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## Volume 2 Chapter 2

### II. Sense of Place

#### A. Plymouth Historic Resources Profile

##### 1. Summary

Plymouth's evolution as a community is recorded in its landscape. Historic settlement patterns – still evident from the town's road network, stone walls, abandoned rail beds, remnants of dams along the Baker and Pemigewasset Rivers and streams, and the clusters of historic buildings that define its downtown and hamlets – establish the broad framework for context sensitive development. A variety of resources are found locally, including historic landscapes, settlements, sites, and structures that mark progressive stages in the town's development, and today remain relatively intact. It's important that these historic resources be preserved for present and future generations. They provide a critical link to the town's past, and they contribute much to Plymouth's historic character and community identity.

The need to identify, record and preserve local history for present and future generations has been an ongoing community effort. Plymouth's founding and early development has been celebrated in centennial, bicentennial and annual Fourth of July day celebrations and has been documented in several historical accounts. One of the most profound measures of Plymouth's commitment to its historic resources dates to its acquisition of the County Courthouse in 1972, its listing on the National Register in 1982 and its renovation for Town Offices in 1996.

When comparing the 2016 Community Attitude Survey with the 2004 survey, the results show a decrease in commitment between the community and historical resources of the town. In the 2004 Community Attitude Survey, 80% of the respondents favored regulations to protect historic resources and 62% support using tax dollars for purchasing historic properties or easements to protect them. In the 2016 community attitude survey, only 43% of those surveyed favored setting aside funds in the town budget from property taxes for historical resources. Also, as of 2016, 71% of the community believes funding for Historical Resources should come from private donations. In 1990, North Country Council conducted a study of Plymouth's historic resources in the areas surrounding Plymouth's downtown. This profile includes information from the 1990 study. It specifically notes historic settlement patterns, sites and structures, presents opportunities and constraints to historic preservation, and offers recommendations to consider.

## 2. Town History and Historic Settlement Patterns

As noted, Plymouth's early town history is documented in town records, in the holdings of the Plymouth Historical Society, and in local histories and maps. Histories housed at the Pease Public Library and Plymouth State University's Lamson Library include:

- *History of Plymouth, NH* by Ezra S. Stearn 1906
- *The 150<sup>th</sup> Anniversary of the Granting of the Charter July 1763-1913*
- *Twenty Decades in Plymouth, NH 1763-1963* by Eva A. Speare 1963
- *Plymouth's First Lady: Eva Augusta Speare 1875-1972* by Audrey Moulton
- *Clothespin/Calendars: Recollection of the Past* by Eunice K. Halfmann 1985
- Numerous articles in the Plymouth Record and Record Citizen by Penny Kleinpeter
- *One Hundred Years of Service: Plymouth Teachers College and Plymouth State College* by Norton Bagley

Highlights of Plymouth's earlier development, summarized from early histories, the 1990 Historic and Cultural Resources Survey, and related documents include the following:

### Native American Period (through late 1600s)

- Occupation of the area by Native Americans predated the arrival of English settlers in the 1700s by more than a century. Near the junction of the Baker and Pemigewasset Rivers was an Abenaki village. Howard Sargent, an archaeologist associated with the New Hampshire Division of Historic Resources (NHDR), located and investigated two Native American sites in the 1970s. One, NHDR site number NH19-1, is near the mouth of the Baker River; the other, NH19-2, is near the National Guard Armory. In the early 20<sup>th</sup> century, a survey was conducted in the same area by archaeologist Warren K. Morehead. Records as to the location of the artifacts he recovered have not been located. The artifacts recovered by Howard Sargent are in the collection of the Sargent Museum in Manchester.

### Early Historic Period (1700 - 1790)

- White hunters and trappers traveled up the Connecticut River in the late 1600s, but it was not until the 18th century that exploratory expeditions occurred in the Plymouth area. During conflicts with Native Americans, colonial forces, led by Lieutenant Thomas Baker in 1712, and later Colonel John Lovewell in 1753, used ancient trails and passed east along the route from Haverhill, NH on the Connecticut River to the Pemigewasset River via the Baker River to what is now Plymouth. In his 1712 expedition, Lt. Baker attacked a group of Abenaki camped at the junction of the Baker and Pemigewasset Rivers, killing eight. For his exploits, he was promoted to captain and although the original name of the Baker River was Asquamchumauke, the river was renamed after him.
- The rich interval lands attracted an exploratory party from Hollis, NH in 1762. A charter was procured in July 15, 1763 and the white settlement of Plymouth began the same year. Most of the original settlers were from Hollis, with several from Dunstable, Massachusetts, Chester and neighboring towns. The Congregational Church was organized before the settlers had left Hollis and the first minister, Nathan Ward, was chosen. The first town meeting was held in July 1766. During the first 10 years of the settling of Plymouth, the following significant structures were built and roads laid out:

- a meetinghouse at the foot of Ward's Hill,
  - a school,
  - a tavern, and
  - the Dartmouth College Road (little more than a wide path.)
- District schoolhouses and cemeteries, many of which remain today, marked areas of concentrated development. The rich interval soils along the Baker and Pemigewasset Rivers led to the growth of large river valley farms. Hill farms on immediately adjacent land also grew in number.
  - By 1773, there were 345 people in town.
  - The power of the numerous rivers and streams in Plymouth was harnessed early to supply lumber and flour to the many outlying hill farms.

