserve and protect the Town's historical buildings, sites, features and cultural heritage.

5.3.2 Preservation Objectives

1. Encourage historic preservation so that Groton's heritage is carried forward.
2. Continue to fund the Groton Historical Society. The Groton Historical Society's (GHS), mission to preserve Groton's past for the future, makes this non-profit organization a valuable Town resource and partner to affect our historical and cultural preservation goal.
3. Encourage the erection of markers, under the State Historic Marker Program, as a good way to inform residents and visitors about significant people, places and events in Groton's past.
4. Designate select Groton roads as scenic per RSA 231:157. New Hampshire State law enables a community to designate any road as scenic unless it is a Class I or II highway.
5. Consider adopting innovative land use controls. RSA 674:21 gives communities authority to adopt a variety of controls that may support the preservation of community character.
6. Consider the acquisition of important historical sites, such as many of the mine sites, cellar holes, ETC. for conservation and preservation purposes in limited but critical cases.
7. Investigate protection measures for Groton's Class VI and abandoned roads, which were often the location of historic development, and which today can serve as recreational trails.
8. Preserve and maintain the five (5) Town cemeteries as well as locating and documenting private burial grounds. The Town cemeteries are Rolfe Hill Cemetery, Union Cemetery, River Road Cemetery, Kimball Hill Cemetery, and Bailey Hill Cemetery.

ARTICLE 6. TAX BASE

The tax base of a town is the measure upon which the assessment or determination of tax liability is based. It refers to that pool of assets -- houses and /or real estate, businesses and utilities, ETC. -- that is the collective value of all taxable interests in a community. The economic health of a town rests upon its tax base and is essential to both its overall well-being and its future. If planning officials fail to understand the value of a diversified tax base, residents alone will carry the full liability. With population growth and rising costs of community services, the town may become vulnerable, subjecting residents to ever-increasing property taxes.

Planning officials, however, need to be realistic in efforts to promote a diversified tax base and alert to other metrics that can play a significant part in the town's well-being. The suitability for business development relates directly to Groton's location, population, topography and natural resources, proximity to major transportation corridors and the region's vitality as a whole. In addition, what a business pays in taxes indicates only at what level that business is tax bearing. Planning officials must also compare the tax generated to the expenses (cost of community services) required by that particular land use when analyzing if it is tax positive and will help to keep taxes low.

Lastly, officials should only permit future development after considering parcel suitability and balancing land uses to ensure the development is appropriate and complimentary to one another. A significant driver that should inform every decision to provide special exception, issue building permits and allow future development is the Vision and Principles of this masterplan and the stated preferences of its residents. They are grounded in the mapping and analysis tools discussed in the body of the Plan and incorporated and attached, which identify areas in Groton that are more or less suitable for development based on natural resource features that acting as constraints to development. Every region of Groton, each parcel of land has its own suitability for development, while other parcels are unsuitable, development leading to negative environmental and/or aesthetic impacts. The variables that determine the suitability of a parcel for development include, among others; soil characteristics, topography, water resources, wildlife and vegetation, as well as consideration for noise, fire and public health and safety. Retention of the quite small town rural character of Groton, preservation of the environment, the forested expanses, water resources, diversity of plant and wildlife and the beautiful mountain ridgelines must always be central controlling factors with every decision.

Section 6.1 Historical Prospective - 1997 Cost of Community Services Study

To consider how to diversify its tax base and better understand the relationship between economic base and land use decisions, Town officials conducted a Cost of Community Services study in 1997, See **Appendix D**. The study compared the costs of providing infrastructure and other public services (cost of services) to different types of land uses, such as commercial/industrial, residential, and open space. It also characterized the land use as tax positive or tax negative; asking if the tax revenues the land use provides were more or less than the costs of services it requires.

The general pattern of this study, as well as similar studies conducted elsewhere in NH, is that the income from residential property is insufficient to pay for the services that residents demand or need. Undeveloped open space and commercial/industrial land use provide more direct income to their communities than they require in services, thus underwriting the costs of residences. A study focusing on the impact of open space, conducted in 1994, that analyzed statewide data, concluded on average, that property taxes are higher in communities with larger tax bases and more taxable property, more residents and more commercial/industrial development. Conversely, property taxes are lower in towns with more undeveloped land per year round resident. The study also documents that vacation housing has a

measurable economic benefit. (Ad Hoc Associates (1994) Building a Healthy Squam Lakes Economy, Salisbury VT 05769).

