Population in Greensboro

A. Trends

From the time of its settlement in the late 1700's Greensboro's population grew steadily, reaching a high of 1065 residents in 1860. Since that time the population decreased to its most recent low of 593 in 1970. The 2010 Census puts the total population count at 762, which represents a very minor decrease from the previous decade. (See Figure 1).

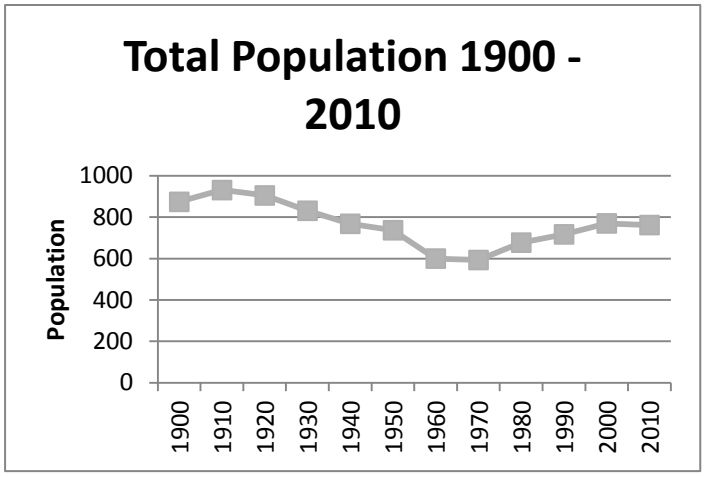


Figure 1: Total population from 1900 - 2010 in Greensboro.

In the past four decades the population of Greensboro has grown at a relatively steady rate. While this growth trend had been comparable to those of Orleans County and Vermont as a whole, the 2010 Census shows a slight drop of 8 people, or 1%. Similarly, population growth rate in Orleans County slowed to 3.5%, and the growth rate in Vermont dropped to 2.8%. We can expect slower growth rates through the next decade (see Figure 2).

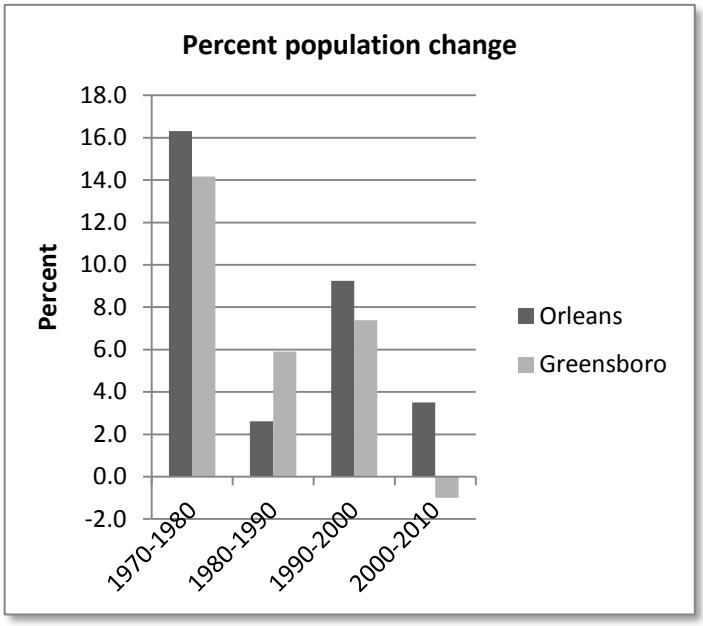


Figure 2: Percent population change from 1970 to 2010 in Greensboro and Orleans County.

Seasonal population trends play an important role in the population dynamics in Greensboro. Due to a high number of vacation homes (approximately 307 homes for seasonal, recreational, or occasional use), it is estimated that the - population of 762 (projected from 2010 decennial census) nearly triples during the summer months.

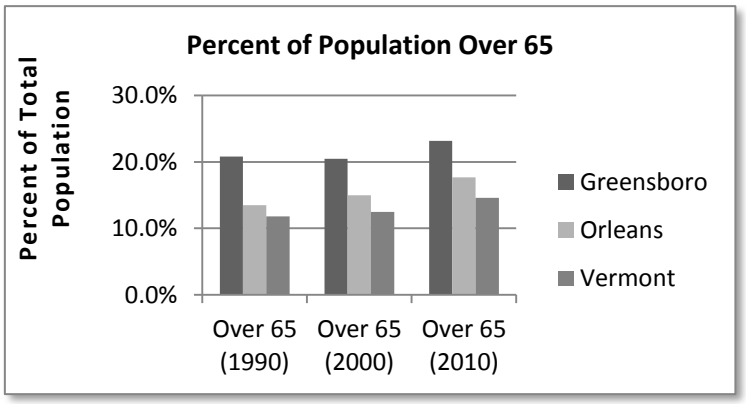


Figure 3: Percent of population over 65 in Greensboro, Orleans County, and Vermont.

B. 2010 Characteristics

The population of Greensboro is 762 year-round residents. Of this, 52.4% are female, 47.6% male. The median age is 51.3 years, which is considerably higher than the median age for Orleans County (43.7 years) and Vermont (41.5 years). This is closely linked to the high proportion of Greensboro residents above the age of 65 (23.2%) versus the Orleans County and Vermont percentages (17.7% and 14.6% respectively) (Figure 3), and the below average proportion of residents under the age of 18 (19.4%) when compared to Orleans County (21.3%) and Vermont (20.7%) as illustrated in Figure 4.

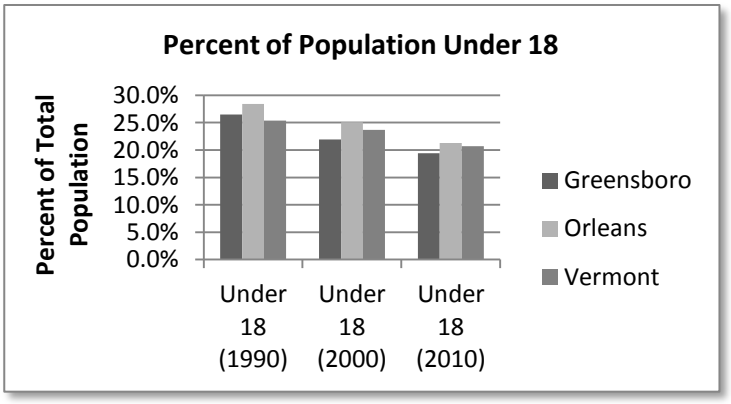


Figure 4: Percent of population under 18 in Greensboro, Orleans County, and Vermont.

Based on current trends, it appears the population will become increasingly skewed over the next two decades. Currently 12.6% of the population falls within the 45 to 54 year old age group as illustrated in Figure 5. As this large portion of the population ages, it will further increase the already large portion of the town population above retirement age.

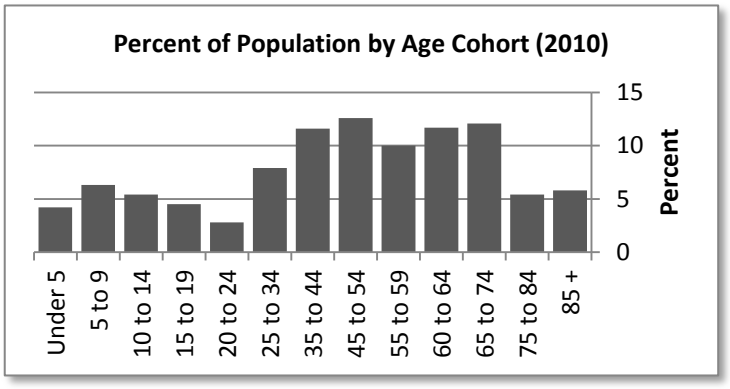


Figure 5: Percent of population by age cohort (2010) in Greensboro.

Based on current trends, it appears the population will become increasingly skewed over the next two decades. Currently 12.6% of the population falls within the 45 to 54 year old age group as illustrated in Figure 5. As this large portion of the population ages, it will further increase the already large portion of the town population above retirement age.

Racial/Ethnic Background of Population (2010)	
Black or African American	0.8%
Latino/Hispanic	1.3%
American Indian and Alaska Native	0.1%
Asian	0.3%
Other	0.1%
Multi-racial	2.0%
White	96.7

Table 1: Racial/ethnic background of the Greensboro population in 2010.

As with most rural communities in Vermont, the Greensboro population is primarily white (Table 1). According to 2006-2010 American Community Survey Five-Year Estimates, only 5.4% of the population speaks a language other than English at home. 6.9% of the town population is foreign born.

The population density of Greensboro (39.4 square miles in size) has been increasing steadily with the rising population over the past three decades (Figure 6). However it is still well below the state and country averages. However, this information is calculated for full-year residents only and would increase significantly during peak tourist season.

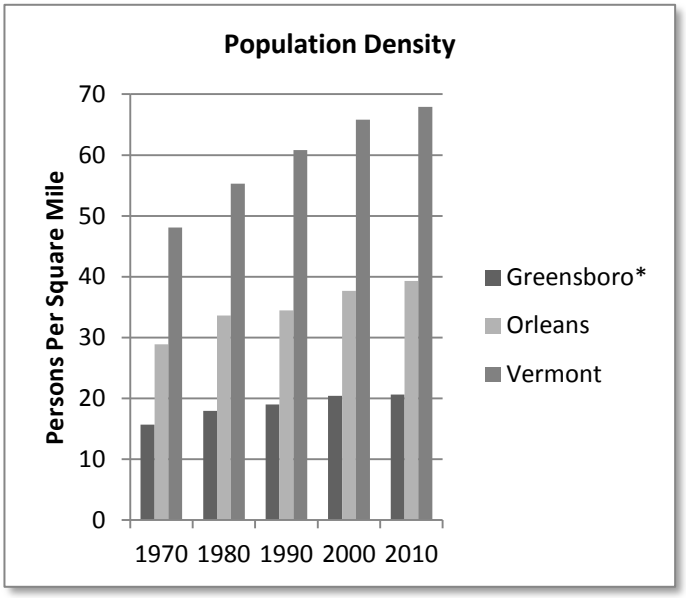


Figure 6: Population density of Greensboro, Orleans County, and Vermont, from 1970 – 2010.
***Greensboro estimate**

C. Greensboro Population Projections

The American Community Survey (part of the Census Bureau) and the Vermont Agency for Commerce and Community Development make population projections. However, because Greensboro is such a small town, these projections are not credible. The growth of Greensboro is likely quite slow, or even stagnant, given that the population did not change from 2000 to 2010.