#### **Revolutionary and Post Revolutionary Periods (1770 - 1830)**

- The first settlers in town constructed log cabins while they built their more proper home according to prevailing architectural tradition. Vernacular dwellings of this period were constructed in the 1-1/2 story Cape Cod form, with central chimneys, and some with applied Georgian/Federal elements, usually in the entrance. The more prosperous residents built 2-1/2 story homes, both in town and in outlying areas. Farming was still the prevalent occupation.
- By 1790, there were 625 people in town; Grafton County was organized, and more construction had occurred, including:
  - a courthouse where Daniel Webster tried one of his earliest cases,
  - schoolhouses in the outlying districts,
  - a second meetinghouse on Ward's Hill,
  - several stores,
  - the first bridge over the Pemigewasset River,
  - Holmes Plymouth Academy, and
  - the new Webster Tavern.
- During the early 19th century, the road system expanded with the construction of the Mayhew Turnpike, the opening of stagecoach lines to the North Country and White Mountains, and the completion of the Franconia Notch Road in 1805. Holmes Plymouth Academy was opened at a location across from present day Plymouth Historical Society Museum on Court Street.
- Early manufacturing ventures supported the needs of the local population. In time, these ventures were turning out commercial products, such as deerskin gloves and bricks. Industrial and commercial growth was somewhat limited due to the lack of reliable transportation both into and out of the region.

#### **Beginnings of Plymouth's Industrialization Period (1830 - 1865)**

- As waterpower was harnessed for industrial development, Plymouth quickly became a major trade center for the area. Subsistence farming was increased in scale to take advantage of the proximate markets. Throughout this period, sawmills and gristmills

increased in number until nearly every brook was providing power for some type of small industry.

- Several hamlets grew around these mills; the most notable aside from Plymouth Village was Glove Hollow in the southeastern part of town, where a sawmill, a tannery and glove factories were located. Another industry that grew in Plymouth during this period was the pottery business, where a characteristic “brown ware” was produced. The potteries and brickyards were located west of the town near the Baker River, a major source of clay.
- In addition to the various industries, there was a trend toward agricultural specialization during this time, as seen in the increased number of dairy herds and flocks of sheep. Farmers were increasingly involved in a cash economy as small commercial and mill villages developed at key stagecoach intersections and waterpower sources.
- Transportation depended upon stagecoaches; improved roads or turnpikes linked a number of villages and determined the dominant commercial centers of the region. Plymouth began to capture many of the tourists who began flocking to the White Mountain area.
- The Boston, Concord and Montreal Railroad, which veered toward the Connecticut River from Plymouth, arrived in 1850 and spurred traveler visits. By 1860, there were many taverns and three hotels, including the famous Pemigewasset House.
- Between 1830 and 1865, outlying hill farms continued to be settled at a steady pace, with settlement uniformly spread across town. Combined with the rapid growth of the glove, pottery and brick making industries, increased demands were placed on municipal and commercial services.
- Large public and commercial buildings began to line the main street as the central business district began to take on its present concentration of structures. Photographic views of c.1860 show downtown Plymouth streets lined with large, wood, Greek revival style commercial buildings. During this period, the Congregational Church on the common, the Universalist Church, and the first Town Hall were built.

#### **Industrialization and Downtown Development (1865 – 1900)**

- The first training for teachers in New Hampshire was offered at the Holmes Academy in 1937.
- Since the 1960s, there has been much commercial development along major highways just outside the village, especially along Route 3A/25 toward West Plymouth. Outlying open space that was formerly farmland has undergone substantial subdivision (along roads in North Plymouth), but the town itself retains much of its rural character.
- The year 1963 initiated the expansion of Plymouth Teacher’s college marked in part by college building expansion. During this decade, Plymouth became a gateway for

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ski development at Tenney Mountain, Waterville, and Loon. In general, the decade between 1963 and 1973 was one of transition in Plymouth, and other towns similarly situated, in that the town was compelled to make changes responding to outside forces at the state and national level.

- The town of Plymouth purchased the Grafton county courthouse in 1972.
- Two major floods occurred in 1973, one in June/July, and another in December. Due to these floods, flood insurance zoning came into consideration.
- The oil embargo and gas shortage of the early 1970's affected Plymouth, as the Plymouth College delayed the start of the spring semester, due to people's inability to drive or travel there.
- The first major developments of Tenney Mountain occurred in the late 1970's, where Hatch Plaza was opened and gave way to a variety of different stores.
- Plymouth worked towards a goal of more economic development with other towns throughout the mid-1980s.
- Plymouth ranked top 7 in 100 best small towns of America in 1993.
- The show "The Brotherhood of Poland, NH" filmed its pilot episode in Plymouth in March of 2003.
- Plymouth College changed its name to Plymouth State University in 2003.
- Plymouth's student population grew substantially as a result of being recognized as a University instead of a teacher's college.
- The Groton wind farm was built in 2012, and became one of the first renewable energy projects completed on Tenney Mountain Highway near Plymouth.
- Plymouth celebrated its 250th anniversary in 2013.
- Three floods affected Plymouth in 2017 and 2018. One in February 2017, caused by ice jams up river, and another in late October 2017, caused by heavy rain. In January 2018, ice jams caused the most recent flood.
- Northern Pass, a \$1.1 billion dollar power transmission line project, spanning 192 miles through New Hampshire from southern New England to Quebec was first proposed in 2011 by Northeast Utilities and Hydro-Quebec electrical company. The project has the potential to affect many NH towns, including Plymouth, scenic outlooks, and trails along it. The NH Site Evaluation Committee denied the permit for the Northern Pass project to proceed in February of 2018, and the project was turned down.

Commented [RY1]: Citation or shouldn't be included?

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#### 4. Looking Toward the Future

### Current Preservation Resources

Efforts to record and preserve Plymouth's history for future generations have been ongoing, probably since its founding. The responsibilities for collecting and preserving records and artifacts relating to the town's historic development have fallen largely to the town – for town records as required by state law. Those records date to the 1770s and include birth, death, and marriage information.

The Plymouth Historical Society collects historical information that is shared with the community at various functions, weekly news stories, and through a museum maintained by the Society in its home, the old courthouse and original town library. The museum collection includes displays of photographs, samples of the products of the west Plymouth potteries, and other reminders and relics of past days. The society is governed by its officers and a Board of Trustees and is supported by membership dues and fundraising efforts.

The town's interest in preserving local historical resources extends beyond the town's historic sites and structures; it also includes the rural, agrarian landscape that provides their cultural context. At the October 2004 Public Forum, participants expressed concern about losing the town's agrarian landscape. It was noted that important historic features should be inventoried and means for preserving these features identified and implemented. In the 2004 Community Attitude Survey, 80% of the respondents favored regulations to protect historic resources while 62% support using tax dollars for purchasing historic properties or easements to protect them.