However, other community studies indicate that short and long-term negative economic impacts of commercial/industrial land use were missed in the simplification of this type of study. Further detailed research is needed of the impacts of various land uses in Groton, particularly in consideration of our largest businesses (see table 2) as well as other changed land use in Groton (increased current use/conservation). The potential cost of exigent (among others, police and fire emergencies) and decommission factors that are associated with having high-risk industries (Dynamite/explosives storage and Industrial wind turbines) as part of Groton's tax base could change the ratios and result in different outcomes. Several other factors crucial to consider include the cost to the community of reclaiming damaged/contaminated lands, reduced assessments on residential property, fire and rescue costs, as well as negative aesthetics that might affect community character. These dynamics to a calculation of the costs of services these land uses require could eliminate or at the very least decrease, the advantage of what appears to be high tax bearing/tax positive land use.

6.1.1 Tax Base as of Year-End 2016

Since our town, and most of our neighboring communities have low populations, are rural, forested and hilly; we can expect that business development will definitely not take the form of big-box retail strip mall development, or restaurant choices, professional offices, medical or smaller retail establishments.

Table 2 displays Groton's business tax base as of year-end 2017

Large National/Multi-National Businesses	Product/Service	Employees	Established
Managed Forests	Logging		
Maxam North East LLC	Dynamite/explosives	2 -5	2008
Groton Wind LLC (AvanGrid Renewables a subsidiary of Iberdrola)	Wind Energy Facility 48 Megawatts	6	2012
Electric Utilities	Power Transmission Infrastructure & Lines		
Local Businesses	Product/Service	Employees	Established
Madden Auto Service LLC	Auto Repair	1	2015
Buck-N-Horse Campground	RV & tent sites with trails on 55 acres of woodland	1 or more	2005
Gordon Coursey & Sons LLC	Logging, Land Clearing Log Home Building	6	1975
Ethier Excavating and Blasting	Excavation, land and site development	1-2	1984
TLC Tree & Crane Service	Tree care & removal Land clearing	5	1980
Numerous home-based businesses	Lawn Care & other Service Related		

6.1.2 Profile for Groton's Largest Businesses

6.1.2.1 Groton Wind LLC is a 48 MW project comprised of twenty-four (24), 2-megawatt wind turbines. The project is installed along the north/south boarder of the east side of the town. Each turbine is on a 256 foot tower with each blade measuring 139 feet long, "for a total turbine height from foundation to blade tip of approximately 398 feet" (depending on the foundation size). During the construction phase, the project created roughly 150 specialized jobs. Groton Wind now employs 5-6 permanent employees and continues to provide "local contracts for supplies, maintenance and plowing." **Groton Wind LLC** is a project of **Avangrid Renewables** a subsidiary of **AVANGRID (NYSE: AGR)** and part of the **IBERDROLA Group**, a Spanish public multi-national electric utility company.

The location of the project is suitable in that the project fronts on the commercially zoned area of our adjacent neighbors, and has excellent access to the state primary route and secondary highway systems, disturbing no Town roads classed as V or other public ways (class VI or private roads). Visibly, some of the turbines can be seen from several roads. Perhaps the most controversial view is from the trail system of several regional mountain reserves and Newfound Lake, where a limited number of turbines are within the viewline of hikers, vacationers and residents.

The turbines and connecting maintenance roadways are located on leased land, which when removed from its original current use status gave the Town a one-time Land Use Change Tax (LUCT) of \$236,897. The new designation on the land has also meant an annual net increase in tax revenue for the Town. In addition, rather than being taxed on the infrastructure (turbines) or assessed as a utility, the facility makes a Payment In Lieu of Taxation (PILOT). Beginning when the energy project went online, Iberdrola's contracted obligation to Groton of quarterly payments, billed as follows for 2017: $48 \text{ MW} \times [\$11,845.80 \times 2.5\% = \$12,141.95] = \$582,813.60/4 = \$145,703.40$. While the county tax burden for Groton residents will likely increase because of the wind project, that cost should be more than offset by the PILOT payments, leaving Groton with an annual net gain.