Land Use

Introduction

There are 925 parcels of taxable land in Greensboro and 22 exempt parcels. The total area of Greensboro is 25,600 acres.

Future development in Greensboro is limited by both natural resources and zoning regulations. Development is limited by mountainous terrain, steep slopes, wetlands, floodplains, and conserved land. Zoning regulations, through the various land use districts also puts limits on development, as shown below:

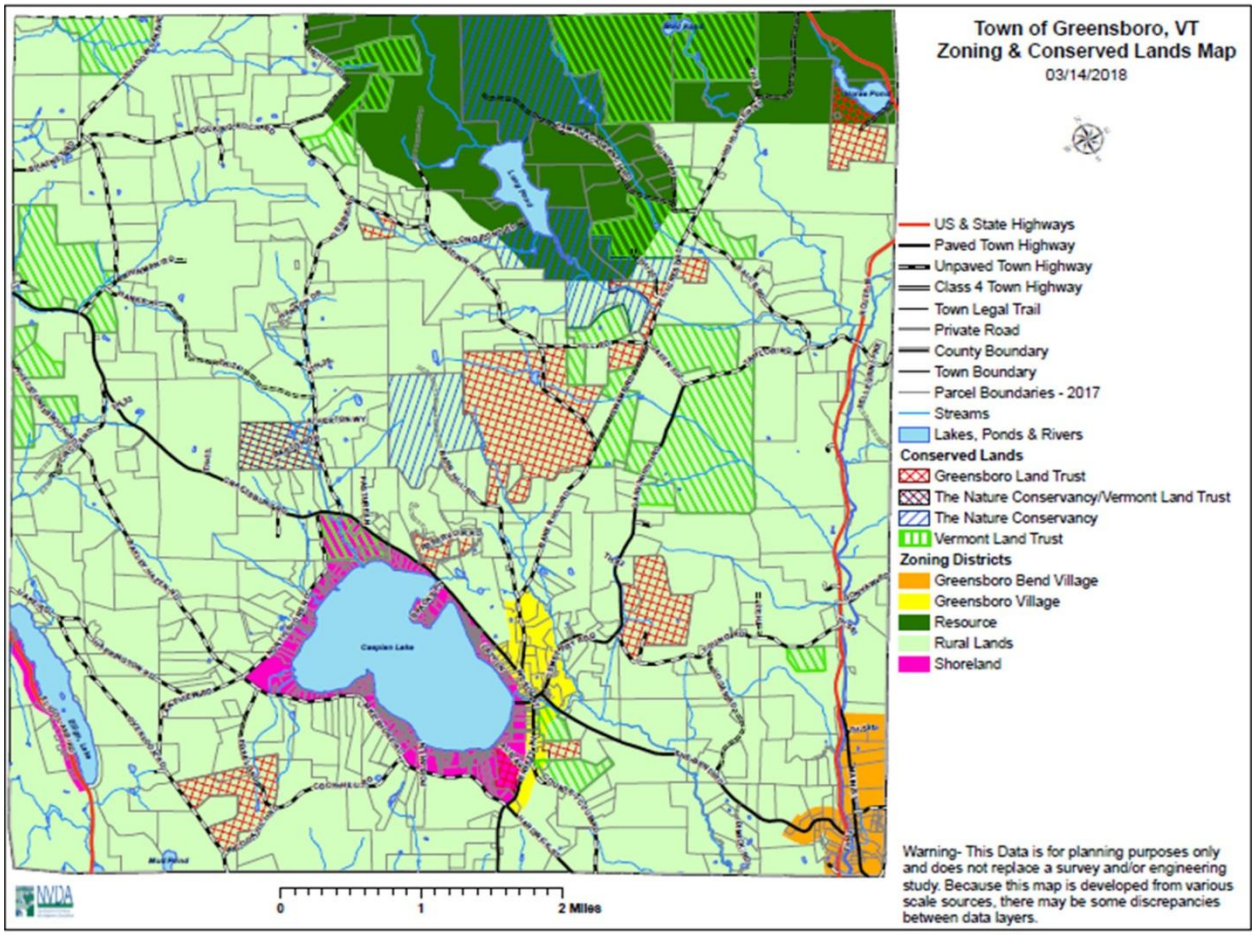
Greensboro Village District	Minimum lot size: ½ acre
Greensboro Bend Village District	Minimum lot size: ½ acre
Lakeshore District	Minimum lot size: 1 acre
Rural Lands District:	Minimum lot size: 10 acres
Resource District	Minimum lot size: 25 acres

In addition, Greensboro allows a Planned Unit Development (PUD) in the two Village Districts and in the Rural Lands District. A PUD clusters dwellings so that open space, forests and farms are preserved to the extent practicable. A PUD can be source of workplace, senior or affordable housing. PUDs cluster several dwellings and set aside about 50% of the land as open space or otherwise productive land.

These land use districts establish restrictions on the general type, location, scale, distribution, pattern and character of future land uses in Greensboro. The Town's land use regulations and zoning map are used to determine the specific land uses permitted and the densities and dimensional requirements established for a given property.

The land use districts and conserved lands are shown in Figure 1. Conserved lands include those of the Vermont Land Trust, the Nature Conservancy, and the Greensboro Land Trust.

Figure 1: Greensboro Zoning Districts and Conserved Lands



Geography

Greensboro lies in the southern part of Orleans County, and borders Caledonia County on the east and south. Greensboro is adjacent to Glover to the north, Stannard to the east, Hardwick to the south, and Wolcott to the west. The area of Greensboro is 39.4 square miles, of which 37.8 square miles is land and 1.6 square miles is water (Caspian Lake and Eligo Lake). With regard to elevation, the lowest part of Greensboro is the shoreline of Eligo Lake (1100 ft) and the highest part is in the northeast (2200 ft)

Geology

Northeastern Vermont geology is characterized by the term “Vermont Piedmont”, where the word piedmont means "at the foot of the mountains" or "foothills". This region is made up of rolling hills and valleys, and glaciated lakes "at the foot" of the Green Mountains. The most

common rock types in this region are sedimentary and metamorphic. Igneous rocks, including granite, are also found in the Piedmont region and make up the most common mineral deposits.

Surficial geological mapping indicates that most of Greensboro is classified as unsorted till. Till is also called glacial till, which is unsorted sediment derived from erosion and entrainment of material by the moving ice of a glacier. Its content includes clay, sand, gravel, and boulders.

Soils

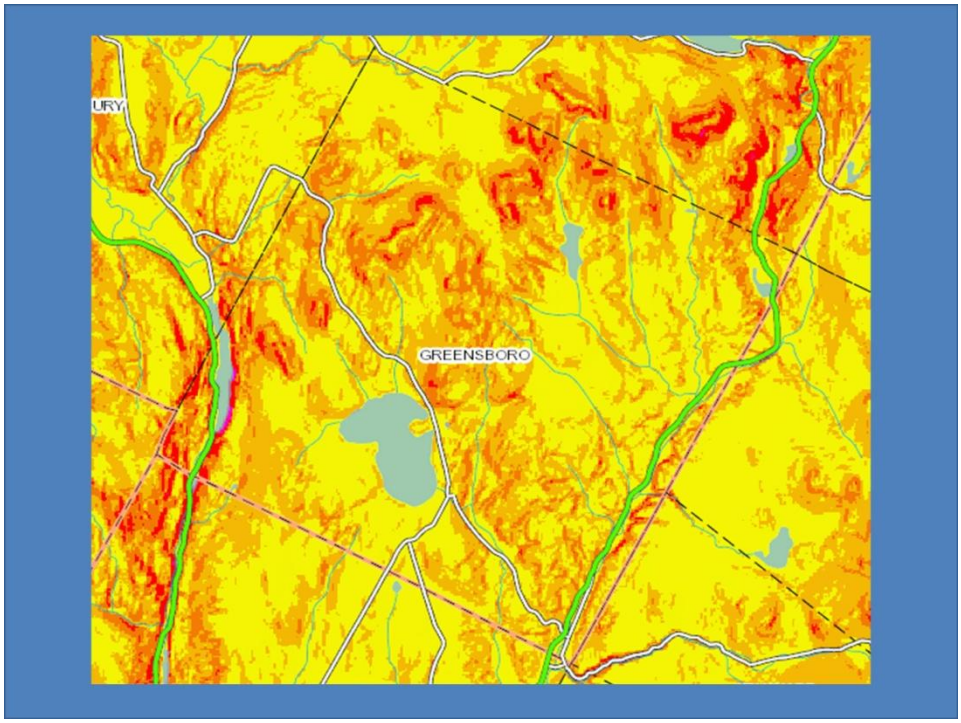
Soils in Greensboro are varied. Areas with gentle slopes that are under cultivation or are used as pastureland typically have soils that are well-drained sandy loam characterized by some fine sands along with clay and stony sands. The soil types include Cabot silt loam, Vershire-Lombard complex, and Peru fine sandy loam. Areas with steeper slopes that are forested typically have soils that are poorly drained and rocky or stony in character. Examples include Buckland loam and Turnbridge-Lyman complex.

Topography

The topography of Greensboro is varied, with the elevation ranging between 1000 ft on Lake Eligo to hills in the northern part of the town at 2200 ft. The terrain is marked by many hills, with streams flowing through some of the lowest areas between the hills.

The variability of the terrain is best seen on a map of slope, shown in Figure 2.

Figure 2: Greensboro Slope Map



About 16,000 of Greensboro's 25,600 acres is less than 10% slope. The lightest, or yellow lands in the figure are less than 10% slope. The next darker color (orange) land has a slope of 10-20%, and the darkest (red) areas have a slope of greater than 20%.