In recent decades, the town working with other entities has:

- initiated historic resource education (e.g., *Three Treasures* brochure, *Town Hall* handout, *Heritage Trail Guide* pamphlet);
- shown vision by commissioning the North Country Council in 1990 to study the historic and cultural resources of parts of the town; and
- demonstrated financial commitment to historic resources by renovating and using the Town Hall.
- has acquired 163 acres, the Walter-Newton Natural Area and an easement on 1,100 acres on Plymouth Mountain.
- In additional parcel of conservation land was acquired by the town of Plymouth in Tenny Mountain

There were some different responses from the 2016 Town of Plymouth Master Plan Survey, only 43% of those surveyed favored setting aside funds in the town budget from property taxes for historical resources. Instead, the respondents prioritized natural and recreational resources. Also, 71% believed that the funding for the historical resources should come from private donations, and 70% believes it should come from grants.

Based on the 2016 survey, it looks like there may be a political will to preserve and enhance the town's rural and cultural heritage and downtown character. Regarding the latter, the establishment of Plymouth Main Street program is seen as one step in that direction (see Appendix A - Historic Resources and Programs for more resources.) Concerning the rural and cultural heritage, it has been suggested that the town, through its governance and the Historical Society, continue to provide for the protection, preservation, and, when pertinent, the maintenance of historic landmarks as well as the preservation of elements of rural character.

## 5. Planning Considerations → Planning board please review

**Goal:** The preservation of Plymouth's rural character, traditional settlement patterns, historic resources, and cultural heritage.

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1. To insure the protection of landmark structures such as the Plymouth Railroad Station/Senior Center downtown, the Rollins Block, Holmes House, Rounds Hall, and the Draper-Maynard Building on the University campus would be their nomination for inclusion in the National Register for Historic Places. Such would expand the existing Historic District.
2. With regard to architectural features outside of the downtown area, undertake a photographic update of the George Clark Collection of photographs of Plymouth houses.
3. Preserve rural elements by designating "scenic roads." RSA 231:157 provides for such designations. One such road unofficially considered by some as "scenic" is Old Hebron.
4. The further acquisition of easements and the further establishment of Environmental Safety Zones should be considered as protection strategies.
5. Include an historic preservation item in the Capital Improvement Plan; such an indication of town support for variations of historic preservation would be an important "match" item in funding proposals.
6. The town and the Historical Society, should embark on a follow-up of the 1990 North Country Council historic resource study which included the following suggestions:
  - a. Complete a survey of historic resources downtown; refer to #'s 1 and 2.
  - b. Survey and map (via GPS) cellar holes and other historical archaeological sites in order to document evidence of early dwellings and other structures.
  - c. Consider establishing overlay districts or zones where viewscapes, scenic roads, and agricultural lands will be protected via easements or tax incentives, refer to 4 and 5.
  - d. Consider enhancing the Plymouth section of the NH Heritage Trail with interpretive identification markers so that trail walkers will not have to rely on a brochure to understand the historical significance.
  - e. Consider extending the present historic district to include significant historic structures in the downtown area, as noted in #1.
7. The town should create, by means of an ordinance, a review process to occur when the demolition of a building considered to be of historic or architectural significance.
8. Planning Board considerations regarding protecting historic resources:
  - a. Create an advisory committee to the Planning Board to assist in decisions relating to development in overlay districts or subdivision of land with special qualities or historic/archaeological values. The committee could also advise concerning threatened properties.
  - b. Establish a site plan review provision that, in addition to setbacks, creates guidelines for height, mass, and fenestration.
  - c. Investigate a means by which certain criteria must be considered when subdivision could intrude on historic or cultural resources.
  - d. Explore the possibility of establishing adaptive re-use provisions as a means of protecting historic buildings in accordance with guidelines provided by the US Department of the Interior.

## **Appendix A: Historic Resources and Programs**

As of July 1, 2017 and the adoption of the New Hampshire's state budget for Fiscal Year 2018-2019, the Department of Cultural Resources' four divisions have combined with the Division of Parks & Recreation and Division of Forest & Lands (both formerly divisions of

the Department of Resources and Economic Development) to form the **New Hampshire Department of Natural & Cultural Resources**.

Their mission is to protect, preserve, promote and manage New Hampshire's natural recreation and cultural resources. The state's "Historic Preservation Office"—previously established under federal legislation in 1974, has major programs such as;

- **State Register of Historic Places** – including the listing of locally nominated historic sites and structures (at least 50 years old) to provide: public recognition, consideration in the planning of local and state funded projects, special consideration or relief in the application of access, building and safety code regulations, and to qualify for state financial aid for preservation projects.
- **National Register of Historic Places** – national listing of nominated historic districts, sites and structures, also administered in New Hampshire by the Department, which affords limited protection under federally funded projects, tax incentives, and federal financial assistance, when funds are available.
- **Project Review (Section 106)** – a “review and compliance” process, established under Section 106 of the National Historic Preservation Act of 1966, to identify significant historic properties that may be affected by state or federally assisted projects or actions, so that harmful impacts can be avoided or minimized.
- **Barn Preservation Program** – including the New Hampshire Barn Survey Project, information about related grant and tax incentive programs, property tax incentives, historic preservation grants (when available), and barn assessment grants available through the New Hampshire Preservation Alliance.
- **State Conservation & Rescue Archaeology Program (SCRAP)** – a public participation, training and certification program for archaeological research, management and education, administered by the Division's Archaeological Bureau, the intent of which is to increase the rate of site identification and evaluation, reduce the rate of site destruction, recover information from sites to be destroyed, and conduct original research.
- **Historical Marker Program** – jointly managed by the N.H. Division of Historical Resources and N.H. Department of Transportation, to place historic markers along public rights-of-way that identify historic sites, structures or events, in response to proposals from concerned citizens, an historical society or other local groups.
- **Certified Local Government (CLG) Program** – which includes some requirements for participating municipalities, but at the same time allows local governments to apply, on a matching basis, for preservation funds set-aside exclusively for CLGs.

