Final as Amended April 21, 2021

Town of Fremont, New Hampshire
Natural Resources Inventory
Update 2021

Exeter River

Acknowledgements

The Fremont Natural Resources Inventory Update 2021 was written by members of the Fremont Conservation Commission with assistance from the Rockingham Planning Commission. Conservation Commission members are:

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Forward by the Fremont Planning Board

On April 21, 2021, the Fremont Planning Board unanimously voted to adopt this 2021 update to the Town's Natural Resource Inventory as robust and well written Appendix to the Town's Master Plan. Over the course of its development there was discussion and debate over the cause and effect of climate change and as such, the Planning Board wishes to make clear that they neither refute nor endorse the Conservation Commission's statements regarding anthropogenic climate change. The Planning Board wishes to thank the Conservation Commission for its commitment to stewarding the Town's natural resources and looks forward to continued collaboration on town planning and conservation matters.

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1.0 Introduction

1.1 Fremont Conservation Commission Mission Statement

Our mission includes:

1. Making recommendations to other boards regarding actions that will affect natural and watershed resources.
2. Making recommendations to the New Hampshire Department of Environmental Services (NH DES) regarding local wetlands issues.
3. Protecting Spruce Swamp and the upland buffer around it. This wetland complex is among the highest quality of habitat in New Hampshire and home to rare, endangered and threatened plants and animals.
4. Protecting the Piscassic and Exeter Rivers and their watersheds to the fullest extent possible. These rivers and their tributaries flow into the Great Bay.
5. Protecting the regional conservation focus areas identified in regional and state plans. Two of the focus areas in these plans include Spruce Swamp and the Exeter River and its watershed.
6. Managing the Oakridge, Glen Oakes and the Cooperage Town Forests by balancing low impact recreation with habitat and water resources protection.
7. Performing public outreach on natural resources, conservation and recreation.

1.2 Statutory Authority and Duties

Per New Hampshire Revised Statutes Annotated (RSA) 36-A:2: "A city or town which accepts the provisions of this chapter may establish a conservation commission, hereinafter called the commission, for the proper utilization and protection of the natural resources and for the protection of watershed resources of said city or town. Such commission shall conduct research into its local land and water areas and shall seek to coordinate the activities of unofficial bodies organized for similar purposes, and may advertise, prepare, print and distribute books, maps, charts, plans and pamphlets which in its judgment it deems necessary for its work. It shall keep an index of all open space and natural, aesthetic or ecological areas within the city or town, as the case may be, with the plan of obtaining information pertinent to proper utilization of such areas, including lands owned by the state or lands owned by a town or city. It shall keep an index of all marshlands, swamps and all other wetlands in a like manner, and may recommend to the city council or selectmen or to the department of natural and cultural resources a program for the protection, development or better utilization of all such areas. It shall keep accurate records of its meetings and actions and shall file an annual report which shall be printed in the annual town or municipal report. The commission may appoint such clerks and other employees or subcommittees as it may from time to time require."

The purpose of this Natural Resources Inventory (NRI) is to assist the Fremont Conservation Commission in fulfilling its statutory obligations. The NRI locates, lists and describes the natural resources found in Fremont as required by RSA 36 A:2. It is a 'stand-alone' document that is also included as a chapter in Fremont's Master Plan. It promotes awareness and appreciation of Fremont's natural resources. The report describes water resources, soils and geology, forest and agricultural resources, wildlife habitat, and conservation land, and provides recommendations for protection of these resources. The Town boards and the residents of Fremont can use the NRI as a guide for making better decisions regarding natural

resources. Geographic information system (GIS) maps associated with the latest available data were used to illustrate the features. These maps were compiled from several data sources.

1.3 How is the Natural Resource Inventory Used?

As noted below, the NRI is used in many different ways and contains a wide range of information.

- The Conservation Commission uses the NRI to make natural resource recommendations to the Planning and Zoning Boards and to NH DES regarding local wetland issues in Fremont.
- The Town Boards use the NRI to enable better protection and management of the natural resources in Fremont.
- Town Boards, Fremont residents and Land Trusts use the NRI to identify forest, agricultural land and wetlands that need permanent protection.
- The NRI is used to document current (year 2020) natural resource conditions to support monitoring of changes in resource conditions over time.
- The NRI is used in grant writing because it provides detailed information about the natural resources.
- The NRI includes *The New Hampshire Wildlife Action Plan's* data and maps and describes natural habitats in Fremont. It rates the conditions of the habitat areas. Fremont has some habitats that are the highest quality in the state, some that are the highest quality in the region, and some that are supporting landscapes (i.e., the surrounding area that supports these high-quality habitats). The NRI includes information on endangered, threatened, or NH species of concern that may live in Fremont.
- The NRI provides detailed information about natural resources not otherwise included in the Town's Master Plan.
- The NRI incorporates relevant reports and studies regarding natural resources in Fremont into one document (often by links), increasing awareness of these documents, and enabling easier access and increased use.
- The NRI includes maps with the most recent GIS data available at the time of report preparation to show the natural resource features described in the report. These maps are used for Town Planning and by interested people.
- The NRI includes Appendix 1 which lists free online GIS tools for mapping and planning and references where the most up to date mapping and information may be found.

Like all communities in the region, Fremont is faced with the challenge of finding a balance between growth and protection of its significant natural resources. The rural and historic character of Fremont in combination with rivers, ponds, forests, and farms provides a high quality of life for residents and an excellent habitat for native plants and animals.

Fremont residents have shown their support for the protection of natural resources by supporting the adoption of local land use regulations and policies designed to protect water quality, wildlife habitat, and the working landscape of farms and forests. The citizen survey conducted by the Town as part of the 2020 Master Plan Update revealed that protection of open space is still an activity the Town should pursue. Ninety percent of responding residents indicated that maintaining open space, natural areas, and working farms is important to the character of Fremont. Concern about protecting Fremont's natural resources and the potential side effects from certain types of businesses is one of three major themes to emerge from the 2002 survey. Additionally, this survey showed an increase in concern about land use changing

more rapidly from a natural state or agriculture to more intense uses such as residential or commercial. Fremont citizens indicated a desire to protect water resources: 97% want drinkable water from private wells; 95% want healthy wetlands, streams and ponds; and 59% said protection of aquifers was 'definitely needed' while 29% said 'might be needed'.

Natural resources for Fremont were mapped by the Rockingham Planning Commission (RPC) and are located in an appendix at the end of this inventory. These maps were completed using GIS data from different sources and at different scales. The RPC uses data from GRANIT (Geographically Referenced Analysis and Information Transfer) from the University of New Hampshire's Complex Systems Research Center. These GIS maps have combined information from several sources into a common scale and format. It is important to remember that these maps are accurate for site specific information and there may be more recent information available than what is provided in this NRI. Check the references within each map to evaluate data resources for more up to date information or contact the RPC with specific data inquiries.

2.0 Description of Natural Resources in Fremont

2.1 Land Use

This section describes the existing land use features which include forest cover and surface water resources such as Spruce Swamp, the Exeter and Piscassic Rivers, and Town wetlands. Fremont encompasses 11,142 acres, or 17.4 square miles. Table 1 lists some of the different types of land uses from the Towns Vision system. This is not a detailed up to date list, but it gives you a general idea of the percentages and types of land uses in Fremont. For example, mixed forest is the predominant land use, covering approximately 45% of town. For the most up to date and detailed land use, reach out to the Selectmen's Office.