6.1.2.2 Maxam North East LLC, is a privately held company primarily operating in the Explosives business within the Chemicals and Allied Products sector. Public records show it was established in 2010 and incorporated in New Hampshire. They received a special exception in 2008 by the Groton ZBA on their application to site a storage facility on 3,600 acres covering several communities (approx. 723.4 acres are in Groton). This occurred prior to the adoption of Site Plan Regulations, a significant factor since the Planning Board was unable to consider siting guidelines for this project.

A portion of the 3,600 acres that Maxam owns within Groton's borders includes the access road, maintenance and office buildings and a portion of the explosive storage bunkers. A suitable project for Groton because there is no visible or noise disturbance to the Town. As with Iberdrola, the placement of improvements on the property resulted in a land use change and a LUCT payment of \$4,280 with annual tax payments from Maxam generally equaling \$3,000. Maxam is expected to maintain a year-round workforce of 5-10 employees.

Both **Groton Wind LLC** and **Maxam Explosives** are highly tax bearing and appear to be tax positive as well, since the revenues these uses provide are more than the costs of services they require. Yet as we have seen in the previous section, more could be learned by repeating a cost of community services study.

6.1.2.3 Managed Forests. The logging industry's contribution extends across communities and throughout the state by creating and supporting jobs and taxes. Timber harvesting and related trucking, primary manufacturing (e.g., sawmills and wood energy plants), and secondary manufacturing (e.g., construction products, furniture and paper) all are part of the economic bounty of forests. A good measure of the tax benefit to Groton that commercial forestry provides is the stumpage value generated through the state Timber Tax Program (RSA 79: 10-12). Through this program, the town is eligible to receive 10% of the stumpage value cut in the town. Between 2012 and 2016 the value of the timber tax for Groton was \$48,281.96

Forests also provide other benefits. By encouraging commercial forestry, Groton may be able to leverage an open space investment and increase the array of natural, social and other amenity values. The forests function in Groton may then be measured in terms of its beauty, its irreplaceability, its contribution to life support functions or recreational opportunities, or its role in supporting wildlife or reducing environmental or human health risks.

Forests are complex natural system. It is a dynamic ecosystem, defined by the interactions of living organisms with their environment. Although timber harvesting is an essential tool for achieving many objectives, it may also be incompatible with specific goals, such as protecting ridgelines, special vistas and scenic areas, natural areas or preserving habitats for wildlife species. Information on the status of and trends in socio-economic benefits together with statistics on the predominantly environmental and recreational values, is essential in evaluating the complete roll sustainable forest management plays in Groton's tax base.

Section 6.2 Implications, Goal and Objectives

Groton's 2012 resident work session and survey conclusions indicate respondents place little to no importance on encouraging new business opportunities in town, although they do want to keep property taxes to a minimum. Lastly, officials should only permit future development after considering parcel suitability and balancing land uses to ensure the development is appropriate and complimentary to one another. A significant driver that should inform every decision to provide special exception, issue building permits and allow future development is the Vision and Principals of this masterplan and the stated preferences of its residents. They are grounded in the mapping and analysis tools discussed in the body of the Plan and incorporated and attached, which identify areas in Groton that are more or less suitable for development based on natural resource features that acting as constraints to development. Every region of Groton, each parcel of land has its own suitability for development, while other parcels are unsuitable, development leading to negative environmental and/or aesthetic impacts. The variables that determine the suitability of a parcel for development include, among others; soil characteristics, topography, water resources, wildlife and vegetation, as well as consideration for noise, fire and public health and safety. Retention of the quite small town rural character of Groton, preservation of the environment, the forested expanses, water resources, diversity of plant and wildlife and the beautiful mountain ridgelines must always be central controlling factors with every decision.

Two of the most important issues to the residents of Groton are the preservation of the small town rural character of the community, including the traditional look and feel of the town as it currently exists and the natural resources, including preservation of the environment.