Land Use

Land use in Greensboro is varied. The major land uses (approximate) are listed below. Transitional is a mix of homes, pasture and forest, typically found on the edges of developed areas.

Transitional	20%
Evergreen Forest	14%
Deciduous Forest	18%
Mixed Forest	20%
Pasture	10%
Open Water	5%
Wetlands	4%
Commercial/industrial/residential	4%
Other	5%

Source: Vermont Fish & Wildlife, 2008

Figure 3 shows the National Land Cover map for Greensboro. The figure shows pasture land and cultivated land as yellow and brown, respectively, and green areas (light and dark) are forested. As can be seen, most of Greensboro is forested.

Figure 3: Greensboro Land Cover

Transportation 12-9-17

The infrastructure that allows people to travel from point to point plays a very important role in Greensboro's economy and recreation opportunities. Greensboro's transportation network is a combination of different modes, from the two village centers, where vehicle speed is a concern, to dirt roads, where maintenance is an issue, to Route 16, which transports people at higher speeds. Transportation also encompasses other means of movement, such as snowmobile and Nordic trails, cycling, and walking paths.

Roads

Greensboro employs a staff of three, plus one part-time summer person, to maintain its fifty-seven miles of dirt roads, eleven miles of pavement, 14 bridges, and 582 culverts. The town road crew works out of the Town Shed located on Cemetery Ridge. The town owns a gravel pit in Glover.

Two state road pass through Greensboro: State Route 16 runs through Greensboro Bend as it connects Hardwick to points in northern Orleans County, and a short portion of State Route 14 runs aside of Lake Eligo. In the 2016-2017 fiscal year, the town spent approximately $628,000 keeping the roads maintained. Road maintenance equipment owned by the town includes a pick-up, two ten-wheeler 14-yard dump trucks, one 7-yard six-wheel dump truck, an excavator, a grader, and a bucket loader. Driveway plowing and roadside mowing services are contracted to private contractors on an annual basis.

Public Transit

Rural Community Transportation, Inc (RCT) is the only public transit provider in the Northeast Kingdom. They provide transport for a fee on its fixed routes. It not only provides regular routes, but will schedule an individual volunteer driver to driver a person from their home to an appointment. Unfortunately, their regular routes do not cover the Greensboro/Hardwick area.

Airports

The state-owned airports in the Northeast Kingdom are Northeast Kingdom (Newport) and Caledonia (St. Johnsbury). These airports serve private aircraft and limited charters and cargo services. For national and international destinations, the closest airports are Burlington and Montreal.

Rail Service

The closest rail service to Greensboro is Amtrak out of Essex Junction. Amtrak runs the Vermonter service to Springfield, MA, New York City, Philadelphia, Baltimore, and Washington, D.C.

Cycling

The roads in Greensboro offer a variety of on-road and backroad cycling opportunities. Some roads have fog lanes that enable safer bike riding, such as Route 16 in Greensboro.

The NVDA published a document called "Cycling in the Kingdom" that describes a number of cycling routes and loops in the Northeast Kingdom. One of the loops is called "Around the Block", which begins in Hardwick and follows Route 14 north to Irasburg, then takes Route 58 and Route 5 south to Barton, then Route 16 south to the Hardwick area. This route passes through Greensboro Bend.

The Lamoille Valley Rail Trail is currently under construction on the railbed of the former Lamoille Valley railroad, which ceased operation in 1994. The rail line extended from Swanton to St. Johnsbury. Sections from St. Johnsbury to Danville, and Morrisville to Jeffersonville are complete. A future section will connect Danville with Morrisville, which will pass through Greensboro Bend, providing easy access to what will be the longest trail in New England. This trail will provide many recreational advantages to Greensboro during all four seasons.

Snowmobile Trails

Vermont Association of Snow Travelers (VAST) sponsors the maintenance of snowmobile trails through the volunteer efforts of local club members. The only VAST trail in Greensboro follows Richardson Road (Town Road 23) from Craftsbury to Campbell's Corner and to Edsell Road south to Cook Hill Road.

In addition, there are many private snowmobile trails in Greensboro.

Cross-country Ski Trails

The Craftsbury Outdoor Center operates a system of Nordic trails that cover much of Craftsbury and Greensboro. Trails also extend from Highland Lodge to Craftsbury.

Sidewalks, Walking Paths and Traffic Calming

One of our initiatives is to work towards creating safer village centers in Greensboro, while at the same time improving opportunities for walking and biking. This also is a goal of Act 174, Energy Planning, as discussed in the Energy Chapter, to reduce energy consumption.

In early 2017, discussions were begun with Local Motion, a state-wide advocate for safer cities and walkable and bikeable communities. Local Motion performed a study of the Greensboro Village, from Tolman Corner to the town center, and north to Cheney Road. The purpose of the study was to suggest a number of actions that would calm traffic and provide for safer walking.

Local Motion discussed many possible ways to reduce vehicle speeds in the town and provide for better and safer walking conditions. The following is a summary of the types of actions that could be implemented:

- Install speed feedback signs on major entrances to the village.
- Extend Breezy Avenue sidewalk to Tolman Corner.
- Repair sidewalks where needed.
- Shorten the crosswalk at the confluence of Laurendon and Craftsbury roads.
- Add four crosswalks at Tolman Corner.
- Paint speed changes on the road (to 25 mph) on Breezy Avenue.
- Installing signs at crosswalks.
- Add a four-way stop at Tolman Corner.
- Create a traffic circle at Tolman Corner.
- Install raised crossings, three inches above grade.
- Add fog lanes to reduce vehicle speeds and provide a space for pedestrians.
- Add a walking path between Town Center and Cheney Road (Stage 1) and then to Highland Lodge (Stage 2).

These type of traffic calming and walking improvements also would apply to Greensboro Bend.

RECREATION and CULTURE

Recreation is integral to the life and community of Greensboro. The full time residents along with a significantly larger summer population appreciate and enjoy the recreation opportunities available in the town. The natural areas that are valued include our lakes, the rural landscape, and preserved natural areas. Other recreation and cultural attractions and organizations include the Mountain View Country Club, The Highland Center for the Arts, the Greensboro Arts and Alliance Residency, the Greensboro Ladies Walking Society, concerts, lectures, plays, Circus Smirkus camps and art galleries. Caspian Lake provides for swimming opportunities at the public beach along with boating access and fishing.

These facilities allow for a myriad of summer activities including hiking and walking, bicycling, swimming, boating of various sorts, golf, tennis, concerts, performing arts, lectures and exhibits. Winter activities include cross country skiing, snowshoeing and ice fishing along with performing arts events at the Highland Center. There is a system of cross country skiing and snowshoeing trails maintained by and connected to the much larger trail system of the Craftsbury Outdoor Center. Snowmobilers utilize the VAST snowmobile trail that winds through Greensboro.

Other recreation activities include yoga classes, softball and soccer games at the Tolman's Corner field, and swimming lessons at the public beach. Also Greensboro Bend is the location of a public playground with a basketball court.

Although Greensboro has these opportunities available to its residents and visitors there is no compilation of information describing these same activities. Our natural and cultural advantages provide what might be best opportunity to grow Greensboro's economy. To take advantage of this opportunity will require coordination and a proactive effort on the part of the town. To this end it is recommended that the town hire at least a part time recreation and cultural affairs director to create recreation and cultural guides, coordinate recreation and cultural activities, and develop new events and publicize these events to encourage the growth of recreation and cultural tourism in Greensboro.

Natural Resources Section 3-28-18

Greensboro is home to a community of people who care about the natural landscape and whose vision for the future is a profound and strengthened human commitment to the natural world, while striving to protect and conserve Greensboro's natural heritage. Nearly 40 sq miles in size, Greensboro is rich with outstanding natural features. The local community recognizes the value in stewardship of wildlife, plants, ecological systems, fish, and the immeasurable benefits therein.

Given the community commitment to conservation (The 2016 Greensboro Community Survey results showed overwhelmingly that protection of our natural resources and protection of the rural character of Greensboro were the top priorities of our residents), it is natural to take the steps to actualize that commitment. If we foster the stewardship of undeveloped lands in large landscapes, we will protect the quality biological requirements of wildlife and native plants. Furthermore, we will nurture the natural environment so prized by our community members who actively participate in restorative outdoor activities of skiing, hiking, fishing, boating and wildlife watching. It is less the activity and more the natural environment that is restorative.

FORESTS

A continuous forest habitat, uncontaminated and unfragmented, offers lands that represent what makes life in Greensboro sought after and appreciated; serves up what connects wildlife to wildlife, and current residents to dreams of what the future holds for future generations of the community. The forest habitat must be recognized as a significant contribution to Greensboro's natural and cultural heritage and must be respected and supported as such.

Contiguous forest habitat is defined as an area of forested land with either no roads or low densities of Class III or Class IV roads and virtually no human development. While this habitat may be actual forests of differing ages, it could also be wetlands, streams, ponds or old meadows--private environments for the wildlife that make their homes there and the plants and natural communities that thrive there without human contamination. Key to the sustainability of wildlife is the concept that animals can migrate widely to share genes and to access varying feeding habitats. Thus, the habitat in undeveloped lands and waters must connect with other undeveloped lands and waters so animals and fish can roam, procreate and thrive, again, absent the human contamination. Contiguous forest habitat--undeveloped land habitat--buffers species against consequences of land fragmentation. Greensboro must consider and prioritize this fact,

the concept of contiguous forest habitat, when viewing any proposed development and/or conservation efforts.