Table 1 Fremont Land Use 2015

Land Use Code	Land Use Description	Acres	Count
1120	Multi-family, low rise apartments and townhouses, but not duplexes (1 - 3 stories)	65.8	19
1130	Single family/duplex	1,747.8	306
1140	Mobile home parks	55.3	6
1210	Commercial retail	13.9	10
1230	Services	36.1	17
1250	Government	13.0	4
1260	Institutional	9.5	3
1270	Educational	6.8	1
1300	Industrial	2.3	1
1442	Road right-of-way	157.6	7
1447	Auxiliary transportation	6.5	23
1449	Other road transportation	1.1	1

Land Use Code	Land Use Description	Acres	Count
1450	Communication	1.0	1
1460	Electric, gas and other utilities	62.1	9
1580	Other industrial complexes	7.7	1
1610	Multiple stories, residential in upper stories only	7.6	1
1690	Other mixed uses	7.5	2
1730	Outdoor recreation	52.6	5
1740	Cemeteries	3.6	2
2000	Agricultural Land	384.8	30
2900	Other Agricultural Land	59.8	16
3000	Brush or Transitional Between Open and Forested	277.2	83
4000	Forest Land	5,388.1	188
5000	Water	230.0	71
6000	Wetlands	2,055.1	245
7500	Strip Mine/Quarry or Gravel Pit	150.2	9
7600	Disturbed Land	339.3	58
	Total	11,142.4	1,119

2.2 Forest Resources

2.2.1 The Value of Forests

Fremont's forests provide valuable habitat for plant and animal populations. The forests absorb rainwater, increase groundwater infiltration, and buffer surface waters from sedimentation and contamination. Trees cool summer temperatures by 10 degrees or more, break winter winds, and filter dust and pollutants from the air. Forests host scenic recreational trails and hunting grounds. New Hampshire's tourist industry and seasonal residents are attracted by healthy forests. In addition, well-managed forests provide a sustainable supply of maple syrup, home firewood, commercial wood products and jobs needed by New Hampshire residents. Fremont forests provide all of these functions to the surrounding communities. Fremont's forests have scenic beauty and a modified microclimate; stabilize steep slopes and snowpack; and help control the flow of water and the creation and maintenance of stream habitat for aquatic animals and recreation. In addition, forests constitute a major storage of carbon not only in the trees themselves, but in the forest soils as well. Most importantly, forests provide us with biodiversity.

A forest is not merely a stand of trees: it encompasses all of the trees in the forest area. It includes the substrate (soil or rock) on which the trees depend for anchorage and support, nutrition, moisture, and supply of oxygen to the roots. The soil and atmospheric climate, including fire and moisture, influence the

distribution and abundance of all the organisms in the forest. A forest includes the other plants and animals with which the forest interacts. Animals feed on, shelter under, or may even benefit the plants. Microorganisms may exert direct or indirect beneficial or antagonistic effects on the trees and other living organisms.

A forest may consist of more than one forest types. Forest types are distinctive associations or communities of trees, shrubs, and non-woody plants, and are named for the predominant tree species occurring in the type. Common forest types in Fremont include white pine, red oak, hemlock, and aspen-birch. A forest type may be dominated by a single tree species or it may be dominated by several species growing together.

New Hampshire is the second most forested state in the United States after Maine. Fremont is approximately 70% forested; the state average is approximately 85%.[1] Many of Fremont's forests have grown from abandoned agricultural land and are now mature. However, due to increased development, the area of Fremont's forests is decreasing.

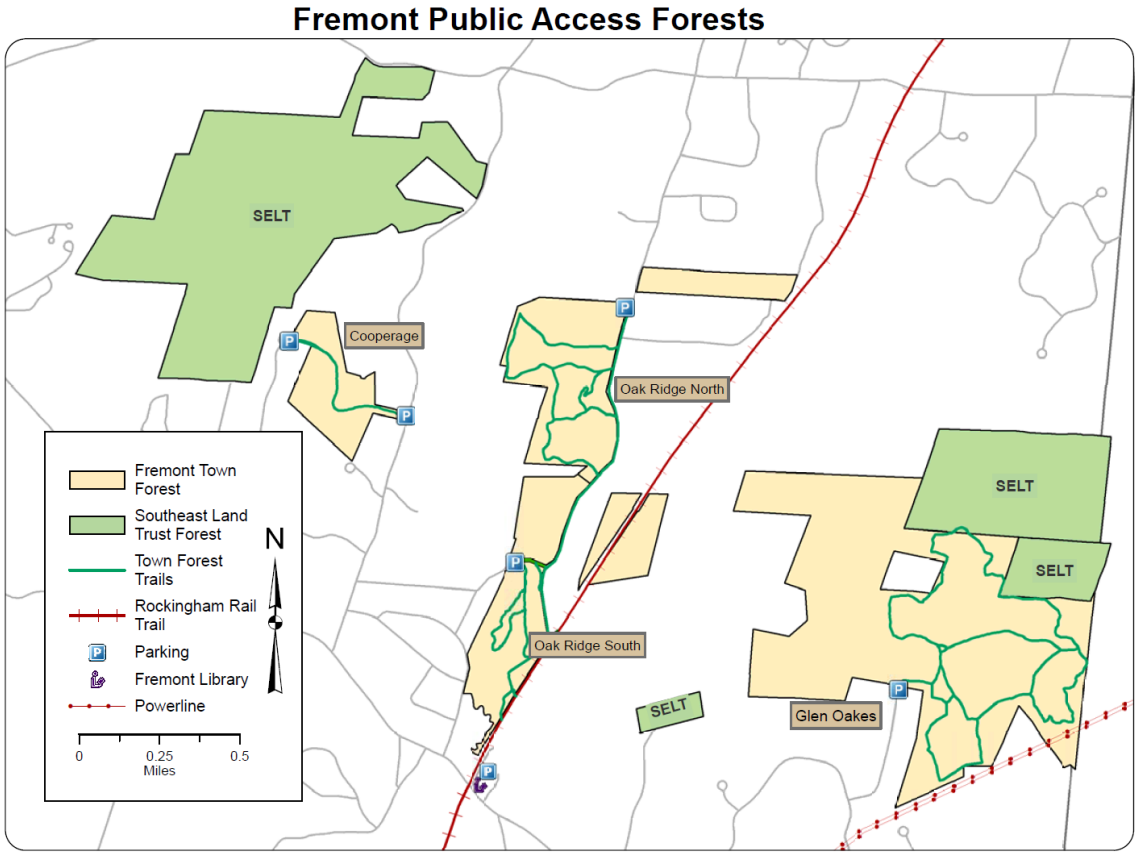
The Fremont Conservation Commission actively manages Fremont Town Forests under direction of the Town Forester Charles Moreno. Glen Oakes Forest is managed in accordance with the *Glen Oakes Forest and Wildlife Management Plan,* which is available at the following link: http://morenoforestry.com/wp-content/uploads/2015/09/fmp-fremont.pdf. One of the Conservation Commission's goals for the Town forests is to maintain a diverse and health ecosystem. To achieve this goal, poor quality and diseased trees are periodically removed to provide increased growing space, support a healthier forest, and improve habitat for wildlife.

2.2.2 Fremont Public Access Forests

Publicly accessible forests within Fremont are listed below.

- Oak Ridge Town Forest encompasses 189.4 acres, with wetlands accounting for a substantial area and bisecting the property into north and south sections.
- Glen Oakes is a 388-acre parcel of wooded land that borders the southeast edge of Spruce Swamp. This Town forest is an upland buffer that provides essential protection for the swamp, which is the largest wetland in Rockingham County and is designated prime by the Town of Fremont.
- The Cooperage Town Forest is 53 acres and was donated to the Town by Frank Catapano of Beede-Spaulding Inc., the developer of a conservation subdivision in Fremont, in 2014.
- The Southeast Land Trust (SELT) now owns 539.36 acres in Fremont. SELT allows public access including hunting unless the seller/donor stipulates otherwise. SELT does NOT allow off-highway recreational vehicles (OHRVs) and enforcement is strict.

[1] NH Division of Forest and Lands



2.2.3 The Town Forests

The Conservation Commission seeks to sustain all forest values including non-timber values such as plant, fish and wildlife habitat, and water and air quality. The Commission desires to improve long-term forest health and productivity by protecting the forest with management practices that protect the ecosystems and prevent fire, pests and diseases while enabling recreational and educational use. The Conservation Commission, under the direction of the Selectmen, developed a Town Forest Ordinance which is intended to protect Town Forests by governing the uses and activities to be in accordance with some state statures.