For planning officials to accommodate resident preferences while increasing opportunities for growth and diversification of Groton's tax base the following concepts and zoning changes should be considered:

Performance Zoning. This approach to zoning is an alternative to conventional zoning approaches. As opposed to developing a prescriptive zoning scheme, which dictates permitted uses and uses by special

exception, performance zoning allows a wide range of uses, if such uses meet environmental, aesthetic, and other performance standards. In addition to providing specific performance standards, such

ordinances also include incentives for developers to build better projects. Common examples include increased density and other dimensional bonuses in exchange for architectural design features, renewable energy features, and greater landscaping and vegetative buffers, donation of on-site or off-site property for conservation open space and/or public purpose.

Architectural and Design Performance Standards. Architectural design ordinances or guidelines help to ensure projects are more compatible with the community's character. These typically include height and other dimensional scale, landscaping, building façade, color and construction aesthetics including cladding, signage, lighting, as well as location and buffering of the building and parking.

6.2.1 Business Development Goal

To consider limited business development consistent with the Town's needs and the residents stated preferences and in keeping with the Town's ability to provide services.

6.2.2 Business Development Objectives

1. To continue to refine the Town's ordinances and regulations so they are proactive regarding site and architectural design.
2. To evaluate sites for business uses which have safe transportation access.
3. To evaluate and consider business uses which have a development potential rating that will not adversely affect soil characteristics, topography, water resources, wildlife and vegetation. The business must meet decibel, light, and signage standards set during Site Plan Review, as well as having suitable access for police, rescue and fire.

ARTICLE 7. GROTON HAZARD MITIGATION PLAN UPDATE 2014

Section 7.1 Groton's Plan

The Groton Hazard Mitigation Plan Update (the "Plan") was compiled to assist the Town of Groton in reducing and mitigating future losses from natural or human-caused hazardous events. The Plan was developed by participants of the Town of Groton Hazard Mitigation Planning Team, interested stakeholders, the public and Mapping and Planning Solutions (MAPS). The Plan contains the tools necessary to identify specific hazards and aspects of existing and future mitigation efforts.

HAZARD MITIGATION PLAN DEFINITIONS

"A natural hazard is a source of harm or difficulty created by a meteorological, environmental, or geological event."

"Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards (44CFR 201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.

The Plan is an **update** to the 2007 Groton Hazard Mitigation Plan. In an effort to produce an accurate and current planning document, the Planning Team used the 2007 Plan as a foundation, building upon that Plan to provide more timely information. Groton's plan addresses the following natural hazards and human-caused hazards.

Natural Hazards

- 1) High Wind (Windstorms)
- 2) Flooding (Heavy Rain & 100-Year Events)
- 3) Severe Thunderstorms & Lightning
- 4) Tornado or Microburst
- 5) Flooding (Beaver Dams)
- 6) Flooding (Local Roads/Erosion)
- 7) Wildfire
- 8) Expansive Soils (Potholes)
- 9) Hurricane
- 10) Hailstorm
- 11) Flooding (Dam Failure)
- 12) Extreme Temperatures
- 13) Severe Winter Weather

- 14) Snow/Ice Slide
- 15) Earthquake
- 16) Drought

Human-Caused Hazards

- 1) Extended Power Failure
- 2) Hazardous Material-Transport
- 3) Epidemic & Pandemic
- 4) Hazardous Material-Fixed Location
- 5) Terrorism

Section 7.2 Implementations, Goals and Objectives

The Plan is an important document; the drafting participants considered many factors before prioritizing the mitigation and emergency strategies. They analyzed Groton's geographic location, topography and forested lands, to arrive at future natural disaster occurrence projections in Groton. Additionally, the planning participants reviewed the frequency and type of disasters the Town has been impacted by, including but not limited to flooding, lightning strikes, extreme temperatures, severe winter storms, severe wind and hurricanes.

They also recognized that potential exists for tornado, wildfire, and earthquake damage. Finally, the planning participants identified **Hazard Material-Transport** as the primary future human-caused hazard, due to materials being carried through town to the Maxam Explosives storage depot on Groton's steep, narrow and dark roadways.

The Plan of 2014 is a preparedness/planning tool to use to reduce future losses from natural and human-caused hazards as required by the national Disaster Mitigation Act of 2000. The Plan does **not** constitute a section of the Town's Master Plan, however, mitigation and emergency strategies from the Plan should inform Master Plan updates, and as such, the Planning Board will consider specific concerns during its planning process and decision-making.