The **New Hampshire Preservation Alliance**, founded in 1985, is a nonprofit organization dedicated to preserving New Hampshire's scenic and cultural landscapes and historic resources. The Alliance is a source of information, technical assistance, and small grants, for preservation planning and for the preservation of historic barns and other agricultural outbuildings. Two of their programs:

- **Project Development Grants**

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- **Barn Assessment Grants** (note that this program was temporarily suspended as of August 1, 2003)

**B. Plymouth Natural Heritage**

## 1. Summary

- Plymouth has a temperate climate influenced by topography and general weather patterns - long, cold winters and cool summers of about 113 frost-free days.
- Elevations in town range from around 440 feet above mean sea level on the Pemigewasset River at the Plymouth, Bridgewater and Ashland town lines, to 2,193 feet on Plymouth Mountain.
- Although there are many small pockets of sand and gravel, there are no deposits large enough to support new commercially viable operations.
- Plymouth has approximately 4,552 acres (7.1 mi<sup>2</sup>) of farmland designated as prime farmland, important statewide or locally important.
- Though located in the upper Merrimack River watershed system, Plymouth is locally part of the Pemigewasset-Baker River watershed. Most surface water in Plymouth eventually drains into one of these two rivers.
- Environmentally sensitive areas serve important ecological functions and/or may pose significant development constraints. Sensitive areas include steep slopes in excess of 25% grade, floodplains, wetlands, and critical wildlife habitat.
- Nearly a quarter of the land area in Plymouth contains steep slopes (25% or more). Development of steep slope areas can result in accelerated runoff, soil erosion, and potential environmental hazards.
- Flooding is the single greatest natural hazard experienced in New Hampshire. Plymouth has a dozen locations that are known as repetitive flood hazard areas. These areas are moderately vulnerable areas that are likely to flood regularly.
- Between 9 and 12% of Plymouth's land area is wetlands. Wetlands reduce flooding, retain storm water runoff, recharge and filter water, support vegetation, provide valuable wildlife habitat, and add to the beauty of Plymouth's landscape.

Plymouth's natural heritage is rich in history, beauty and variety. The natural environment is largely defined by historic settlement patterns and land use. It continues to contribute to the town's character and the quality of life of its residents. While some lands are better suited to intense development, other areas of town have unique features that call for limited development or outright preservation. Natural resources have not always been managed for sustainability, resulting in environmental degradation. Fortunately, many of Plymouth's most significant natural features retain much of their environmental and ecological integrity.

This profile summarizes these natural features and references more detailed studies commissioned in recent years by local public officials. It is divided into six sections that include: climate, topography and drainage, earth resources, soils, water resources and environmentally sensitive areas.

## 2. Climate

The local climate affects water supplies, dominant vegetation types, the local growing season, energy demand (for heating and air conditioning), renewable energy supplies (e.g., solar, wind, and hydro power), building and road construction and maintenance, and air quality. Monthly averages over a 30-year period, as reported for New Hampshire, are presented below:

<b>Table 1</b> <b>Monthly Normal Values of Temperature, Precipitation, and Degree Days</b> <b>(HDDs/CDDs) for Plymouth over a 30-year period</b>						
	<b>Air Temperature (°F)</b>			<b>Precipitation</b>	<b>Heating/Cooling Degree Days</b>	
<b>Month</b>	<b>Mean</b>	<b>Maximum</b>	<b>Minimum</b>	<b>(inches)</b>	<b>HDDs</b>	<b>CDDs</b>
January	20.0	59.0	-27.0	3.78	1,217	0
February	21.0	54.0	-17.0	2.87	1,064	0
March	30.0	63.0	-15.0	3.54	1,203	0
April	43.0	88.0	21.0	3.39	550	5
May	53.0	88.0	25.0	3.86	361	11
June	62.0	95.0	34.0	3.82	112	68
July	66.0	88.0	45.0	4.25	33	96
August	64.0	91.0	37.0	4.06	91	45
September	57.0	90.0	30.0	3.39	124	60
October	47.0	82.0	19.0	4.09	349	2
November	38.0	68.0	10.0	4.13	924	0
December	27.0	61.0	0.0	3.5	1,381	0
<b>Annual</b>	<b>44.0</b>	<b>77.25</b>	<b>13.5</b>	<b>44.68</b>	<b>7,409</b>	<b>287</b>

Sources: [Areavibes: Plymouth, NH, US Climate Data](#), [Weather Underground](#)

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· The Plymouth area has a temperate climate, influenced by general weather patterns and local topography. Northwesterly winds are prevalent, bringing cold dry air during the winter months, and cool dry air in the summer. Stronger southerly winds occur during July and August, contributing to summer heat and humidity. Storm events are often associated with winds from the east. Thunderstorms are most common during the summer months.

· Winters are long and cold, with temperatures averaging below freezing during winter months, and January and February extremes that drop well below 0°F (-10 to -25°F.) Snowfall averages around 71 inches per year. However, seasonal snowfalls often vary widely from the average.

· Very hot summer weather (>90°F) is infrequent, though hot weather is common (70 to 80°F.) The local growing season, or period of days free of freezing temperatures, averages 113 days and usually runs from the end of May to mid-September; but freezes have occurred as late as June, and as early as August.

· Precipitation is generally distributed evenly throughout the year, with slightly higher monthly averages during spring and fall months. Droughts are infrequent, but can be severe – a 2002 drought was one of the severest on record, resulting in the declaration of a statewide drought emergency.

#### **Climate Change:**

Global climatic change – the warming of the earth’s atmosphere due to the emission of “greenhouse gases” such as carbon dioxide – will have local impacts. The burning of fossil fuels (e.g., from motor vehicles, furnaces) in particular releases large amounts of carbon dioxide into the atmosphere.