2.2.4 Protecting Our Trees and Forests: Damaging Insects and Diseases

Mr. Moreno, Fremont's Town Forester, found several damaging insects and tree diseases in Glen Oakes (see The Glen Oakes Forest and Wildlife Plan). A description of these harmful insects can be found at https://nhbugs.org. This website is an excellent reference for residents to explore insects and diseases in Fremont.

2.2.4.1 Invasive Species

An invasive species is a plant, insect, and/or fungal species that is not native to a particular region and has the ability to thrive and spread aggressively outside its natural range. The invasive species thrives and spreads in a new habitat because this habitat has no natural predators (insects, diseases and/or foraging animals) that can keep the invasive species' growth under control. Without any natural predators to prevent its spread, the invasive species, particularly in the case of plants, will put extreme pressure on native plants and animals. Ultimately the invasive plant will alter native habitats and reduce biodiversity

by choking out native vegetation, threatening rare and endangered species and degrading wildlife habitat. With the loss of native vegetation and wildlife habitat also comes the loss of a number of our native animal, bird and insect species that depend on the native habitats to survive. Invasive species present the worst threat in wetlands, sand dunes, fire prone areas, and serpentine barrens where rare native plants are found.

According to the New England Wildflower Society, nearly 1/5th of New England's 3,000 plant species are in danger of disappearing from our region. In addition, invasive species are degrading public natural areas at an estimated rate of 4,600 acres per day. The Nature Conservancy estimates that 42% of all species on the Federal Endangered Species Lists are listed partly due to the effects of invasive species (and for 18%, invasive species are the sole reason for their listing). Rich, diverse plant communities can become barren, inhospitable expanses of invasive plants with little value to wildlife. Invasive plants may even deplete groundwater. For these reasons, it is important to limit further introduction of invasive species to our town and to control or remove the invasive species that are currently present. Additional information is available at Cooperative Extension offices: https://extension.unh.edu/resource/invasive-plants. A guide to invasive plants and insects can be found at NH Upland Invasive Species: https://extension.unh.edu/resource/new-hampshire-guide-upland-invasive-species. Invasive plants have been found in Glen Oakes by the Town's forester Mr. Moreno.

2.2.4.2 Tree Farms

There is one tree farm in Fremont enrolled in the national American Tree Farm System® (ATFS), a program of the American Forest Foundation. Much of the work ATFS accomplishes is at the state and local level. ATFS programs are run by state and community volunteers. While each state Tree Farm program is self-governing, all work is performed under guidelines that were developed at the national level.

Source: Tree Farm Info: Rita Carroll, NH Tree Farm Administrator
Society for the Protection of NH Forests
54 Portsmouth St.
Concord, NH 03301
Phone: (603) 224-9945 x331

2.3 Conservation and Public Lands

Fremont has Town-owned and privately owned parcels that are permanently protected and legally protected by conservation easements or deed restrictions. It also has Town-owned land not permanently protected. There are large areas of land that are privately owned, of which some are permanently protected while others are not. What does it mean for conservation land to be protected? It means that there is a deed, either the original property deed with restrictions or a separate easement deed stating that the land will remain undeveloped. The exact terms vary by property. Mapping Fremont's conservation lands helps to identify opportunities for expanding these conservation areas, enabling wildlife to move safely through protected corridors and habitat areas and adding buffers that protect sensitive and fragmented areas. As of the date of this NRI, 1,611 acres of a total of 11,142 acres (source for total acreage is NH Department of Revenue Administration), or 14.5%, of land in Fremont are permanently protected by conservation easement or by conservation restrictions in deeds .

Fremont also has privately owned, large, undeveloped, not permanently protected parcels of land in the current use program. The current use program is authorized under RSA 79 and is a tax incentive program to entice qualified property owners with 10 undeveloped acres or more to agree to keep their land in an

undeveloped state. The assessed value is based on the ability of the land to produce income in its undeveloped state as opposed to income by developing this land. Buildings and other improvements, such as driveways and septic systems, or "curtilage" land that is needed to support surrounding structures are excluded from current use. If the land is removed from this program for development, the property is taxed accordingly. CurrentUseLaypersonsGuide.pdf (newenglandforestry.org)

Unfragmented lands are undeveloped sections of Fremont with few or no roads. These areas include forests blocks, open water, wetlands, farmland, and gravel pits. These land blocks are unrelated to ownership boundaries. Large blocks of forest, wetlands and farmland that are unfragmented by development or public roads are valuable for:

- Providing essential forest interior habitat for species such as some songbirds that need to be distanced from human activity, pets, and the forest edge in order to survive.
- Providing habitat for mammals that have large home ranges and prefer to avoid human contact, such as bobcat, otter, and moose.
- Enabling owners of large parcels of forestland to conduct timber harvests that are economically viable.
- Minimizing conflicts that can arise when managed forests and farms are surrounded and interspersed with development.
- Offering opportunities for remote recreation, including hunting, hiking and snowmobiling, where permitted by landowners.

Large tracts of undeveloped land are more likely than fragmented areas to support viable populations of species (many different kinds of animals and plants) and therefore act as a source of individuals that can then move to another fragment. Small fragments may be unable to support breeding populations. Persistent fragmentation as development increases may also lead to genetic changes and a loss of genetic diversity as populations are subdivided into small, locally breeding populations. Table 2 lists the acreage requirements for wildlife in New England as estimated by NH Fish and Game.

Table 2 Unfragmented Block Requirements Per Species

Acres	Species
25	Minimum size for breeding pair of whip-poor-wills
100	Minimum size for a red-shouldered hawk
100	Area required for viable population of wood thrush
500	Approximate maximum dispersal area for wood, spotted or Blanding's turtle
1200	Minimum home range for northern goshawk
1320	Maximum home range for Cooper's hawk
3900-6144	Minimum home range for lynx
9400	Area required for breeding pair of northern goshawks
23,616	Average home range of male bobcat in Maine

There are numerous studies on natural resources in Fremont and the region. Studies include:

- NH Wildlife Action Plan
- 2006 The Land Conservation Plan for New Hampshire's Coastal Watershed, https://forestsociety.org/sites/default/files/Coastal_Plan%20compressed.pdf

- 2010 Town of Fremont CTAP Open Space Report See Town of Fremont website or a hard copy is available in the Land Use Office.
- Impervious Surfaces in the Coastal Watershed of NH and ME, High Resolution Images – 2015

https://scholars.unh.edu/cgi/viewcontent.cgi?article=1396&=&context=prep&=&sei-redir=1&referer=https%253A%252F%252Fwww.bing.com%252Fsearch%253Fq%253Dfay%252Brubin%252BImpervious%252BSurfaces%252Bin%252Bthe%252BCoastal%252BWatershed%252Bof%252BNH%252Band%252BME%252C%252BHigh%252BResolution%252B%2525E2%252580%252593%252B2015%2526src%253DIE-SearchBox%2526FORM%253DIESR4A%2526pc%253DEUPP_#search=%22fay%20rubin%20Impervious%20Surfaces%20Coastal%20Watershed%20NH%20ME%2C%20High%20Resolution%20%E2%80%93%202015%22

2.4 Geologic Soils

The geologic soils map displays surficial geology, bedrock geology, soil types, and typography. Surficial geology includes existing sand and gravel pits and areas of town with potential for sand and gravel pits. Bedrock geology includes the types of materials found underneath the soil.

Like the rest of New England, Fremont was shaped by glacier action over 10,000 years ago. The motion of the glacier moved large amounts of rock and soil materials and smoothed the surface, giving a more rounded appearance to the surface. However, the glacier also left us with coarse, stony and often infertile soils.

By combining knowledge of the physical environment with what is known of the distribution of plants and animals, the U.S. Forest Service has divided New Hampshire into the following three principal biophysical or ecological regions or sections:

- Southern New England Coastal Plain and Hills Section (southeastern part of NH);
- Vermont-New Hampshire Upland Section (southwestern part of NH); and
- White Mountain Section (Northern part of NH).