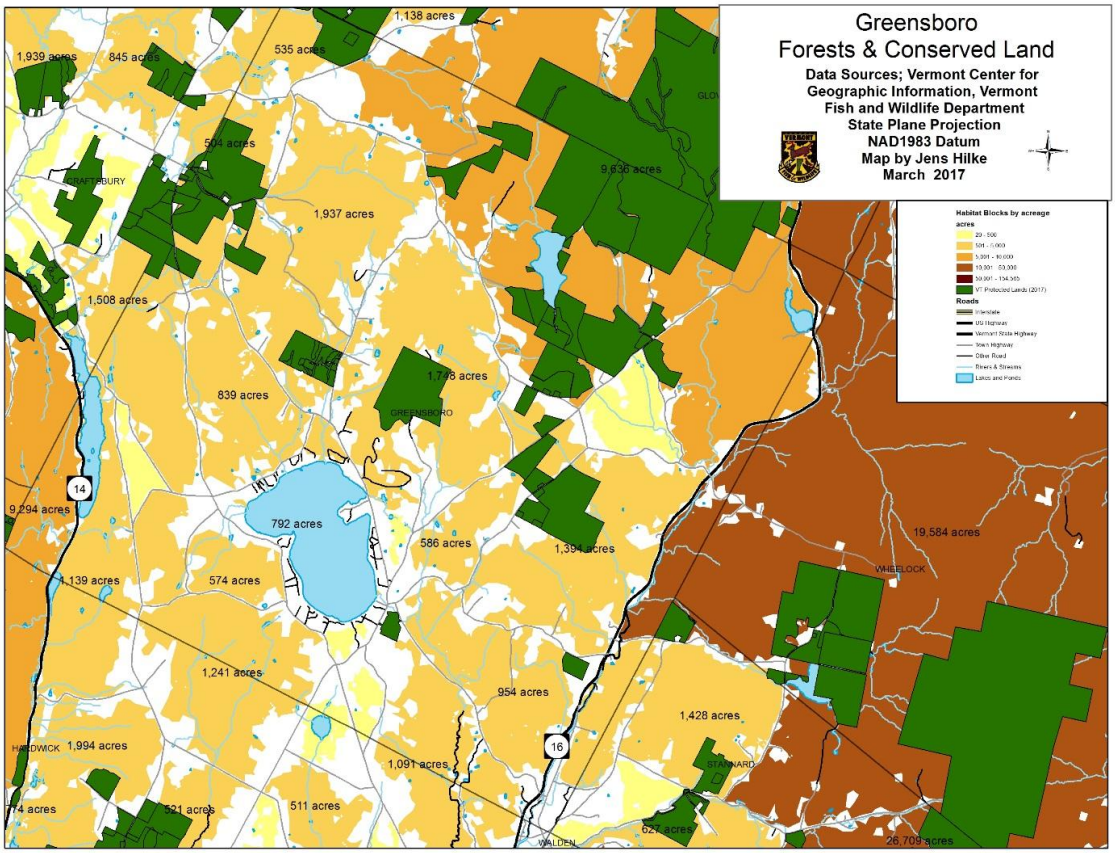
Act 171 requires that municipalities (and regional planning organizations) address the problem of forest fragmentation and impacts on habitat connectivity corridors. In concert with Act 171 requirements, our Town Plan must consider the protection of locally significant forest blocks and habitat connectors, which impact forest and ecological health and viability. Policies should be included in the Town Plan that encourages active management of these areas regarding logging, timber production, recreation, and wildlife habitats.

Greensboro has 38,255 acres of blocks of contiguous forest habitat, 76% of the 49,940 acres of the town. Future planning must consider and prioritize this fact, the concept of contiguous forest habitat, when viewing any proposed development and/or conservation efforts. The largest forest blocks in Greensboro ring the outer boundary of town. A 9,636 acre block in the northeast extends into Glover. To the east, a small portion of a 19,584 acre block [that is mostly in Wheelock] occurs east of Rt 16. To the west/southwest, a small bit of a 9,294 acre block in Wolcott occurs west of Rt 14. The inner ring of forest blocks surrounding Lake Caspian are all less than 2,000 ac.

Of this area, 3,315 acres are conserved, (6% of Greensboro). These are primarily conservation easements on privately owned land. In addition, there are 15,960 acres (32%) in the Use Value Appraisal program. *[*Vermont's Use Value Appraisal (UVA) Program (also known as "Current Use") enables eligible private lands where owners practice long-term forestry or agriculture to be appraised for property taxes based on the property's value of production of wood or food rather than its fair market residential or commercial development value. When land is enrolled in the UVA program, the State attaches a lien to the deed.]* In Greensboro, permanently conserved land is mostly north of Lake Caspian, with a concentration in the northeast of town.

Figure 1 shows contiguous forest habitat and conserved land. Greensboro has about 7,300 acres of high priority acres of contiguous forest habitat, of which 6,300 acres are classified as highest priority forest blocks.

Figure 1: Forest Blocks and Conserved Lands in Greensboro



ENDURING FEATURES

The biophysical region of Greensboro, as defined by its climate, bedrock geology, superficial geology, topography, hydrology and land use history, is in the Northern Vermont Piedmont region. Calcium rich soils in this cool climate creates mixed forests, Northern White cedar swamps, interesting fens and natural areas. The agricultural soils are good and coupled with the cool climate offer a short growing season.

Evidence of glacial movement and of the associated moving water which shaped the land are abundant in Greensboro and in the land surrounding Greensboro. These features are part of the landscape that resists change despite changes in land cover and wildlife. They will remain the same with climate change. They speak to time, to a much longer and a much larger view.

Polished bedrock is found on the top of Barr Hill. Evidence of north/south glacial action is also seen in the valley of Eligo Gulf, (The most prominent cliffs in town are located on the

eastern side of Lake Eligo), the elongated hills of Patmos Peak and Baker Hill. Terraces were formed in the Lamoille River valley when the glacier retreated.

Limestone and phyllite deposits (metamorphic rock) underlie much of Greensboro but are not currently of commercial value. There are three sections of plutonic rock (granite): in a crescent curving over the north end of Caspian Lake, around the northern section of Long Pond, including Paddock Hill, and in an area northwest of Gebbie Corners.

The town offers other interesting glacial features. Across town small erratic boulders can be seen including Rocking Rock and the large Pulpit Rock in North Greensboro, as well as one on the Swamp Road and several on the north shore of Caspian Lake. [An erratic is material moved by geologic forces from one location to another, usually by the movement of the ice in a glacier].

Paddock Hill, located approximately one mile northeast of Long Pond is a *roches moutonnées*. [A roches moutonnees is is a rock formation created by the passing of a glacier over underlying bedrock. All the sides and edges of the rock have been smoothed in the direction that the glacier that once passed over it. The other side is much more rough and craggy.] The large vein of granite on Paddock Hill was used in the late 1800's and early 1900's for local building purposes and to supply the granite polishing shed in Greensboro Bend. There are also granite outcroppings in Caspian Lake such as Huckleberry Rocks, Gunther's Rocks, and Bathtub/Elephant Rocks, and Blueberry Rocks in Long Pond.

Various small ponds and swamps scattered throughout the area are largely the result of glaciation. Glaciation left behind several kettle ponds: Long Pond, Horse Pond and the two Mud Ponds. [A kettle pond is created when a section of glacial ice dropped off of the retreating glacier and was buried in sediment. When the ice melted, a shallow hole was left which ultimately filled with water, sediment or vegetation.]

LAKES AND STREAMS:

CASPIAN LAKE

Caspian Lake is regarded as the Town's natural resource jewel and, together with Long Pond and Horse Pond, are considered to be in the overall top 20% of Vermont's Best Lakes. (Vermont Lakes and Ponds Program, 2012). The lake is 789 acres and has a maximum depth of 142 feet, (mean depth is 57 feet), a maximum length of 1.66 miles and a maximum width of 1.3

miles. It is classified as oligotrophic (a deep clear water lake with a very low nutrient level). It is in the Upper Lamoille Basin whose waters ultimately flow into Lake Champlain.

In 2016 the status of the lake was downgraded to Stressed due to the flow alteration with resultant water level fluctuation, causing pollution and jeopardizing fish habitat. Caspian had one of the finest lake trout fisheries in northern Vermont but current water level fluctuation has the potential to impair fishery. Ice damage due to the lack of drawdowns invites evaluation of the best water level to be maintained in order to have the least amount of impact. Furthermore, sedimentation and road and developed land runoff are negatively affecting water quality. Action by the Town to address the sedimentation and the feeder stream contribution to the problem is imperative. Furthermore, the groundwater table is unusually high and each old, outdated and expired, overburdened septic systems increase the danger of septic overflow, especially in wet years.

The only lakeshore property owned by the town of Greensboro is the "Willey Beach" which is preserved in its natural wooded state, adjacent to the Public Beach. The Public Beach is owned and managed by the Hardwick Electric Department. The beach is maintained through a Beach Committee made up of Hardwick and Greensboro representatives.

The Greensboro Association is very active in keeping the Lake free from Eurasian Milfoil and Zebra Mussels. The Association also sponsors swimming lessons and monitors water quality on a weekly basis. These activities are testament to the concern and care the residents, both full and part time, have for Caspian Lake.

The Vermont Department of Conservation (DEC) has conducted a lake water quality monitoring program for over twenty years. These data have been reported as the Lake Scorecard. Overall, the DEC rates Caspian Lake as follows:

Nutrient Trend: Fair Condition
Shoreland Habitat: Fair Condition
Invasive Species: Good Condition

The DEC monitors Caspian Lake for total phosphate (a limiting nutrient in most lakes), chlorophyll-a (a green pigment responsible for the plant’s ability to convert sunlight into chemical energy), and Secchi depth (an indicator of lake water clarity or transparency). These parameters provide an indication of nutrient loading or algal biomass activity.

Table 1 presents a comparison of the water quality parameters across several Vermont lakes.

Constituent Lake:	Caspian	Seymour	Willoughby	Carmi	Elmore
Mean Summer TP,ug/l	9	9	11	31	15
Mean Chlorophyll-a, ug/l	2	2.4	1.2	17	4.1
Summer Secchi, m	7.6	8	8	2.5	3
Mean Lake Depth, m	57	51	140	10	6

The mean chlorophyll-a concentrations in the DEC data have been stable over ten years.

The summer Secchi disk depth data have been stable over time.

However, the mean total phosphate concentrations in the DEC data show that Caspian Lake trend is "significantly increasing". The sources of TP should be investigated and mitigated to the fullest extent possible to restore Caspian's water quality.