· It is estimated from New Hampshire climatic records that annual average summer temperatures in southern New Hampshire have increased by 1.6°F, and winter temperatures by 3.2°F, since 1895. New Hampshire’s annual temperatures have increased at twice the national rate (U.S. Global Change Research Program, New England Regional Assessment 2002).

· Climate change will affect the state’s, and the region’s, environment and economy (US Global Change Research Program):

o Higher temperatures will result in more extreme weather events, including more frequent storms, flooding and droughts – which will affect surface and groundwater supplies, and infrastructure. Sea levels are expected to rise along the coast.

o Impacts to human health will result from deteriorating air quality; increases in extreme weather events and heat related deaths, and the influx of disease carrying species.

o The composition of New Hampshire’s forests will change, including the loss of such species as beech, hemlock, and sugar maple – affecting the resource-based economy, the fall foliage season, and wildlife populations.

Reference: [New Hampshire Climate Action Plan- DES](#)

### 3. Topography and Drainage

Topography strongly influences the location and potential environmental impacts of development. Historically, roads and rail lines followed natural grades, avoiding the steepest and most poorly drained areas. Development, which once clustered in areas accessible by road and rail, now often extends into more remote areas.

- Plymouth lies within the southern portion of the Northern New England Uplands region. The local topography is mountainous – a product of the weathering of underlying bedrock and glacial activity.

- The drainage divide between the Lower Baker and Pemigewasset watersheds runs roughly along a line from the northeast due south through town. Land in the northwestern half drains to the Lower Baker River, which ultimately flows into the Pemigewasset River. The western portion of town drains into the Pemigewasset River, largely via Glove Hollow Brook.

Commented [RY3]: Should this be eastern portion?

- Elevations in town range from around 440 feet above mean sea level on the Pemigewasset River at the Plymouth, Bridgewater and Ashland town lines, to 2,193 feet on Plymouth Mountain. Rivers, streams, floodplains, ponds and wetlands occupy many of the town's low-lying areas.

- Most of the bedrock beneath Plymouth is considered to be a gray quartzite riddled with varying layers of mica dating from the Devonian period of the Paleozoic era (about 350 million years). No commercial bedrock or mineral deposits have been identified.

- Based on historic records, seismic activity statewide is common, but there have been few earthquakes strong enough to cause real damage. It is recommended by the state, however, that public buildings, infrastructure and utilities be sited, designed and constructed to minimize the possibility of earthquake damage.

- Much of the town's surficial geology is deposits composed of unconsolidated, loose assortments of rock fragments left behind by the advance and retreat of glaciers of 14,000 to 10,000 years ago. The withdrawing ice shields - tills and outwash deposits, left behind two major types of materials. These serve as groundwater aquifers, sources of sand and gravel, and the parent material for most local soils.

- According to the *Natural Resource Inventory - May 2005*, approximately 6.3 square miles (4,010 acres) or 22% of town is underlain with stratified-drift and till aquifers. These are located mostly along the Baker and Pemigewasset River floodplain, but also found in other areas in town (see Water Resource Map).

### 4. Earth Resources (Sand and Gravel)

Sources of construction materials (e.g., sand and gravel deposits) are an important resource – as existing and potential aquifers, and for construction and road maintenance material. Sand and gravel extraction, if not properly managed, can adversely affect ground and surface water quality and supplies, local vegetative cover and wildlife habitat, local roads, and neighboring

properties. At one time there was a specific statutory requirement that municipalities identify known sources of construction materials (e.g., sand and gravel deposits) in the master plan. Although this law no longer exists, such deposits are still important.

- There are many small pockets of construction material in numerous locations throughout town but no deposits that are large enough to support a commercially viable operation except those in operation now or in the past.
- Sand and gravel exist in various quantities within the floodplains of the Baker and Pemigewasset Rivers but excavation is impractical due to their proximity to water and the adverse environmental impacts that excavation may cause.
- The one site permitted under RSA 155-E in Plymouth is located on the south side of Fairgrounds Roads halfway to the Baker River. This is an area of Windsor soil and the excavation area contains an estimated 10,000 cubic yards of sand.
- There are also several old excavation sites in Plymouth, which have been previously used, and their remaining quantity is unknown. These sites are:
  1. Carpenter (“Carpenter Pit”) - Fairgrounds Road - road fill
  2. Ahern (“Telfer Pit”) - Route 3 - gravel
  3. McLoud (Sorel property) - Fairgrounds Road - gravel
  4. Blackey - Fairgrounds Road - road fill
  5. Jacques - Route 3 – sand

## 5. Soils

Soil scientists at the Natural Resource Conservation Service have collected information about Plymouth soils. Soils are a vital part to any community, as they can be used for agriculture and provide a large habitat for different animal species and organisms along with strong land for development. According to the USDA Web Soil Survey, the soils in Plymouth are spatial and tabular complete. Thus, because a soil layer underlies most activities on Plymouth’s surface, soils-based information can and does play an important part of this natural resource inventory.

**Commented [RY4]:** Maybe I am missing something but I don't understand this.

- The Village Water and Sewer District provides and maintains a central sewer system that makes on-site septic systems unnecessary in the higher density areas of town where the District’s high and low pressure and gravity fed lines are located. However, on-site systems must be used outside the Village Water and Sewer District.
- On-site systems rely primarily on favorable soil characteristics to absorb and purify liquid domestic and similar waste to prevent health hazards and water pollution. Residential and commercial growth outside the Village Water and Sewer District will only accelerate the demand placed upon soils to accommodate development.
- In addition to septic system suitability, soils data may be use as a planning tool to avoid adverse consequences of development such as erosion, sedimentation of streams, pollution of groundwater supplies, increased flood hazard, and associated losses in property values. Soils data may also be used to make informed choices about which areas have the capacity to support higher densities of development.

- Prime and statewide agricultural soils are identified for protection in the *Natural Resource Inventory - May 2005*.
- Current subdivision regulations, but not zoning regulations, include limited provisions for storm water management, sediment and erosion control to contain flooding and soil erosion.