Fremont is in the Southern New England Coastal Plain and Hills Section which can be further divided into three subsections:

- Gulf of Maine Coastal Lowland (immediate coastal region);
- Gulf of Maine Coastal Plain (southern portion); and
- Sebago-Ossipee Hills and Plain (northern portion).

Fremont is in the Gulf of Maine Coastal Plain, a subsection characterized by broad, hilly plateaus and drumlins leading to the coastal zone.

2.5 Agricultural Soils

The farmlands map displays three types of farmland information: prime farmland, farmland soils of statewide importance, and areas of agricultural land use in Fremont. This map also highlights developed

areas that occur adjacent to or on farmland soils. The US Department of Agriculture Natural Resource Conservation Services sets the following definitions for agricultural soils:

- Prime Farmland Soils - soils that produce or have the potential to produce the highest yields with minimal expenditure of energy and economic resources. Rockingham County lost 1/3 of its prime farmland to development between 1997 and 2002.
- Soils of Statewide Importance – soils, in addition to prime farmland, that are of statewide importance for production of food, feed, fiber and forage.

In a state as heavily forested as New Hampshire, fields and other farmland provide habitat for a variety of wildlife species and are important elements of scenic views. Farmlands also provide an important link to Fremont's history. Agricultural land is valued in Fremont for the food that its farmers produce, some of which is locally available, and for the potential of increased food production. This land is also valued for its scenic beauty and diverse habitat. Fremont's farmers and farm families help other residents connect with the town's rural heritage and promote better land management. Much of the character of the town we owe to those who have sustained their farms and agricultural lands for generations. Preserving Fremont's productive farmland will help ensure locally grown produce and a sustainable future for the citizens of Fremont.

An analysis of 2001 landcover data shows that 13 acres of the town were in orchard, 2 acres were in row crops, and 353 acres were in hay or pasture. There are many Fremont residents who hay or have their fields hayed but are not commercial operations. It should be noted that the above is not an inclusive list as there are numerous residents unknown to us who have horses, sheep, chickens and other livestock. In addition, many people raise vegetables, fruit and herbs for their own consumption and to share with their neighbors.

Grasslands are an ever diminishing and crucial requirement for many birds, including meadowlarks, bobolinks, woodcock, and killdeer, which are under increasing pressure from loss of habitat. The 2006 NH Fish and Game Wildlife Action Plan estimates there are 509 acres of grasslands in Fremont, with 0.7% of these lands protected from development through conservation easements.

2.6 Water Resources

2.6.1 Wetlands

Wetlands, as defined by the Environmental Protection Agency, the NH DES, and the Fremont Zoning Ordinance are those areas that are inundated or saturated by surface or groundwaters at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. Thus, a wetland is defined by the three "H's": hydrophytes or wetland vegetation, hydrology, and hydric soils.

Wetlands are an integral part of Fremont's natural resources: 21% of Fremont's total acreage is wetland. Wetlands are important for removing excess nutrients, pollutants, and sediment from the water. Wetlands slow and store rain, runoff and floodwaters, enabling rainfall and snowmelt to soak in to the soil and replenish the underlying groundwater that supplies private wells. Wetlands support diverse populations of plants and animals. In addition, wetlands provide recreational, educational and research opportunities. They add to the beauty of the town, especially in the fall when the red maples turn scarlet. Wetlands are most often found along streams and adjacent to ponds and lakes. They can be found in

clustered complexes that are of great value. Vernal pools are a special type of wetland that dry out completely in the summer and have no fish population. These pools are critical for certain species of amphibians: they are the only habitat where wood frogs, salamanders and fairy shrimp can reproduce. Vernal pools have not been mapped for Fremont.

There is a diversity of wetland types in Fremont, including areas of open water with emergent vegetation such as cattails, forested wetlands, and scrub-shrub wetlands. The principal types of wetlands with standing water in the spring have been mapped from aerial photos by the National Wetlands Inventory (NWI) of the U.S. Fish and Wildlife Service. The NWI wetlands do not include all wetlands, particularly those that do not typically have standing water in the spring. Therefore, this is an underestimate of the acres of wetlands.

Each wetland type has a distinct habitat with distinct plants and animals living there. There is species crossover between habitats. Because of these diverse habitats, Fremont has a wealth of plants and animals. Some are endangered, threatened or species of concern.

2.6.1.1 Wetland Definitions

Palustrine wetlands are inland wetland systems that lack flowing water. Lacustrine wetlands are associated with lakes and ponds. Riverine wetlands are fed by water flowing through a channel. Definitions of different types of wetlands are provided below. These definitions were obtained from Classification of Wetlands and Deepwater Habitats of the United States.

- Forested wetlands (palustrine) are characterized by woody vegetation that is 6 m (20 ft.) tall or taller.
- Scrub-shrub (palustrine) wetlands include areas dominated by woody vegetation less than 6 m (20 feet) tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.
- Emergent (palustrine) wetlands are characterized by erect, rooted, non-woody (herbaceous hydrophytes), excluding mosses and lichens. This vegetation is present for most of the growing season in most years, dying back in winter. The vegetation grows above the land or water surface. They may have roots or bulbs underground that survive the winter. These wetlands are usually dominated by perennial plants. Cattail marshes are one example.
- Unconsolidated bottom wetlands are those wetlands with open water over most of the surface area of the wetland. It includes all wetland and deepwater habitats with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%. Vegetation may grow in these wetlands below the surface of the water and/or may float on the water but is typically not visible early in the growing season.
- Lacustrine wetlands include wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; and (3) total area exceeds 20 acres. Similar wetland and deepwater habitats totaling less than 20 acres are also lacustrine if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 2 m (6.6 feet) at low water.
- Riverine wetlands include all wetlands and deepwater habitats contained within a channel, with the exception of wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. A channel is "an open conduit either naturally or artificially created which periodically

or continuously contains moving water, or which forms a connecting link between two bodies of standing water" (Langbein and Iseri, 1960:5).

Table 3 lists the acreage for each type of wetland found in Fremont.

Table 3 National Wetland Inventory in Fremont

Wetland Type	Acres
Upland Total area of Fremont excluding wetlands	8812
Palustrine: Forested	1446
Palustrine: Scrub shrub	496
Palustrine: Emergent (e.g. cattails)	273
Palustrine: (PUB)-Unconsolidated soils (not packed) like sand and gravel) Often found in stratified drift aquifers	62
Lacustrine	52
Riverine	1
Total	11,142

The percentage of wetlands in Fremont is 21%.

2.6.2 Prime Wetlands

Prime wetlands are defined in RSA 482-A:15 as “any areas falling within the jurisdictional definitions of RSA 482-A:3 and RSA 482-A4 that possesses one or more of the values set forth in RSA 482-A:1 and that, because of their size, unspoiled character, fragile condition or other relevant factors make them of substantial significance.”

In 2003, West Environmental prepared a study of Spruce Swamp for the Town of Fremont. This 824-acre wetland is recognized as an exemplary fen (a type of wetland) by the NH Natural Heritage Bureau and is also recognized as one of the highest quality habitats in the State. The Study resulted in Spruce Swamp being designated as Fremont’s first Prime Wetland by the State of New Hampshire. The complete study can be viewed in the Town Land Use Office.

In 2007, West Environmental, Inc. prepared a ‘Wetland Evaluation Report’ for the Town of Fremont. The purpose of the report was to gain a better understanding of wetland resources in Fremont and to identify wetlands that qualify for Prime Wetland Designation. Fifty-five wetlands were evaluated to assess the comparative function and value of each wetland. The wetland assessment methodology used by West Environmental, Inc., based in part on the US Army Corps of Engineers New England Division’s functional methodology, allowed for each wetland to be given a wetland value score. These wetland value scores, in turn, allowed for each of the assessed wetlands to be ranked from the most diverse and highly functioning wetlands to wetlands with limited functions. Wetland functions include: groundwater recharge/discharge; floodflow alteration; fish/shellfish habitat; sediment /toxicant/pathogen retention; nutrient removal; production export (produce food for or usable product for consumption);

sediment/shoreline stabilization; wildlife habitat; recreation; educational/scientific; uniqueness/heritage; and visual quality/aesthetics.