Phosphorus promotes the growth of algae in lakes which, in turn, can impair recreational uses, aesthetic enjoyment, water supplies, the biological community and produce toxins that harm animals and people. Phosphorus in lakes comes primarily from nonpoint sources. Nonpoint sources of phosphorus are carried by precipitation running over the land and sometimes through the soil into our waterways. Nonpoint sources of phosphorus include agriculture runoff, stream bank erosion, developed land (from roads, parking lots, lawns, athletic fields, and buildings), wastewater treatment facilities and failing septic systems, forest harvesting, and historically deposited phosphorus that has collected in bottom sediments in portions of the lake. Point source discharges of phosphorus include regulated storm water discharges and sewage treatment plants.

Because excess nutrient loading results from activities both in the watershed and along the lakeshore, protective action is required at both the lake and along the waterways in the watershed.

1.
https://anrweb.vt.gov/DEC/IWIS/ReportViewer.aspx?Report=LayMonLakeReport&ViewParms=False&LayMonID=CASPI
2.
https://anrweb.vt.gov/DEC/IWIS/ReportViewer.aspx?Report=WQSummarySecchi&LocationID=503784
3.
https://anrweb.vt.gov/DEC/IWIS/ReportViewer.aspx?Report=MonitoringSiteSummary&ViewParms=False&LocationID=503784

References:
1. https://anrweb.vt.gov/DEC/IWIS/Factsheets/Chem.pdf

ELIGO LAKE

This lake of 174 acres, with a maximum depth of 100 feet (mean depth is 29 feet), is shared with Craftsbury. That Town maintains a public beach at the north end. The area surrounding this glacial pond is so level that it drains both south (into the Lamoille) and north (into the Black River). The steep slopes on the eastern side are environmentally sensitive as are the northern and southern outlet areas. Like Caspian, Eligo is oligotrophic, meaning a deep clear water lake with very low nutrient level. Eligo is currently fighting to combat its Milfoil problem.

LONG POND

One of the four "kettle" ponds in town, this body of water consists of 100 acres and is essentially undeveloped. Its maximum depth is 33 feet (mean depth of 15 feet) and it is classified as mesotrophic (moderate in nutrients). It was evaluated by the State for water quality, biological diversity and unusual or scenic natural features. It is ranked as exemplary in all three categories. Other than the fishing access owned by the State of Vermont and a few lots owned by private landowners, most of the surrounding property is owned and protected by The Nature Conservancy. One of the largest northern white cedar swamps of approximately 115 acres is located at the southern end of Long Pond. It is second growth trees of white cedar, a few emerging white spruce growing out of a mossy groundcover growing over a meter of woody muck. Historically, a state-threatened orchid, (Calypso bulbosa), the fairy slipper, has been seen there, along with a rare moss (Calliergon richardsonni); and and adult black-backed woodpecker (Picoides articus). It is labeled by the state as a warm water fish habitat.

HORSE POND

This pond of 32 acres with a maximum depth of four feet is adjacent to Route 16. Classified as mesotrophic, recreational fishing is poor due to excessive plant growth. It is labeled by the state as a warm water fish habitat.

MUD POND(S)

These ponds are located in North and South Greensboro. These two ponds are small, (9 and 5 acres), shallow, are rapidly eutrophying and becoming swamps. There is no road access to either pond.

RIVERS AND STREAMS

High quality surface water that is clean and cool is important to the spawning and nursery habitat for Caspian and the Lamoille River Watershed. River corridor protections around issues of channel erosion, encroachment, flood resiliency, nutrients are important considerations for the Town Planning and Zoning regulations.

Major streams that drain to Caspian are Cemetery Brook, Porter Brook and Tate Brook. Both Porter and Tate support very high quality mixed resident trout, allopatric brook trout and spawning/nursery stream populations. They are important to the spawning and nursery habitat for Caspian Lake and for the Lamoille River Watershed and are ranked as a very high water which support recreational fishing. Whetstone and Wright Brooks also drain to Caspian.

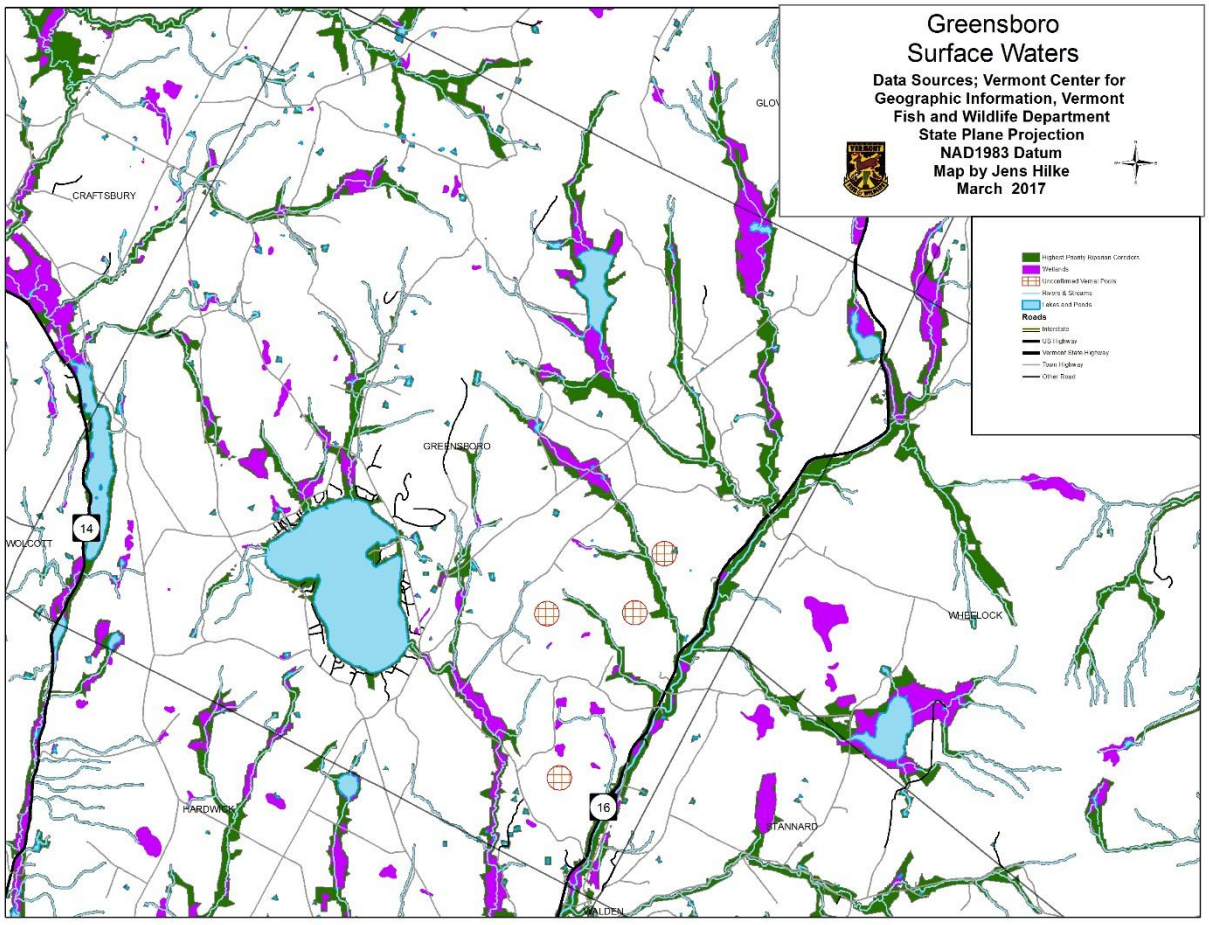
The Lamoille, Barton and Black Rivers originate in Greensboro. The Lamoille River which runs through the valley adjacent to Greensboro Bend has ecological integrity consistent with very good or excellent conditions to support biological health of macroinvertebrates and fish communities. In addition, there are several smaller brooks and streams in good condition all of which drain into the Lamoille River, including: Esdon Brook, Paine Brook, Withers Brook and Stanley Brook. Mud Pond Brook, the outlet of Mud Pond, and Sawmill Brook, the outlet of Long Pond, both drain to the Lamoille and are in very good or excellent condition to support biological health. Skunk Hollow Brook is an inlet of Long Pond.

Greensboro Brook, the outlet of Caspian also drains to the Lamoille. However, this brook is stressed by land erosion, toxics and nutrients. Projects to mitigate stormwater runoff from Laurendon Avenue will be important.

WETLANDS, SWAMPS AND RIPARIAN AREAS:

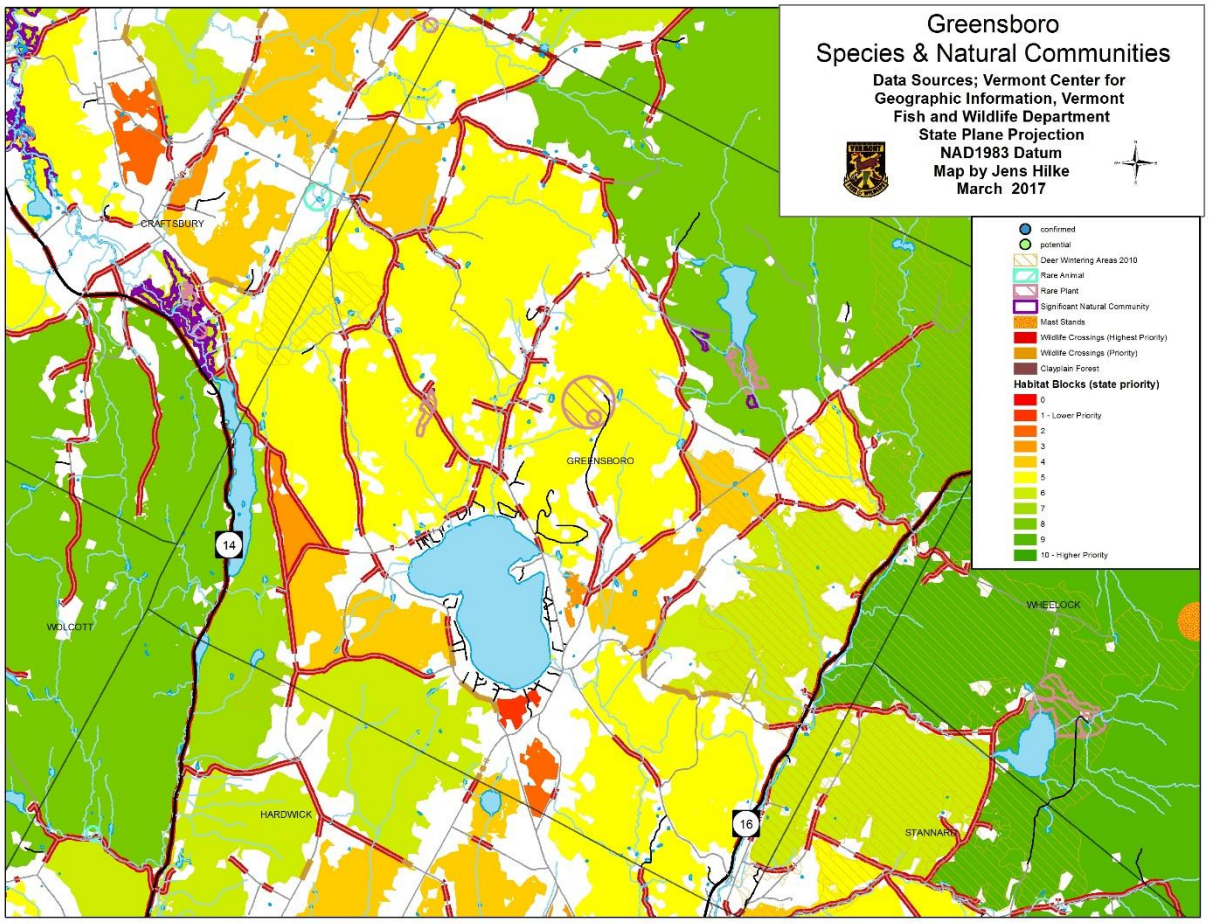
Figure 2 shows the wetlands, lakes, ponds, and streams in Greensboro. All wetlands in Greensboro are Class II or Class III wetlands. Note that the streams and associated wetlands create habitat connections that allow animals to move from one location to another.

Figure 2: Greensboro Surface Water



BIOLOGICAL AND WILDLIFE:

Figure 3 shows the sensitive natural communities that have been identified in Greensboro. These include deer wintering areas, rare plants and animals, significant natural communities, mast stands, wildlife crossings, and habitat blocks (with levels of importance indicated by color, with green being the highest priority).



Rare and endangered plants include a stand of Lycopodium sabinifolium (Savinleaf Groundpine) on Baker Hill.

The bird life in Greensboro is chronicled by The Annual Bird Count (see the History of Greensboro, Appendix 16 “Birds of the Greensboro Area”). The common loon is frequently seen on Caspian Lake, and nested there successfully in the summer of 2016, due to the construction of a floating nesting habitat and floating signs not to disturb.

Flood Resiliency First Draft 12-9-17

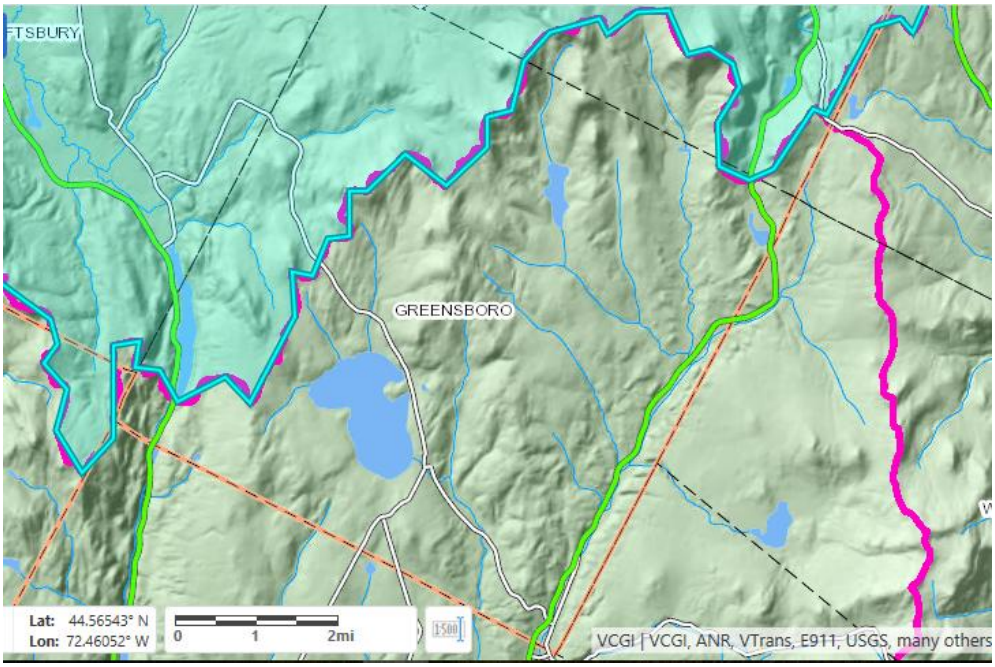
Vermont Statutes Act No. 16 states that as of July 1, 2014, municipal and regional planning must contain a Flood Resilience Element. This chapter must identify flood and fluvial erosion hazard areas and designate those areas to be protected, including floodplains, river corridors, land adjacent to streams, wetlands, and upland forests to reduce the risk of flood damage to infrastructure and property. It must also recommend policies and strategies to protect the town from flooding.

Background

Flooding risk is a function of a number of issues, including the nature of the watershed, the topography of the land surface and its rate of change, and man-made structures that may affect the flow of storm-related water.

Greensboro lies within two watersheds: the Upper Lamoille River watershed, and the St Francis watershed (a sub-basin of the Lake Memphremagog watershed). The Upper Lamoille River watershed is fed by an area of about 720 square miles, beginning at the headwaters in Greensboro. Most of the streams in Greensboro ultimately drain into the Lamoille River (the only exception is Eligo Lake, which drains to the St Francis watershed). Figure 1 shows the boundaries of the two watersheds in Greensboro.

Figure 1-1
Watersheds in Greensboro

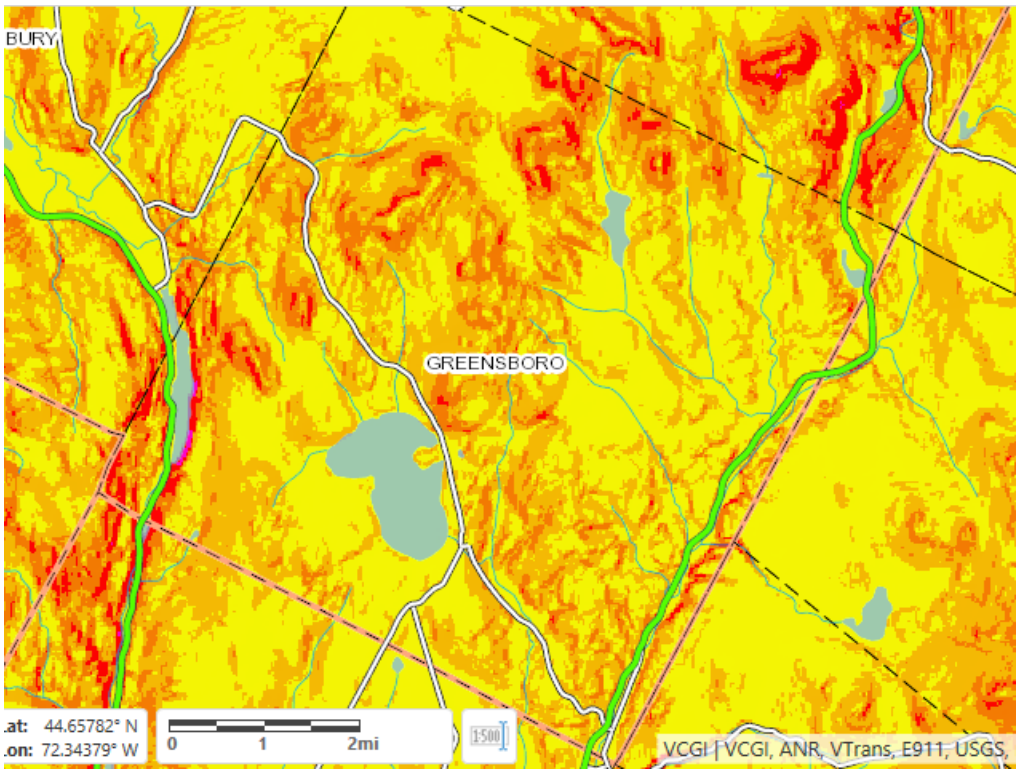


Legend:
Unshaded Area: Lamoille River Watershed
Shaded Area: St Francois River Watershed
Source: VCGI

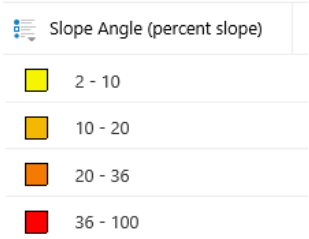
Greensboro is characterized by topography that varies considerably across the town. For example, the highest location in the town is an un-named hill about a mile northwest of Paddock Hill (2200 ft), followed by Paddock Hill and Barr Hill (2100 ft). The lowest parts of town are the shore of Eligo Lake (1000 ft) and Greensboro Bend (1200 ft).

Rapid changes in topography over short distances (i.e. slope steepness) can create conditions during heavy rain events where damaging soil erosion can occur. Figure 2 shows the slope as a percent, for Greensboro. The figure shows that there is a significant amount of land area in the town where slopes are well above 10%. The steep areas are cause for concern about soil erosion.

Figure 2
Slope as Percent



Legend:



Source: VCGI

Flooding Risks

Flooding risk arises from a number of physical attributes in Greensboro, such as floodplains, river, or river corridors, streams, uplands, wetlands, and roads (including culverts and bridges).