7.2.1 Hazard Mitigation Goal

To reduce Groton's exposure to natural and human-caused hazards.

7.2.2 Hazard Mitigation Objectives

1. To introduce and implement effective hazard mitigation measures identified in Groton's Hazard Mitigation Plan of 2014 to accomplish the Town's Goal.
2. To remain informed of the mitigation and emergency strategies from the Plan and as necessary, planning decisions will incorporate mitigation elements.
3. Of the Plan's identified priorities for the Planning Board to address, the following (taken directly from the Plan) are ranked highest:
 - *Problem Statement: No ordinances currently exist that restrict or prohibit development in steep slope areas and other areas of town that are difficult to reach. Action Item - Establish a steep slopes ordinance to restrict and/or prohibit development in difficult to reach areas in order to maintain safe access for fire apparatus to wildland-urban interface neighborhoods and properties and to mitigate storm-water run-off, flooding and erosion.*
 - *Problem Statement: Emergency response to residential homes in remote and difficult access areas is often hampered by design of driveways. Action Item - In order to maintain safe access for fire apparatus to wildland-urban interface neighborhoods and properties, establish driveway standards that address slope, width and access.*
 - *Problem Statement: Subdivision regulations do not address any requirements for onsite water storage, minimum fire flow, or fire breaks in wildland-urban areas. Action Item - Develop new subdivision regulations to require onsite water storage, minimum fire flow and/or fire breaks in the Wildland Urban Interface.*
 - *Problem Statement: The Water Resource Plan has not been referred to as a guiding document when reviewing subdivision regulations. Action Item - Obtain a copy of the Water Resource Plan from NCRC&D and encourage referral to Water Resource Plan and maps when reviewing subdivision proposals.*

ARTICLE 8. IMPLEMENTATION

According to RSA 674:2, III, the master plan may include the following section:

“..(m) An implementation section, which is a long range action program of specific actions, time frames, allocation of responsibility for actions, description of land development regulations to be adopted, and procedures which the municipality may use to monitor and measure the effectiveness of each section of the plan.”

This section will assist the Planning and Select Boards, as well as other town officials to oversee the completion of the suggested implementation actions. Each of these actions has been assigned a general timeline and a responsible department/board to assist with future evaluation of the progress on these tasks. A chapter reference has also been included to tie these actions back to their corresponding chapters.

This section of the master plan is dynamic and should be reviewed and modified as needed.

<i>Implementation Action</i>	<i>Time Period</i>	<i>Department/Board</i>	<i>Chapter Reference</i>
Form a citizen committee to assist the PB to review existing regulations (Excavation, Subdivision, and Site Plan) along with Groton's Zoning. The committee's charge is to 1) Research traditional zoning and innovative land use controls under RSA 674:21 2) Recommend to the PB revisions and/or new regulations and zoning which can accomplish a planned, orderly development of the Town, consistent with land suitability and the Vision and Principles of this Master Plan.	1 year	Planning Board	Art. 3 LAND USE
Groton's current zoning, Rural Residential Development, allows uses of land primarily non-residential by Special Exception only. Research if overlay zoning should be added or amendment and district zoning designations established. Should preferred development zones be implemented: a Rural Residential and Rural zone, a Forest District, Business and Commercial Zones?	2 years	Planning Board with Citizen Planning Committee (CPC)	Art. 3 LAND USE

Consider cluster development where a significant percentage of the land area is placed in conservation easement and set aside for common open space	1-2 years	Planning Board with CPC	Art. 3 LAND USE
Consider implementing regulations in the form of Visual Resource Protection Overlays or a Zoning Ordinance which protects the scenic and ecological resources associated with lands characterized by high elevations, steep slopes, and visual sensitivity. The enactment should include application requirements, design criteria and performance standards.	1-2 years	Planning Board with CPC	Art. 3 LAND USE
Implement zoning for ADU consistent with RSA 674:71 - 73	1-2 years	Planning Board with CPC	Art. 2 COMMUNITY PROFILE Art. 3 LAND USE
Consider implementing a Steep Slope Ordinance, setting out development criteria to ensure the protection of the environment, public property & safety, and abutting properties.	1-2 years	Planning Board with CPC	Art. 3 LAND USE
Consider implementing set-backs and frontage requirements for both residential and business development.	1-2 years	Planning Board with CPC	Art. 3 LAND USE
Consider density when planning Establish a minimum lot size, to ensure the preservation of the town's rural character.	Ongoing	Planning Board with CPC	Art. 3 LAND USE
Implement a required minimum lot size, to ensure the preservation of the town's rural character.	Ongoing	Planning Board with CPC	Art. 3 LAND USE
Develop new regulations to require subdivisions to have onsite water storage, minimum fire flow and/or fire breaks in any wildland -urban interface areas	1-5 years	Planning Board with CPC Public Works Dept.	Art. 7 HAZARD MITIGATION