Based on the ranking system, four distinct tiers of wetlands emerged. Tier 1 included seven of the largest, most diverse wetland complexes in Fremont. Tier 2 included seven wetlands, although smaller than Tier 1, that proved to be diverse and high functioning wetlands. Tier 3 included 12 wetlands ranging in size from 12 to 20 acres that provide significant wetland function and value. Tier 4 included 23 wetlands that qualified for the Prime Wetland designation but did not have the high function and value that the top 26 wetlands had.

Based on these findings, and in accordance with RSA 482-A:15 and NHDES Wetland Rules (Wt) Chapter Wt 700 of the Department of Environmental Services administrative rules, the top 26 scoring wetlands were designated Prime Wetlands by the State of New Hampshire. The full report and a Prime Wetland Map can be viewed at the Town Land Use Office.

Table 4 Fremont's Largest Wetlands and Wetland Complexes

Name	Location	Acres
Spruce Swamp	North Road at Rail Trail and, for the most part, east of the unpaved section of Tavern Road to Copp Road. The southern limit of Spruce Swamp is defined by the Ridge Road esker and Meeting House and Tavern Road extensions.	827
Spruce Swamp South	North and south of Rt. 107, east of Louise Lane	141
Piscassic River Headwater	Shirking Woods, west and East of Beede Hill Road roughly between the unpaved section of Shirking Road and Tavern Road	Not Available
Tilton Swamp	West of Sandown Road, south of Whittier Drive in the area of Victoria Farm Road	Not Available
Bog Meadow Wetlands	Exeter River south of Chester Road near Sandown border	Not Available

2.6.3 Spruce Swamp

Spruce Swamp is the largest wetland complex in Rockingham County and is identified as an Exemplary Fen by the New Hampshire Natural Heritage Inventory. A fen is fed primarily by groundwater and is alkaline. Fens are often confused with bogs, which are fed primarily by rainwater and often inhabited by sphagnum moss, making them acidic. Like other wetlands, fens will ultimately fill in and become a terrestrial community, such as a woodland, through the process of ecological succession.

Spruce Swamp encompasses 827 acres, 711 acres of which have been designated Prime Wetlands. The Swamp is over 2 miles long from north to south 1.5 miles wide from east to west. Spruce Swamp is drained by four streams, two flowing north towards the Piscassic River, one flowing east towards the Exeter River,

and one flowing south towards the Exeter River. The swamp is located over a large aquifer and has a diverse plant community, including vast area of scrub-shrub, forested marshes, and large shallow marshes. Beaver impoundments control significant portions of this wetland systems hydrology. Wetlands ecologists consider Spruce Swamp to be one of the few remaining unspoiled ecosystems in southeastern New Hampshire.

In 1998, the Audubon Society of New Hampshire (ASNH) conducted a wetlands inventory for the entire Exeter River watershed. Wetland systems in the ten watershed communities were studied and two systems in Fremont were identified as priority wetlands in the watershed. These systems were labeled Spruce Swamp and Spruce Swamp South. These two priority wetland systems identified by ASNH were evaluated simply for descriptive purposes and were not evaluated with respect to wetland function.

Spruce Swamp – This 827-acre wetland is primarily forested, with several areas of shrub swamp, emergent marsh, and ponded open water. Spruce Swamp drains into the Exeter River via a small tributary channel, known as Red Brook, that originates in the wetland. Several large areas of marsh are highly interspersed with open water. The main area of the wetland comprises a mixture of primarily deciduous and some coniferous forested vegetation. Both the northern and southern extremes of the wetland include large areas of emergent marsh vegetation. Emergent sections are comprised primarily of bluejoint grass with some sedges. The edges are fringed with shrubs such as sweet pepperbush, leatherleaf, highbush blueberry, and mountain holly. Sphagnum moss dominates the shrub wetland floor. In the northern sections, especially west of the railroad trail, leatherleaf dominates the flooded shrub swamps. The habitat is utilized by a variety of songbirds. Beaver activity is evident in the form of lodges and dams in the southern emergent swamp section. The hydrologic regime is primarily flooded (shallow and deeper ponding) in the shrub and emergent areas, with saturated soils and some seasonal flooding in the forested portions. Disturbance in this wetland is primarily the railroad trail and several road-crossings in the southern sections. Much of the value of this system lies in its large extent and diversity of wetland classes.

Spruce Swamp South – This 141-acre primarily emergent wetland is located immediately south of the Ridge Road esker and Meeting House and Tavern Road extensions. The wetland is characterized by a large cattail marsh and open water. South of the Ridge Road esker, the wetland is dominated by forested and scrub swamp, areas of emergent marsh, and emergent-shrub wetland. The emergent and shrub sections are dominated by bluejoint grass, reed canary grass, sedges, alder, winterberry, northern arrowwood, silky dogwood, and red maple shrubs. There is good interspersion of vegetation and open water in these sections. Scrub-shrub and forested wetland vegetation includes cinnamon, royal, and sensitive ferns; swamp rose; witch hazel; alder; highbush blueberry; silky dogwood; buttonbush; red maple trees and shrubs; and scattered white pine and eastern hemlock. The hydrologic regime is permanently flooded north of Route 107. South of Route 107, the hydrologic regime varies from flooded to surface saturated in the emergent and scrub sections. This wetland is relatively small but is important in the context of water quality and its location on the Exeter River. Its proximity and connection with Spruce Swamp further enhance the functions of this wetland.

The esker that forms the Tavern Road extension, a ridge formed of sand, sediments and stones that winds through the surrounding marshes, is an important geological feature of Spruce Swamp. The road/trail on the right at the intersection of Meetinghouse and Tavern Roads climbs the Tavern Road esker and meanders over to the Fremont Branch of the Rail Trail. Ridge Road (now Tavern Road) got its name because of this ridge that mysteriously appears in the wetlands which encompass it. The esker is a landform created as the continental glacier known as the Wisconsin Ice Sheet receded from New Hampshire approximately 12,000 years ago. An ice sheet is a type of large glacier that, unlike an alpine

glacier, is not constrained by topography. Ice sheets create landforms by depositing the sand, gravel, and rocks bound within them as melting occurs while alpine glaciers carve out valleys by erosion. The Wisconsin Ice Sheet is estimated to have had an average thickness of 3500 feet. As the large Wisconsin Ice Sheet started melting from the bottom up and as it continued moving, tunnels were formed at its base. Meltwaters streamed through these tunnels under the ice sheet, depositing sand, sediments and stones that formed a ridge in the path of the ice sheet. The tunnels kept getting larger and larger as the ice sheet receded, creating higher elevations in the ridge being laid down by the melting ice sheet.

The Tavern Road extension (esker) forms the geological southern boundary of Spruce Swamp. The esker's sides are steeply sloped. For many decades in the 19th and early 20th centuries, before Town residents knew the importance of wetlands, garbage was dumped over the sides of the esker into the swamp (The History of Fremont, N.H, by Matthew Thomas). The esker is usually dry and provides a pleasant walk to the Fremont Rail Trail because of the higher elevation and dryness of the ridge.

2.6.4 Vernal Pools

Vernal pools are temporary bodies of water created by snow melt and rain that usually dry up in summer or periods of drought. They are classified as wetlands. Vernal pools provide critical breeding habitat for the wood frog, blue-spotted and Jefferson salamanders, and fairy shrimp. These three species must be present in order to classify the water body as a vernal pool. Other animals such as clams, frogs and aquatic insects that could survive in other water bodies are often found in a vernal pool. Vernal pools do not support fish and are therefore excellent breeding grounds for species whose eggs could be consumed by fish. Spotted and Blanding's turtles, great blue herons, raccoons and predatory insects travel to vernal pools to feed on amphibian eggs, tadpoles, insects and crustaceans in the pools. Little is known about the number and location of vernal pools in most of Fremont. Given their importance for maintaining biodiversity, this lack of information is unfortunate. The animals that live in Fremont's wetlands benefit greatly from vernal pools. According to the *Glen Oakes Forest and Wildlife Management Plan*, (http://morenoforestry.com/wp-content/uploads/2015/09/fmp-fremont.pdf),there is a network of 40 vernal pools in Glen Oakes. Some species are so dependent on vernal pools for their survival that their very presence is taken to establish that a particular basin of water is indeed a vernal pool. Research has shown a vernal pool may require 30 acres of undisturbed upland to thrive.