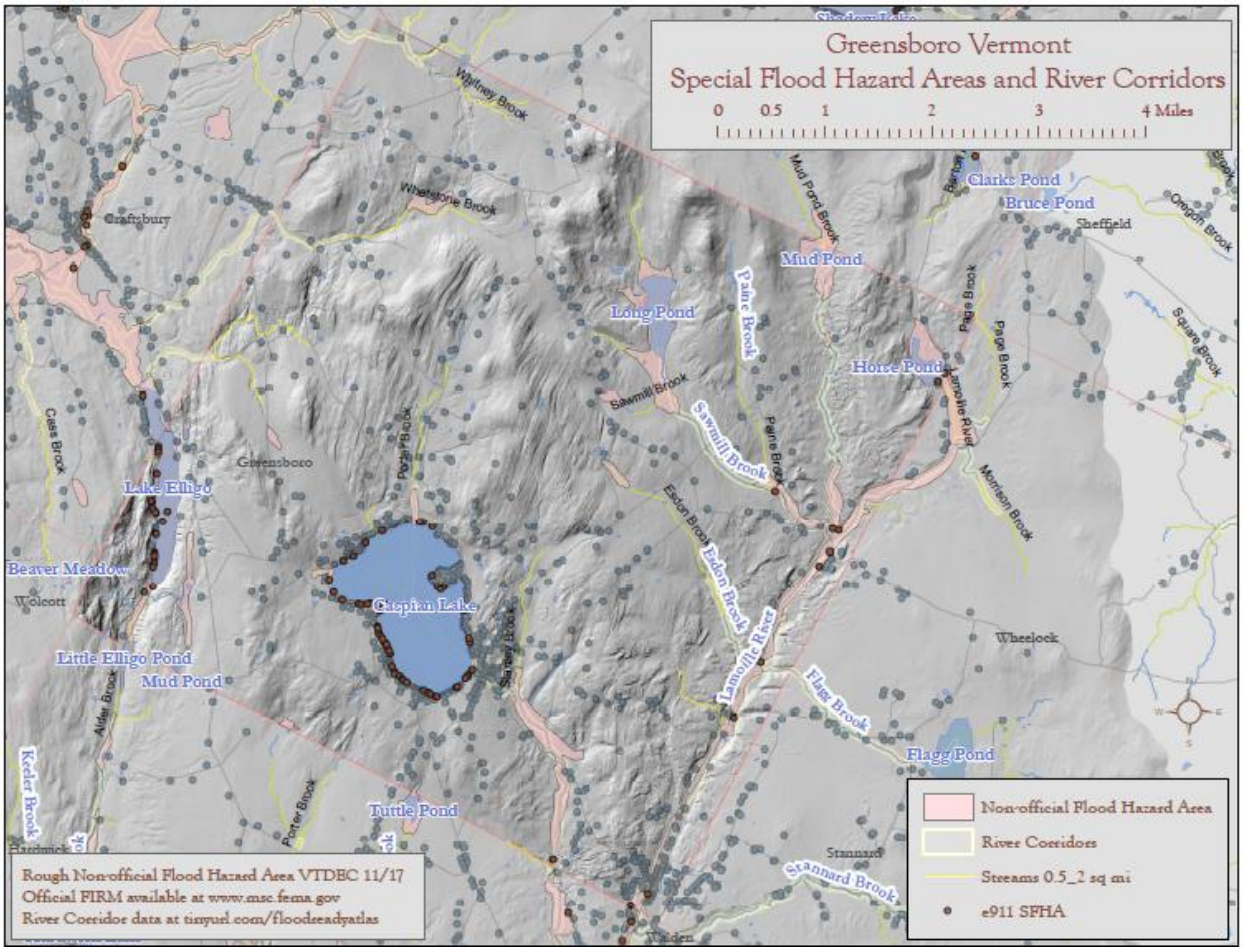
Floodplains

Floodplains are important features that provide for temporary storage of water during major rain storms as well as reducing the water flow velocity and commensurate erosion. A floodplain encompasses the area where a river typically meanders during high flow periods. However, floodplains also are areas with relatively high probability of flooding. Greensboro's floodplains

have not been digitally mapped. The only source data is from the Federal Emergency Management Agency (FEMA) maps called FIRMS, or Flood Insurance Rate Maps. The most recent FIRM prepared for Greensboro was created in 1985.

The Vermont Department of Conservation created a map of Special Flood Hazard Areas (SFHAs) within Greensboro. The SFHAs are land areas that are within Zone A on the FIRMS, which denote areas in the 100-year floodplain. This map is shown in Figure 3. There are 88 buildings in the SFHAs in Greensboro, which comprises about 11% of the buildings in the town. Most of these are located along the shores of Caspian Lake, in addition to a few buildings in Greensboro Bend.

Figure 3
Greensboro Flood Hazard Areas and River Corridors



River Corridors

The mainstem of the Lamoille River originates in the northwest corner of the Town of Wheelock, at the outlet of Horse Pond (which is located in Greensboro). It flows 84.9 miles in a generally westerly direction until it empties into outer Mallett's Bay of Lake Champlain ten miles north of Burlington. From its headwaters to the mouth, the river descends approximately 1,200 feet and drains a 706 square mile watershed.

A river corridor includes both the channel and the adjacent land. The purpose of the zone is to identify the space a river needs to re-establish and maintain stable "equilibrium" conditions. In other words, if the river has access to floodplain and meander area within this corridor, the dangers of flood erosion can be reduced over time. River corridors are equivalent to fluvial erosion hazard areas. Note that special flood hazard areas (SFHA) represent the floodplain denoted as Zone A on the FIRM maps. The SFHAs are smaller than the river corridors.

About two-thirds of Vermont's flood-related losses occur outside of mapped floodplains, and this reveals the fundamental limitations of the FIRMs. A mapped floodplain makes the

dangerous assumption that the river channel is static, that the river bends will never shift up or down valley, that the river channel will never move laterally, or that river beds will never scour down or build up.

Fluvial Erosion Hazard Areas (FEH) have been delineated for some communities based on studies of particular stream and river reaches. An FEH is essentially equivalent to a River Corridor Protection Area (RCPA). Both delineate the extent of the meander belt. A River Corridor includes the meander belt and the riparian buffer area required for a naturally-stable channel.

The Vermont Agency of Natural Resources mapped the major river corridors for the state, including the Lamoille River and Greensboro Brook, Mud Pond Brook and Sawmill Brook. The river corridor protection area varies in width for the three streams, and is about 450 ft for the Lamoille River along Greensboro Bend. Figure 4 shows an enlarged view of the River Corridor Protection Area (RCPA) for Greensboro Bend.

Figure 4
Greensboro Bend Flood Hazard Area + River Corridor

Legend:

Pink shading is the Flood Hazard Area (Floodplain)
Clear shading is the River Corridor

Land within the RCPA will experience heightened risk from erosion and flooding. Therefore, the state encourages towns to restrict development in river corridors. Doing so can help streams lose flood energy in undeveloped areas and help prevent flood damage to existing riverside development from getting worse.

There are benefits to Greensboro if the town adopts bylaws that restrict encroachment into designated river corridors. See the section on Regulatory Issues below.

Uplands

While upland areas, which consist primarily of forests, do not present a great flooding risk, they do impact flooding and soil erosion downstream.

Forests limit erosion and the ability of water to transport sediment that can cause water quality problems when forest vegetation and organic debris on the forest floor slow and infiltrate surface water during storms. Forested lands contribute the lowest amounts of nutrients, sediment and other pollutants into Vermont streams per acre compared to other land uses.

Forest blocks are areas of contiguous forest and other natural habitats, frequently spanning multiple ownerships. Greensboro's forest blocks are primarily forests, but also include wetlands, streams, lakes, ponds, and rock outcrops. Forest blocks protect water quality, provide flood storage, and protect habitat for fish and wildlife. Forests also provide shading to moderate water temperatures, and act as a carbon sink.

Best management practices must be applied in upland areas. Development, which involves clearing and increased runoff, should be discouraged in areas of steep slopes (>20%).

On parcels over 25-acres, landowners may be eligible to enroll forestland in Vermont's Use Value Appraisal Program (also known as Current Use). For forestland to be eligible it must be managed according to a 10-year forest management plan that provides for continued management for forest products which meets minimum plan and management standards and is approved by the Department of Forests Parks and Recreation (VFPR). Landowners with riparian areas and forested wetlands are encouraged to manage for protection of these sites during any forest management.

Streams

Headwater streams make up a large proportion of the total length and watershed area of fluvial networks in Greensboro, and are partially characterized by the large volume of organic matter and invertebrate inputs from the riparian forest. Organic matter entering these streams consists of leaves, woody debris, detritus, and sediment. For example, while each headwater stream in the Caspian Lake watershed is short and narrow, they collectively can impact lake water quality during and after large storm events.

Identifying and implementing priority conservation practices for forest landowners at the headwater stream level is important in watershed management for several reasons:

• Controlling soil erosion on logging trails

• Restoring forest riparian buffers along streams

• Stabilizing erosion-prone soils.

Wetlands

Wetlands provide many benefits, including water quality protection, wildlife habitat, recreation, and flood protection. All Class I and II wetlands are protected by the Vermont Wetlands Program. These rules require buffer zones within 100 feet of Class 1 wetlands, and 50 feet of

Class II wetlands. Any activity in a Class I or II wetland requires a state permit. We can further protect wetlands by adopting setbacks and zoning that would allow review of development plans for wetland impacts.

Those wetlands that provide water quality protection at the highest level are a priority for protection in the Lamoille River Basin. These wetland types include those that attenuate sediment, filter overland runoff from flooding and stormwater, support fisheries, and provide refuge for wetland dependent species.

All of the wetlands in Greensboro are Class II or Class III wetlands.

Dams

Dam failures can be a source of flooding risk. There are three dams in Greensboro. Two of them are privately owned and are rated low hazard potential by the state. The earthen dam at Caspian Lake was built in 1929 and reconstructed in 1948. The dam is seven feet high and 205 feet in length. Approximately 2300 ac-ft of water is stored in Caspian Lake under normal conditions.

The Caspian Lake Dam, because of the storage volume, is called a "jurisdictional dam" by the Dam Safety section of the Vermont Department of Conservation. This dam is classified as "significant hazard potential" by the Dam Safety section because a dam failure could result in "a few fatalities and/or appreciable economic loss". Dams with this classification must be inspected every 3-5 years; however, the inspections are voluntary on the part of dam owners.