**Agricultural Soils**

Plymouth currently has fewer farms than in 1979, but there are no concrete sources that tell us the exact number (including full-time and part-time farms). As noted in the *Natural Resource Inventory - May 2005*, almost 25 percent of all land in Plymouth contains agricultural soils suitable for growing crops. Most of these agricultural soils are located in relatively dry and level sections of town, having good access to frontage on local and state roads (see Natural Resources Map.)

- There are approximately 2,409 acres of USDA classified prime farmland found in Plymouth with 884 acres of farmland of statewide importance. Another 1,259 acres of farmland have been classified as locally important (see Natural Resources Map.)
- Actions that put high quality farmland in irreversible uses should be allowed only if those actions are clearly in the public interest of current and future generations.

Total Land Area	18,233 Ac.
Total Agricultural Soils	4,552 Ac.
Ag. Soils of Total Land Area	25%
1950 Ag. Land in Use	1,802 Ac.
1970 Ag. Land in Use	1,535 Ac.
2005 Ag. Land in Use	1,356 Ac.
Change in Ag. Land in Use	-25%

(Source: 1998 Plymouth Master Plan, 2002 Statewide Land Use/Land Cover Assessment, UNH.)

**6. Water Resources**

The state of New Hampshire has declared that all ground and surface waters of the state are public resources that are to be conserved, protected and managed for the public good. It is recommended in state statutes (RSA 4-C:22, RSA 674:2) that municipalities include a local water resource management and protection plan (local water plan) in their master plan, to be implemented through local ordinances and conservation programs. Two such management plans have been prepared and are adopted herein: *Baker River Watershed Management Plan June 2003* and the *Pemigewasset River Corridor Management Plan 2013* (see Volume 3.) In addition to watershed plans, the Plymouth Village Water & Sewer District has prepared a *Source Water Protection Plan October 2001* to protect the quality of Plymouth's drinking water by identifying and managing potential sources of contamination and threatening activities that occur within the source protection area (see Volume 3.)

## Groundwater

Groundwater aquifers include fractured bedrock and unconsolidated glacial (sand and gravel) deposits. Development within aquifer recharge areas, and sand and gravel extraction that reduces groundwater filtration, can adversely affect groundwater supplies and result in groundwater contamination.

- As noted in the recently completed *Natural Resource Inventory - May 2005*, approximately 6.3 square miles (4,010 acres) or 22.2% of the town is underlain with stratified-drift and till aquifers (see Water Resources Map.) These are found largely along the Pemigewasset and Baker River floodplain, but also found in other areas of town. These areas have been identified as significant hydraulic features and sensitive areas where development should be constrained.
- Most, if not all, Plymouth residents and businesses get their drinking water from groundwater sources. Groundwater levels town-wide are generally sufficient to supply individual wells.

Well Data	Total Depth (ft.)	Depth to Bedrock (ft.)	Total Discharge (gals./min.)
Minimum	120	32	1.75
Maximum	807	197	100
Mean	424	47	13.8
Median	405	30	8

Source: NH Department of Environmental Services 2005 (50% of 96 domestic wells)

- Water provided for residents within the Village Water & Sewer District comes from two gravel pack wells located on 16 acres of land the district owns in the "V" formed by the confluence of the Baker and Pemigewasset Rivers. There are also a few sand and gravel aquifers that supply public water systems. As noted in the *Source Water Protection Plan 2001*, these aquifers must be protected from contamination.
- The state regulates major groundwater withdrawals to prevent adverse impacts to surrounding water resources, including rivers, streams, wetlands, and neighboring wells, and also groundwater withdrawals that supply community water systems. It also regulates discharges to groundwater to prevent groundwater contamination.
- Potential groundwater contamination sources include landfills, septic systems, cemeteries, transportation corridors (e.g., hazardous material spills), fertilizers and pesticides, animal waste, above and underground fuel tanks, junkyards, auto shops, and manufacturing facilities.
- There are currently nine active public water supplies (PWSs) listed by the state, each of which is served by a bedrock well (see following table). A public water supply is defined by the state as "a system that provides water via piping or other constructed conveyances for human consumption to at least 15 service connections, or designed to serve an average of at least 25 people for at least 60 days each year. These are further categorized as: community water systems (e.g., municipal systems), non-transient/non-community systems (e.g., schools, factories), and transient/non-community systems (e.g., restaurants, campgrounds).

<b>Table 3</b>			
<b>Public Water Supplies in Plymouth</b>			
<b>System</b>	<b>System Type/Description</b>	<b>Population Served</b>	<b>Connections</b>
Calvery Christian School	Non-Transient, Non-Community, School	25	2
Dunkin Donuts	Transient, Non-Community, Commercial Property	700	1
Plymouth Sands Camping Area	Non-Transient, Non-Community, Commercial Property	125	70
Plymouth Village Water & Sewer District	Community	6,300	985
Tenney Brook Condos I	Community	90	36
Tenney Brook Condos II (Eagle's Nest)	Community	190	76
Kieus Place	Transient Non-Community	100	1
The Italian Farmhouse	Transient, Non-Community, Commercial Property	100	2
Whip O Will Cooperative	Community	165	66
Rte 3 / Crystal Springs	Community System	Unknown	1
Snowy Gables Saloon	Transient Non-Community	65	1
Plymouth Commerce Park	Non-Transient Non-Community	43	2
Plymouth Mobil	Transient Non-Community	300	2
The Last Chair	Transient Non-Community	40	1

The Seafood Center	Transient Non-Community	25	1
Village Square	Non-Transient Non-Community	26	13
Tenney Mountain Association	Community System	228	91
Plymouth 7 Eleven #37391	Transient Non-Community	200	3
Mountain Village School	Non-Transient Non-Community	62	1
Tenney Mountain Country Store	Transient Non-Community	40	1
<i>Source: NH Department of Environmental Services.</i>			

- Wellhead protection areas (WHPA), that include the surface and subsurface areas around public water supply wells, have been delineated and mapped for the Plymouth Village Water & Sewer District.
- Six high-risk land uses have been identified and should be prohibited within the PVWSD's WHPA. These land uses are hazardous waste disposal facilities, solid waste landfills, outdoor storage of road salt, junkyards, snow dumps, and wastewater or septage lagoons. These prohibited uses do not apply to those facilities that already exist.
- Crystal Springs on Route 3 is an unregulated drinking water source owned by the town, which is heavily used by residents of Plymouth and the surrounding area. Like the PVSWD's WHPA, it would be wise to actively protect this spring to protect public health.
- Municipal land use regulations and health ordinances also may be adopted to further protect aquifer areas and groundwater supplies. Local Water Protection Grants – to delineate WHPAs, inventory potential contamination sources, develop local ordinances, and conduct land surveys prior to acquisition – are available through NHDES.