2.6.5 Shoreland Buffers

The undeveloped uplands surrounding a wetland are essential for the wetland's health. Maintaining a buffer of a naturally vegetated, upland area adjacent to wetlands and surface waters is important to reduce the adverse effects of human activity on these water resources. Vegetation in buffers intercepts rainfall, slows meltwater and promotes infiltration. In addition, a vegetated buffer provides habitat for species dependent on the wetland system and travel corridors for larger mammals. A minimum upland buffer width around wetlands and other shorelines of 100 feet is recommended and 300 feet is desirable to maintain good habitat.[2]

Shorelines of lakes, ponds, rivers and streams are called riparian areas, corridors, or buffers. Wider, forested buffers along these areas are more effective than narrow, grassy ones according to *Introduction*

[2] Chase, Victoria, Buffers for Wetlands and Surface Waters, Office of State Planning, Audubon Society of New Hampshire, UNH Cooperative Extension, 1995, revised 1997.

to Riparian Buffers; Connecticut River Joint Commission for NH and VT, September 2000. This same report offers the buffer requirements listed in Table 5.

Table 5 Riparian Buffer Requirements

Function	Buffer Width, Feet
Stabilize banks	35 feet – 50 feet
Filter sediment to protect water quality	35 feet if slopes less than 15%
Filter dissolved nutrients & pesticides to protect water quality	100 feet to 500 feet. 100 feet removes about 60% of pollutants.
Protect fisheries	At least 100 feet
Protect wildlife	300 feet minimum
Flood control	Varies with size

It is important to note that the buffer should be wider if the adjacent land is sloped, if the land use is intensive, if the soils are erodible, if the land is a floodplain, or if the stream or river naturally meanders. Buffers benefit water quality and wildlife by providing habitat, filtering pollutants from runoff, promoting groundwater infiltration, and stabilizing stream banks to control erosion.

Fremont's water resources consist of an interconnected system of rivers, streams, brooks, small ponds, wetlands, and groundwater. In some locations and under some conditions, the surface waters recharge the groundwater and in other locations and conditions, the groundwaters feed our rivers, ponds, wetlands and streams and keep surface waters flowing even during droughts. The quality and quantity of one can significantly affect the other.

Our water resources are vital for habitat for plants and animals. Undeveloped shoreline areas are essential for almost all wildlife species during some portion of their life cycle. Fremont residents rely upon clean groundwater from private wells. These rivers, streams and ponds, and the quality of their waters and shoreline, are very important to the quality of life for residents and visitors. Fishing, canoeing and swimming in Fremont's waters are popular activities.

2.6.6 Water Resource Concerns in Fremont

Concerns for protecting the water resources in Fremont include but are not limited to sustaining the amount of water available as Fremont develops. Also of concern is the quality of the resources. There are no state requirements for testing private wells. Fremont is known to have arsenic, which can occur naturally in groundwater, in certain areas. Arsenic is known to be a cause of cancer, but water can easily be treated to remove arsenic. Deep, bedrock wells often have radon, also known to cause cancer. Treating water for radon can be expensive but is worth the expenditure in terms of protecting one's health.

Perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are man-made chemicals that have been found in groundwater in parts of Fremont, including Ellis School. These chemicals, which are found in many commercial products, can pose a risk to human health. PFOS and PFOA are considered "emerging contaminants", meaning that scientists are only beginning to understand what happens to these chemicals in the environment and what types of risks these chemicals pose to people and animals who are exposed to them. There are treatment systems capable of removing PFOS and PFOA from well water, but it is necessary to test the groundwater to know if these chemicals are present.

Every stream tested in the state has been found to contain chemicals associated with personal care products such as pharmaceuticals, shampoo, soaps, and detergents. Fremont does not have a water testing monitoring program for any of its water resources. There are volunteer programs that test surface waters, such as one sponsored by the Lamprey River Watershed Association, but no samples have been collected from the Lamprey/Piscassic River watershed in Fremont.

Fremont does not have a plan for developing a public water supply if needed. Some nearby southern NH towns are constructing a public water supply because of increasing shortages of water in those towns. A pipeline will be run from Lake Massabesic in Manchester along Route 28 (https://www.nhpr.org/post/southern-nh-upgrade-water-supply-system).

2.6.7 Watersheds

A watershed is the land which water runs over, across or under on its way to the lowest point, or basin, usually a river or stream. A watershed stores and sheds (run-off) water, and watersheds are nested and connected by the water flowing through them. How people use land within a watershed determines the quality of the water in the lakes, streams, wetlands, and groundwater below. Fremont lies within two watersheds, the Exeter River watershed and the Piscassic River watershed.

- Exeter River Watershed—The Exeter River flows from west to east across the southern portion of Fremont and serves as the primary public water source for the town of Exeter. The watershed encompasses ten communities: Chester, Danville, Sandown, Raymond, Fremont, Kingston, East Kingston, Kensington, and Exeter. The river flows through downtown Exeter and becomes the tidal Squamscott River, a primary tributary to Great Bay. The watershed encompasses 8,155 acres, or 73%, of Fremont.
- Piscassic River Watershed—The Piscassic River flows from west to east across the northernmost portion of Fremont and into Brentwood. The Piscassic watershed covers 2,984 acres, or 27%, of Fremont.

Table 6 Fremont's Named Rivers, Streams and Brooks

Watershed	River/Stream
Exeter River	Exeter River
Exeter River	Red Brook
Exeter River	Little River
Exeter River	Abigail Brook
Exeter River	Great Brook
Exeter River	Horse Brook
Exeter River	Huchen Brook
Exeter River	Jewell's Brook
Exeter River	Loverings Brook

Exeter River	Maple Glen Brook
Watershed	**River/Stream**
Exeter River	Moody Brook
Exeter River	North Meadow Brook
Piscassic River	Davis Brook
Piscassic River	Piscassic River
Piscassic River	Brown Brook Squires Spring Winding Brook Woodman Causeway

There are more than 17 intermittent streams located within the Town of Fremont. Most of them are unnamed, flow seasonally, and are located in areas with poorly and very poorly drained soils.

Numerous aquatic species call the Town's rivers and streams home. The water courses and their adjacent riparian corridors are important habitat and travel corridors for most of Fremont's terrestrial wildlife. In addition, many bird species are attracted by the water and the food sources that are located nearby.

The quality of water and habitat in rivers and streams depends upon surrounding land uses and management practices. Sediment from erosion destroys spawning habitat and fills stream beds. Removal of streamside vegetation raises water temperatures and can destroy habitat for trout and many other species upon which fish depend.

Development pressure is increasing along Fremont's rivers and streams. There are no significant human withdrawals of water from Fremont's streams or rivers. However, as development pressures mount, stream banks and stream integrity will be threatened.

2.6.8 Rivers Management and Protection Program

All of the Exeter River in Fremont and the 4th order section of the Piscassic River have been designated by NHDES into the Rivers Management and Protection Program because of the rivers' outstanding natural and cultural resources. The program is administered by the NHDES. Designated rivers each have a local advisory committee. This committee is a partnership between NHDES and local citizens who advocate for the river. According to NHDES:

"The responsibilities of the local advisory committee (LAC) are:

- To advise the commissioner, the advisory committee (Rivers Management Advisory Committee), the municipalities through which the Designated River or segment flows, the municipalities within tributary drainage areas on matters pertaining to the management of the river or segment and tributary drainage areas. Municipal officials, boards, and agencies shall inform such committees

of actions that they are considering in managing and regulating activities within Designated River corridors.