The owner of the Caspian Lake Dam is Hardwick Electric. The most recent inspection of the Caspian Lake Dam occurred on June 27, 2017. The visual inspection was conducted by the Facilities Engineering Division of the Vermont Department of Environmental Conservation.

The findings of the inspection are summarized here:

- Based on the visual inspection of the dam, the condition is considered poor.
- The downstream slope of the dam on one side of the spillway is covered with trees in excess of 30 inches in diameter.
- The spillway condition appears poor. Some concrete is deteriorating, with exposed rebar. The concrete footing appears to be separating from the remainder of the structure.
- The concrete wall adjacent to the left abutment is in a state of failure, and not considered stable, having rotated outwards toward the lake.
- The dam does not meet the current standard of providing 1.5 feet of freeboard during the spillway design flood.

The inspection report recommends that a professional dam safety engineer be retained to specify the repairs needed to bring the dam into compliance with the State requirements, including concrete repairs and tree removal.

Roads and Culverts

Roads, culverts and bridges are important facilities that can be sources of flooding problems and can conduct nutrients and sediment to streams, and then to lakes. Therefore, it is essential that Greensboro maintains its roads and associated facilities in good condition. Greensboro has 69 miles of town roads, in addition to 582 culverts.

Vermont has a number of initiatives to help towns with maintaining roads and culverts:

- The Better Roads Program, which publishes a Better Back Roads Manual, and operates a Better Roads grant Program
- The Vermont Department of Fish & Wildlife published guidance for the design and replacement of road crossings and culverts, called "Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont".
- The Vermont Department of Conservation, Watershed Management Division prepared the Stormwater Infrastructure Mapping Project Report, dated February, 2017 to supplement the existing drainage data collected by the town and with the intention of providing a tool for planning, maintenance, and inspection of the stormwater infrastructure. This report and associated mapping, will assist Greensboro and its residents with emergency preparedness for large rainfall events or spring snowmelt runoff events by helping to keep drains and culverts open, thereby minimizing localized flooding.

The Vermont Agency of Transportation created VTCULVERTS, an inventory of culverts and bridges in Vermont. The VTCULVERTS database shows that Greensboro has 582 culverts, of which 355 are in Good condition and 152 are in Fair condition. Only 65 culverts are in "Poor" condition and none are in Critical or Urgent condition. This data was compiled by the NVDA in 2015.

Act 64, the Vermont Clean Water Act, requires VDEC to develop a new Municipal Roads General Permit (MRGP). The MRGP will require Greensboro to conduct Road Erosion Inventories (REIs) for hydrologically connected municipal road segments. The ANR Natural Resources Atlas shows hundreds of road segments in the town that will be included in this regulation.

Greensboro will also be required to develop Road Stormwater Management Plans for all hydrologically connected road segments not meeting MRGP standards. Greensboro would then be required to implement the Road Stormwater Management Plans over a period of time defined by the MRGP.

Regulatory Issues

The Vermont Rivers Program has created a Flood Resilience Scorecard for the Lamoille River Basin. The scorecard reflects the actions communities have taken to implement the state's flooding guidelines. Greensboro is rated medium flood resiliency. Medium is achieved when a community has adopted the four mitigation measures needed to qualify for the 12.5% public assistance match (listed below). Greensboro can reach the high level of flood resiliency by satisfying the requirements of the River Corridor Protection Program (protecting river corridors from further encroachments).

There are a number of regulatory programs that deal with flooding.

National Flood Insurance Program (NFIP)

Greensboro participates in the NFIP and regulates development in the flood hazard areas according to the minimum standards established by FEMA. These regulations control the use and construction of structures in the flood hazard areas. An important benefit to adopting the rules is that it allows all property owners in Greensboro to purchase flood insurance – whether or not the property is located in a Special Flood Hazard Area (SFHA). Homeowner's insurance policies do not cover flood damage.

Greensboro currently regulates development in the SFHA in accordance with FEMA's minimum standards. If new development is to occur in the SFHA, it must meet certain standards, such as elevation and floodproofing.

The NFIP prepares the Flood Insurance Rate Maps or FIRMs, as discussed earlier.

Emergency Relief Assistance Fund (ERAF)

The ERAF provides a state-funded match for Federal Public Assistance through FEMA if Greensboro meets FEMA requirements. When a community requires public assistance, FEMA funds generally cover 75% of the loss. For federally declared disasters that occur after October 23, 2014, ERAF will contribute half of the required match (12.5%) only if the town has taken all the following steps to reduce flood damage:

- Adopt the most current Town Road and Bridge Standards (which can be found in the VTrans Orange Book: Handbook for Local Officials).
- Adopt flood regulations that meet the minimum standards for enrollment in the National Flood Insurance Program.
- Maintain a Local Emergency Operations Plan (adopt annually after town meeting and submit before May 1).
- Adopt a FEMA-approved Local Hazard Mitigation Plan.

Greensboro has satisfied these requirements; therefore, the Town is eligible for a 12.5% match.

Local Emergency Operations Plan (LEOP)

An LEOP is a guide for activities immediately following a disaster, when it is critical that procedures be in place to respond to situations where health and safety are concerned. The LEOP establishes an incident command system, designates an operations center, and identifies local resources needed in a disaster. Maintaining an up-to-date LEOP is required for a 12.5% match in funding from the state Public Assistance Fund.

Local Hazard Mitigation Plan (LHMP)

The LHMP takes the LEOP to another level. The purpose of the LHMP is to provide education about the possible hazards and vulnerabilities in the town, identify methods to mitigate the risks, and enlist governmental agencies, organizations, businesses, and the public.

The latest LHMP revision was dated 2016. Mitigation strategies were proposed based upon the hazards and vulnerabilities identified. These strategies included the following:

- Integrate LHMP into the Town Plan and bylaws.
- Update flood hazard bylaws to prohibit new structures in floodplains.
- Require new critical facilities to be located one foot above the 500-yr flood elevation.
- Support education and public outreach regarding hazards.
- Develop and implement a Fire Prevention Plan for the villages.

River Corridor Easement Program

The intent of this program is to provide a financial incentive to landowners to allow for passive restoration of channel stability by allowing the natural erosive forces of the river to establish its least erosive form over time. Under a river corridor easement, the landowner sells their river channel management rights within the meander belt width corridor of sensitive and erosive streams. Agriculture and silviculture are permitted within the river corridor easement area. The three primary components of a river corridor easement are:

- Transfer of channel management rights to a land trust.
- No new structures/development within the river corridor.
- A minimum 50 ft. riparian buffer of native woody vegetation whose location floats with the river.

Critical Facilities

Critical facilities are essential to a community's resilience and sustainability. In general, there are two kinds of facilities that a community would consider "critical" during and after a flood:

- Those that are vital to the health and safety of the public before, during, and after a flood, such as emergency responders, schools, and shelters; and

- Those that, if flooded, would exacerbate the problem, such as a hazardous materials facility, power generation facility, water utilities, or wastewater treatment plant.

Because they are defined by their ability to quickly and efficiently respond to and recover from floods, critical facilities should never be flooded, and their critical actions should never be conducted in floodplains if at all avoidable.

Greensboro does not have any critical facilities in the Special Flood Hazard Area or in the recently delineated river corridors.

Regional Compatibility 12-9-17

The purpose of this section is to examine the plans of our adjacent communities, and the regional plan, to ensure that our plan is consistent or compatible with, these plans. The adjacent towns to Greensboro are Glover and Craftsbury to the north, Hardwick to the south, Stannard to the east, and Wolcott to the west. Each of these towns has published town plans. Also, the Northern Vermont Development Association (NVDA) Regional Plan was reviewed.

The review took into consideration issues such as potential land use conflicts that could occur at town boundaries, development trends, and major regional initiatives.

The Northern Vermont Development Association (NVDA) Regional Plan was reviewed to evaluate the compatibility of the Greensboro Town Plan with the Regional Plan.

The following is an excerpt from the goals and strategies of the NVDA Regional Plan:

- Forest Land - sustainable forests
- Agriculture - preserve productive farmland
- Recreation - support year-round recreational opportunities
- Land Development - support established village centers
  - support a variety of housing at different price points
  - protect against fragmentation of rural lands
- Energy - support the use of renewable energy
  - encourage energy efficiency
- Education - pursue opportunities for shared facilities between municipalities
  - support education for all ages
- Telecommunications - support efforts to address gaps in broadband and cell coverage
- Emergency Services - support local efforts for disaster planning
  - discourage development in flood prone areas
- Stormwater - support Green Stormwater Infrastructure
- Wastewater - support the development of community wastewater systems
- Culture - promote local and regional tourism
  - Preserve historic downtowns
- Housing - Seek a balance of workforce, affordable and market rate housing
  - Help communicate with housing studies
- Economic Dev - Assist town's in their economic development efforts
- Natural Resources - protect the quality of the region's water
- Flood Resiliency - Encourage towns to restrict development with river corridor
  - Encourage towns to limit clearing and impervious coverage on steep slopes (>20%)

While these strategies do not represent the entire list of strategies in the NVDA Regional Plan, they do show that when compared to Greensboro's Town Plan, there is consistency. Many of Greensboro's policies and actions are similar to NVDA's strategies.

The village of Hardwick serves as one of the main hubs for the area and provides the surrounding towns with essential services, such as healthcare. The close proximity of Hardwick thus allows the surrounding towns to retain their rural character. Craftsbury, with its historic Craftsbury Common, is rural in character, similar to Greensboro, Stannard and Glover. Wolcott's town center sits along Route 15, and also is rural. A review of the Town Plans for these communities showed that the problems confronted by these towns are similar to those in Greensboro, such as:

- Safeguard water quality and natural resources
- Expand broadband
- Support an aging population
- Achieve a balanced housing solution
- Expand sustainable recreational opportunities
- Develop tourism as an economic opportunity

No conflicts with these plans were observed. Greensboro will continue to monitor progress in adjacent communities, and seek opportunities for multi-town initiatives.