### Surface Waters

Local surface waters include rivers, brooks, and ponds scattered throughout town. These waters support local fisheries, provide important riparian habitat, and have existing and potential value for recreational development and flood management. Where accessible they may also be important for fire protection. The Town of Plymouth is located in the northernmost basin of the Merrimack River watershed. It is bordered on the east by a 5.5 mile stretch of the Pemigewasset River while 5.5 miles of the Baker River flows through the northern section of town in a easterly direction, merging with the Pemigewasset River about 1.25 miles south of the Campton town line.

- There are two lakes or ponds in Plymouth with surface areas over 10 acres: the 119-acre Loon Lake (on the border with Rumney) and a 37-acre Wee Willy's Wetland along Clay Brook (about 1 mile west-southwest of Plymouth Village.)

- There are also a total of about 60 smaller ponds in Plymouth, most with surface areas of less than 2 acres.
- Though located in the upper Merrimack River basin watershed system, Plymouth is locally part of the Pemigewasset-Baker River watershed. Most surface water in Plymouth drains into one of these two rivers.
- The Pemigewasset River extends about 62 miles from its headwaters north of Plymouth in the White Mountains to where it joins the Winnepesaukee River at Franklin, NH, where it forms the Merrimack River 115 miles from the Atlantic Ocean. The Pemigewasset River enters Plymouth from Campton about 0.2 miles below Livermore Falls. It flows southerly for 5.5 miles before exiting Plymouth at the Ashland/Bridgewater town lines.
- The Baker River enters the Pemigewasset from the west, 1.7 miles south of the Plymouth/Campton town lines. It starts on the north slope of Mount Moosilauke (elevation 4,810) in Benton and Warren. Beginning as a steep mountain stream, the Baker River enters Plymouth from Rumney, just north of the West Plymouth traffic circle and slowly meanders east for approximately 5.5 miles to where it joins the Pemigewasset River.
- The Baker and Pemigewasset Rivers share similar characteristics including high flow months during spring snowmelt and low flow months in late summer and early autumn.
- Loon Lake has a surface area of 119 acres, with 62 acres in Plymouth and 57 acres in Rumney. This natural lake has a maximum length of 3,365 feet and a mean width of 1,339 feet. The maximum depth is 30 feet and the average depth is 18 feet. The water is colorless with 10-foot transparency. Loon Lake's bottom is 70 percent clay and 30 percent gravel overlaid with sawdust. It is the only public water in Plymouth under the NH Shoreland Protection Act, which regulates land use within 250 feet of the Lake.
- Plymouth relies largely on state regulations to protect its surface and ground waters. New Hampshire's shoreland protection standards regulate land use within 250 feet of designated surface waters. Towns may promote additional resource protection through their municipal regulations and/or land conservation and management programs. Environmentally-Sensitive Zones are established to include all land within 500 feet as measured horizontally from the edge of the normal river channels of the Baker and Pemigewasset Rivers and the man high water line of Loon Lake.
- The following are prohibited within the Environmentally-Sensitive Zone as outlined above:
  - A. any construction within the setback area
  - B. any disturbance for which an Earth Excavation Permit issued under RFA 155-E (soil and gravel mining) is required.
  - C. Any placement or removal of fill excepting that which is incidental to the lawful construction or alteration of a building or structure or the lawful construction or alteration of a parking lot or way including a driveway on a portion of the premises where removal occurs
  - D. any placement or removal of fill excepting that which is incidental to agricultural or silvacultural activities, normal landscaping or minor topographical adjustment

- Water quality is generally high. However, potential pollution sources include bank erosion, storm water runoff, septic systems, construction sites, junkyards, fertilizers and pesticides, road salt, and other potential point and non-point sources. The state conducts a limited monitoring program of the Pemi and Baker River.
- Plymouth's public waters are legislatively classified as "Class B" waters – good for fisheries, swimming, boating and potable water supplies with treatment – and are therefore managed by the state to support these uses. The discharge of untreated sewage or other wastes into these waters is prohibited under state and federal law.

## 7. Environmentally Sensitive Areas

Environmentally sensitive areas include areas of town that, in addition to ground and surface water protection areas, serve important ecological functions and/or may pose significant development constraints, and therefore should be considered for protection through local ordinances or land conservation programs. Many of these areas have been identified and mapped in the *Natural Resources Inventory - May 2005 (NRI)*.

### Steep Slopes

The development of steep slope areas can result in accelerated runoff and soil erosion, and potential environmental hazards associated with down slope movement.

- Nearly a quarter of the land area in Plymouth contains steep slope (25% or more) in town. These steep slope areas are depicted on Natural Resources Map as sensitive areas that may pose significant development constraints.
- Slopes of 15% to 25%, which may also present limitations for development, make up another quarter of the town's land area.
- Steep slopes are most prominent in the southern part of town. Plymouth Mountain is being managed for conservation, therefore, the upper elevations are not likely to be developed. Ski trails have been developed on the relatively steep portions (15 - 25% slopes) of Tenney Mountain while structures have been sited on the more moderately sloped lands in its lower reaches.
- Plymouth regulations currently do not include steep slope protection and management provisions. However, slopes in excess of 25% constitute undevelopable land and may not be included in density calculations.

### Floodplains

According to the Town of Plymouth's *Hazard Mitigation Plan 2016* (see Volume 3), flooding is the single greatest natural hazard experienced in New Hampshire.