- To consider and comment on any federal, state, or local governmental plans to approve license, fund or construct facilities that would alter the resource values and characteristics for which the river or segment is designated.
- To develop or assist in the development and adoption of local river corridor management plans. The local planning board may adopt such plans as an adjunct to their local master plan.
- To report biennially to the Rivers Management Advisory Committee and the commissioner, and annually to municipalities on the status of compliance with federal and state laws and regulations, local ordinances, and plans relevant to the Designated River or segment, its corridor, and tributary drainage areas. NHDES offers the committee technical assistance in developing and implementing the management plan." https://www.des.nh.gov/organization/divisions/water/wmb/rivers/lac/index.htm

2.6.9 Groundwater Resources

Water in the saturated zone (below the water table) under the surface of the earth is called groundwater. It starts as rain and snowmelt, which then seeps down from the ground surface and saturates materials such as soil, sand, gravel and rock. Like surface waters, groundwater moves, although more slowly. As with surface water, the movement of groundwater is driven by gravity, which creates hydraulic head or water pressure. Groundwater moves from areas of high head to areas of low head. Pumping wells create areas of low hydraulic head, causing groundwater to move from the surrounding area toward the well. In general, the greater the amount of water being pumped from a well, the greater the area of land that contributes water to the well. The wellhead protection area is an approximation of the contributing area. Groundwater and surface water are interconnected. Depending on the site, the time of year, the weather, and nearby withdrawals and discharges, groundwater may discharge to surface water or vice versa.

The U.S. Geologic Survey has characterized Fremont as having two types of stratified drift aquifers, labeled as "Stratified-Drift Aquifer" and "Stratified-Drift Aquifer Over Glacial-Estuarine Silt and Clays". An aquifer can be defined as a formation, group of formations, or part of a formation that contains sufficient saturated, permeable material to yield significant quantities of water to wells and springs. There are bedrock aquifers and sand and gravel aquifers with the latter being the most productive (producing the most water). A small portion of the town contains sand and gravel aquifers. These are glacial deposits of sand and gravel that hold significant amounts of water in the pore spaces between the particles of sand and gravel. This groundwater is continuously replenished by rain and other surface waters.

Groundwater is vulnerable to contamination, most often from leaking underground storage tanks, poorly maintained septic systems, improper disposal of hazardous chemicals, or vehicle accidents. Gravel pits are often located in or over aquifers. Land over aquifers tends to be favored for development because it is relatively level and easily excavated. Identification and careful monitoring of land uses near aquifers are important because private wells extract drinking water from aquifers. Because Fremont has no municipal water supply, each residence and business in town obtains its drinking water from Fremont's aquifers. The Town of Fremont has adopted an Aquifer Protection Ordinance that requires lot sizes to be a minimum of three acres and no more than 10% impervious surface (buildings, driveways, etc.) coverage on the lot. The Ordinance also prohibits certain activities, such as auto repair and hazardous waste storage, to protect the underlying aquifer.

The ability of an aquifer to supply water is called transmissivity and is measured in ft^2/day. All of the aquifers in Fremont have a transmissivity of less than 1000 ft^2/day and are not considered adequate for a public water supply.

Aquifer recharge is the process by which rainwater and snowmelt seep down through the soil into an underlying aquifer. Many natural processes determine how much of the water actually reaches the aquifer and how much evaporates, is consumed by plants and animals or runs off the ground surface into surface water bodies. Much attention has been directed to the importance of protecting surface waters and wetlands from filling and contamination, but there has been much less effort directed towards protecting critical aquifer recharge areas. These are areas where contamination would directly impact potable water supplies in the aquifer. In addition to eliminating contamination sources, water must be allowed to seep into the ground in order to protect both the quality and the quantity of water in an aquifer. Requiring new development to retain all stormwater and melt water on site will help to maintain pre-development levels of recharge. A useful publication in this regard is *Managing Stormwater as a Valuable Resource,* published by the NHDES in 2001.

2.6.10 Drinking Water

All of Fremont's residents rely upon groundwater for their drinking water with wells drilled into underlying sand and gravel deposits and bedrock . NHDES has prepared a Drinking Water Source Assessment Report for Fremont. This report assesses the vulnerability of each public water system to contamination. For more information on best management practices (BMPs) to protect drinking water supplies, the NHDES has three useful fact sheets: *Protecting Groundwater Resource;, Municipalities Have a Key Role in Protecting Groundwater Resources;* and *Protecting Public Drinking Water Sources Based on Source Assessment Reports.* More information may be found at the NHDES website https://www.des.nh.gov/organization/divisions/water/dwgb/dwspp/dwsap.htm.

2.6.11 Contamination Sources

Groundwater quality can be impaired by a variety of materials. Sources of groundwater contaminants include landfills, commercial and industrial wastes, agricultural fertilizers, human sewage, and road salt. NHDES has mapped known and potential contamination sites as part of a groundwater hazards inventory. The inventory is a list of sites registered with NHDES which may be known or potential threats to groundwater. The known sites are locations where contamination of the soil or groundwater has occurred and has been cleaned up or is being monitored by NHDES.

2.6.12 Impervious Surfaces

An impervious surface is one that does not allow rain water or snow melt to seep into the underlying soil. Pavement, concrete, and roofs (buildings) are examples of impervious surfaces. When a watershed is increasingly covered with pavement, buildings, and other compacted surfaces that are impervious to water, significant changes in water quality and quantity result. When rain falls on impervious surfaces, it runs off faster into surface waters, carrying with it sediment and pollutants from road surfaces, lawns, construction sites, and parking lots. Flooding, warming, and channelization of streams result. Infiltration of rainfall into the ground to replenish groundwater is reduced, impacting the quantity of groundwater available for withdrawals for drinking water.

This type of run-off, called "non-point source pollution," is now the most serious threat to water quality for New Hampshire and for Fremont. Construction and site designs that promote retention and infiltration

(soaking in) of rainwater and runoff, narrower streets and driveways when possible, shrub and tree buffers to waterways, and more compact development patterns can protect Fremont's water quality and quantity as the town grows.

Studies conducted in the northeast have documented that by converting as little as 10% of a watershed to impervious surfaces, stream water quality and organisms begin to deteriorate. Above 25% impervious surface, water quality is seriously degraded. On-going research by the NH Coastal Program and U.S. Geologic Survey in the Exeter River watershed has documented the effects of urbanization on stream quality. Results to date from this study indicate that the percent of urban land use in riparian buffer zones and the percent of impervious surface in a watershed can be used as indicators of stream quality. Sites studied along the Exeter River with greater than 14% impervious surface generally showed changes in water quality and habitat conditions. A 2015 study by the Piscataqua Region Estuaries Partnership estimates 3.9% of Fremont is impervious surface. https://www.stateofourestuaries.org/wp-content/uploads/2017/12/impervious-surfaces.pdf

2.7 Wildlife

2.7.1 New Hampshire Fish and Game Wildlife Action Plan

In 2006, the NH Fish and Game Department released the *Wildlife Action Plan*, which is the state's first comprehensive study of wildlife. The plan was updated in 2015 and again in 2020. The *Wildlife Action Plan* is a blueprint for conserving endangered, threatened and species of concern, which are all species of greatest conservation need, and their habitats in New Hampshire. The 2020 update to the *Wildlife Action Plan* includes the use of updated habitats land cover data from National Oceanic and Atmospheric Administration Coastal Change Analysis Program Regional Land Cover Database, updated NWI data, five additional years of rare wildlife data, and the Nature Conservancy's Resilient and Connected Network data. The *Wildlife Action Plan* can be found at https://wildlife.state.nh.us/wildlife/wap.html.

The Wildlife Action Plan identifies several types of land covers in Fremont. Table 7 summarizes the land area in Fremont that is associated with each type of land cover.