Observe the spirit and regulations of the State of New Hampshire's Rivers Management and Protection Program and shoreline protection programs as they pertain to the Cockerhmouth River, other waterways and Spectacle Pond.	Ongoing	Select Board, Planning Board, Conservation Commission, Zoning Board of Adjustment	Art. 3 LAND USE
Update Groton's Earth Excavation and Reclamation Regulations with specific language governing the operation of earth excavation sites in areas overlying an aquifer	1-5 years	Planning Board	Art. 3 LAND USE
Add Earth Excavation and Reclamation Inspection Checklists to Groton's Regulations, to ensure inspections of active excavations.	1-5 years	Planning Board	Art. 3 LAND USE
Consider conducting inspections of earth excavation sites to determine if they are inactive, reclaimed, and/or abandoned in such a manner that nature will reclaim them.	1-5 years	Planning Board, Select Board	Art. 3 LAND USE
Encourage the use of conservation easements to protect undeveloped land. Consider the purchase of development rights or land in fee in order to permanently protect open space.	Ongoing	Planning Board, Conservation Commission, Select Board	Art. 3 LAND USE
Develop reasonable restrictions that allow for home based businesses while protecting the property rights of other residential owners, including setbacks, frontage, parking, landscape and other vegetation buffers, signage, noise, lighting, and hours of operation.	Ongoing	Planning Board	Art. 3 LAND USE
Pursue infrastructure improvements, particularly for bridges and roads	Ongoing	Select Board, Town Depts. & Boards Public Works Dept.	Art. 4 ROADS
Consider encouraging the development of beautification programs for the town that tie the community together.	1-5 years	Select Board Planning Board Volunteers	Art. 2 COMMUNITY PROFILE
Set development boundaries along road corridors. Ensure that any adjacent sensitive natural resources along the road are protected	1-3 years	Planning Board, Conservation Commission Public Works Dept.	Art. 4 ROADS

Interconnect subdivisions. Discourage single point of ingress/egress.	Ongoing	Planning Board Public Works Dept.	Art. 4 ROADS
Establish storm water controls in Groton's Subdivision and Site Plan Regulations to control storm water	1-5 years	Planning Board Public Works Dept.	Art. 3 LAND USE
Investigate protection measures for Groton's Class VI and other abandoned roads, which can serve as recreational trails for Groton's citizens. Safeguards should be established for the stonewalls, cellar holes, and large trees that are often located along these Class VI roads.	1-5 years	Planning Board, Conservation Committee, Select Board, Town Depts. & Boards, Public Works Dept. Historical Society	Art. 5 HISTORICAL and CULTURAL RESOURCES
Plan for pedestrian and bicycle connections, both on and off road.	Ongoing	Planning Board, Conservation Commission Public Works Dept.	Art. 2 COMMUNITY PROFILE
Improve transportation opportunities in a manner consistent with population and demographic changes of the Town by: <ol style="list-style-type: none"> 1. encouraging ridesharing, 2. supporting efforts to secure services and funding for paratransit and elderly transportation, 3. working with nearby jurisdictions and non-profits, forming partnerships that provide for the special transportation needs of the senior population, youth, the economically disadvantaged and the disabled 4. 	Ongoing	Planning Board, Select Board, Public Works Dept., Newly formed Committees and Volunteers	Art. 2 COMMUNITY PROFILE
Consider establishing a position for a Land Use Enforcement Officer, designated to act under the direction, and as the representative of the Zoning and Planning and Boards to enforce regulations and zoning.	Ongoing	Select Board, Planning Board, Zoning Board of Adjustment	Art. 3 LAND USE