- Plymouth's 100-year floodplains – those areas likely to be inundated at least once within a 100-year period or having a 1% chance of flooding in any given year – were first identified and mapped for flood management and insurance purposes in 2001/2002.
- Floodplains are shown on the Water Resources Map as hydrologic features and sensitive areas that may pose significant development constraints.

- There are numerous areas where land is expected to be inundated during 100-year episodes. Loon Lake and its outlet stream leading to the Baker River can expect to sustain flooding; so can portions of Loon Lake, Chaisson and Fairgrounds Roads. Smith Bridge Road can expect flooding as well as portions of the Tenney Mountain Highway. Sanborn Mill Brook along Yeaton Road, Route 3 and Route 3A, significant sections of Clay Brook and Glove Hollow Brook can also experience occasional flooding. There are numerous locations along the Pemigewasset and Baker Rivers where the river has altered its course over the years resulting in the creation of oxbows.
- The extent of damage caused by any flood depends on the lay of the land flooded, the depth and duration of flooding, the speed, rate of rise, and development in the flood plain. NRCS, in a flood hazard analysis of local rivers, points out that even a 10-year flood on the Pemigewasset River, Baker River, or Sanborn Mill Brook would result in the inundation of some residential, commercial and agricultural properties in Plymouth.
- Plymouth has adopted floodplain ordinances including environmental safety zone and is currently a member of the National Flood Insurance Program. It also has recently adopted the *Hazard Mitigation Plan 2016*.

### **Wetlands**

Wetlands are a valuable ecological, recreational and education resource. Wetland areas perform a wide range of functions– they reduce flooding, retain storm water runoff and sediment, recharge and filter surface and groundwater, support unique vegetation, provide valuable wildlife habitat, and add to the scenic beauty of the local landscape.

- Wetlands identified by the presence of poorly and very poorly drained (hydric) soils are quite extensive and widely scattered throughout the community. In the *Natural Resource Inventory - May 2005*, the total wetland area based on hydric soils was estimated to be around 2,146 acres (about 12% of Plymouth’s land area). Wetland areas identified on National Wetlands Inventory (NWI) maps indicate approximately 1,592 acres (or 8.8% of the landmass) of wetlands in Plymouth.
- Although excellent tools, according to the *NRI - May 2005*, generally NWI data under represents the size and number of wetlands, and Natural Resource Conservation Services hydric soil data alone over represents the size and number. In 1985, the town contracted with *Natural Resource Consulting Services* of Concord, NH to perform an inventory and assessment of wetland. The results of the work have been included in the *NRI-May 2005* (see Volume 3.)
- The federal and New Hampshire state governments recognize the importance of wetlands and have numerous programs regulating their use and protection. Digging or filling any wetland in New Hampshire requires a review process by the state Wetlands Board; and large-scale earth alterations must provide erosion and sedimentation control measures before they can be permitted.
- Plymouth’s Subdivision Regulations prevent septic systems from being placed in wetland soils and further requires that wetland soils not be included in calculating minimum lot sizes. The Subdivision Regulations also provide for site-specific erosion

and sedimentation control measures which can aid in protecting the integrity of wetlands. However, Plymouth's Site Plan Review Regulation does not require wetland soils (or any soils) to be identified on the application plat.

- Plymouth's zoning ordinance does not include wetlands protection and management provisions. However, wetlands are defined as undevelopable land and may not be included in density calculations.

#### **Critical Wildlife Habitat (2015 Wildlife Action Plan)**

Critical wildlife habitat, which is necessary for the survival of one or more wildlife species, includes the habitat of rare, endangered or threatened species and natural communities, and other natural areas worth preserving, such as riparian and travel corridors, and large, un-fragmented tracts of forested land. Critical wildlife habitat may be lost through the subdivision and conversion of land to other uses, or adversely affected by incompatible development.

- The New Hampshire Natural Heritage Bureau is charged with facilitating the protection of the state's rare plants and exemplary natural communities. The Bureau inventories species; tracks occurrences based on reported sightings; and interprets natural heritage information for use in local planning. Its current listing for Plymouth includes three threatened plant species and a Wood Turtle sighting.

Species/Community	State Listing	Importance	# Reported (last 20 years)	
			Town	State
Natural Communities - Palustrine	---	Very High	1	1
Plants				
Licorice goldenrod ( <i>Solidago odora</i> )	Endangered	Very High	Historical	21
Loesel's wide-lipped orchid ( <i>Liparis loeselii</i> )	Threatened	Very High	Historical	25
Vertebrates - Reptiles				
Wood Turtle ( <i>Glyptemys insculpta</i> )	Special Concern	Extremely High	2	193

*Source: NH Natural Heritage Bureau Listings, July 2013. New Hampshire Fish and Game.*

- No extensive inventory of the town's biodiversity has been conducted. There are likely other undocumented occurrences of rare plant and animal species in town. There may also be examples of species of "special concern", including showy species such as pink lady's slipper, Dutchman's breeches, pitcher plants, fringed orchids, and flowering dogwood, which are not considered rare, but are vulnerable to over collection.

4/10/18

- Buffered wetlands, lakes and streams, conserved lands, water supply protection areas, and large, un-fragmented forest blocks (500 or more acres) are also identified as habitat features and sensitive areas on included in the *NRI - May 2005* (see Volume 3.)
- According to the *NRI - May 2005*, there are less than average dense softwood stands in Plymouth. This suggests that maintaining the existing stands for the benefit of deer, moose and other wildlife populations is very important.
- Riparian corridors need to be identified, as well as where new buffers should be established or where existing ones should be extended and protected. If left in an undisturbed, naturally vegetated state, these areas protect water quality and fisheries, provide riparian habitat, and may serve as wildlife travel corridors.
- Wetland buffers should also be mapped to include the area within 100 feet of a wetland identified from National Wetland Inventory (NWI) maps. These areas also protect water quality, provide important wildlife habitat, and where connected, may serve as wildlife travel corridors.