Table 7 Area Encompassed by Each Land Cover Type in Fremont

Habitat Type	**Acres**
Appalachian oak-pine	5473.90
Developed Impervious	830.21
Developed or barren land	762.32
Floodplain forest	113.42
Grassland	785.51
Hemlock-hardwood-pine	725.61
Lowland spruce-fir	0.25
Open water	174.30
Peatland	590.78
Sand/gravel	135.76
Temperate swamp	595.03

Wet meadow/shrub wetland	955.31
Total	11142.4

The Wildlife Action Plan (WAP) also categorizes land into three tiers based on the quality of the wildlife habitat provided. Tier 1 is the highest ranked habitat in New Hampshire by ecological condition; Tier 2 is the highest ranked habitat in a biological region (watershed); and Tier 3 is land that has significant habitat at a regional scale and provides a supporting landscape to Tier 1 and Tier 2 land. Table 8 lists information on habitat tiers in Fremont as of 2020 (https://www.wildlife.state.nh.us/maps/wap/fremont8x11scoring.pdf). The Natural Heritage Bureau also lists Fremont's floodplain forest, marsh and peatland as significant wildlife habitats. Table 8 has links that provide WAP maps for Fremont.

Table 8 Fremont Wildlife Action Plan Links

Fremont Habitat Landcover Map	Fremont Habitat Ranked Wildlife Habitat by Ecological Condition (Tiers) (scoring)	Potential Species and Habitats in Fremont (*Note that spreadsheet below has multiple tabs)*
https://wildlife.state.nh.us/maps/wap/fremont8x11habitat.pdf	https://wildlife.state.nh.us/maps/wap/fremont8x11scoring.pdf	https://wildlife.state.nh.us/maps/wap/species/fremont_PotentialWAPspecies_byRange.xlsxpecies

The 2020 NH Wildlife Action Plan includes aquatic wildlife species and habitat information. There is also a Fish Survey Map data viewer that shows the fish that were found in our town in the recent past.

Below is an updated list (2020) of species of greatest conservation need in Fremont from the Natural Heritage Bureau. We know that there are more species of greatest conservation need than shown on this list from our Glen Oakes' BioBlitz, however these species were never reported to the Natural Heritage Bureau. A BioBlitz is an event that focuses on finding and identifying as many species as possible in a specific area over a short period of time. The Conservation Commission held a BioBlitz in the Glen Oakes Town Forest in 2011 to supplement baseline information on forest biodiversity. A full report of BioBlitz findings can be found online at the Town's website or in the Land Use Office.

Table 9 Species of Greatest Conservation Need (National Heritage Bureau, May 2020)

Town Flag	Species or Community Name	Listed? US	Listed? NH	~ reports last 20 yrs Town	~ reports last 20 yrs State
Fremont					
	Natural Communities - Palustrine				
**	*- Medium level fen system*	--	--	1	51
**	*- Poor level fen/bog system*	--	--	1	29
**	*- Sweet pepperbush wooded fen*	--	--	1	1
	Plants				
~	tufted yellow-loosestrife - *Lysimachia thyrsiflora*	--	T	Historical	10
*	weak stellate sedge - *Carex seorsa*	--	E	1	3
	Vertebrates - Birds				
**	Eastern Meadowlark - *Sturnella magna*	--	T	1	28
	Vertebrates - Reptiles				
***	Blanding's Turtle - *Emydoidea blandingii*	--	E	28	1098
***	Spotted Turtle - *Clemmys guttata*	--	T	3	165
***	Wood Turtle - *Glyptemys insculpta*	--	SC	1	280
	Vertebrates - Fish				
**	American Eel - *Anguilla rostrata*	--	SC	2	177
**	Banded Sunfish - *Enneacanthus obesus*	--	SC	1	32
***	Bridle Shiner - *Notropis bifrenatus*	--	T	2	36
**	Redfin Pickerel - *Esox americanus americanus*	--	SC	1	32
	Invertebrates - Dragonflies & Damselflies				
**	Martha's Pennant - *Celithemis martha*	--	--	1	23
***	Ringed Boghaunter - *Williamsonia lintneri*	--	E	1	14
	Invertebrates - Mollusks				
~	Brook Floater - *Alasmidonta varicosa*	--	E	Historical	33

Listed? E = Endangered T = Threatened SC = Special concern

Flags
**** = Highest importance
*** = Extremely high importance
** = Very high importance
* = High importance
~ = Historical Record

These flags are based on a combination of (1) how rare the species or community is and (2) how large or healthy its examples are in that town. Please contact the Natural Heritage Bureau at (603) 271-2215 to learn more about approaches to setting priorities.

May 2020

2.7.2 Wildlife Connectivity

Wildlife connectivity is the ability of animals to move from one habitat to another. Connectivity supports the survival of species that require large habitats and promotes biodiversity and overall healthier ecosystems and wildlife populations. As habitat is lost to building construction, connectivity becomes more critical for ensuring survival of birds, mammals, and other wildlife.

The Nature Conservancy and the Great Bay Resource Protection Partnership recently collaborated on a study titled Connect the Coast: Linking Wildlife Across New Hampshire's Seacoast and Beyond. The focus of the study was to encourage protection of the wildlife corridors needed to ensure regional sustainability of wildlife populations. Some species, such as amphibians, need to move through multiple habitat types. Larger animals need to have a wide range of mobility, moving through multiple habitat blocks. The study analyzed and created habitat blocks first from the Land Conservation Plan for Coastal New Hampshire's focus areas and then from conservation data. They connected these blocks to form wildlife corridors. They prioritized federal, state, municipal and private roads based on where they intersected with corridors and intersections and recommended that transportation officials use Transportation Best Management Practices to provide safe crossings for people and wildlife. The area of study was the Piscataqua-Salmon Falls Watershed, with a surrounding 10-mile buffer to enable cross-watershed connectivity planning. A map of wildlife corridor connectivity is Map 15 of the NRI. The goal is to use the plan as Fremont develops

to enable the wildlife corridors to be preserved and ideally, expanded. The Connect the Coast study can be found at: https://ecologicalconnectivity.com/sites/default/files/project_files/nh-connect-the-coast-report.pdf.

The Glen Oakes Forest and Wildlife Management Plan recommends maintaining wildlife corridors by supporting shrubs and areas of young trees along streams and between wetlands, emphasizing the importance of managing wildlife corridors.

Fish and Game has a plan that prioritizes projects for improving wildlife connectivity for aquatic species.

https://www4.des.state.nh.us/armfund/wpcontent/uploads/2019/05/EnvironmentalLayersAndStreamCrossings_Final.pdf

2.7.3 Fisheries

Fishing is a popular hobby and Fremont's fisheries are an important natural resource. New Hampshire Fish and Game stocks fish in both the Exeter and Piscassic Rivers in Fremont from mid-March to early July. A list of rivers and waterbodies stocked with game fish in 2019 can be found at: https://www.wildlife.state.nh.us/fishing/documents/stocking-full-2019.pdf

Table 10 Common Fish Stock in Fremont

Exeter River	**Frequency**	**Piscassic River**	**Frequency**
Brown Trout (BT)	1+	Brook Trout (EBT)	1+
Rainbow Trout (RT)	1+		

Note: USGS Common Fish Codes: https://pubs.usgs.gov/sir/2007/5291/apdix_1/1-4_fish.doc (sometimes takes a while to load)

2.7.4 Beneficial Insects

Beneficial insects are a natural way to fight insect pests and protect our environment. When we encourage beneficial insects, we are increasing our biodiversity and decreasing our dependency on poisonous chemical controls. Not only are we creating a more beautiful environment, but a safer one as well. There are two categories of insects considered beneficial, predators and parasites. Predators are organisms that kill and feed on their prey outright. They are generally larger than their prey and must eat lots of prey to complete their development. Parasites are usually smaller and often weaker than their prey. They lay eggs on or within a host insect. The immature larvae use the host for food over time. A parasite will use only one or a few insects for food.[1]

You can entice beneficials to your yard and garden by providing them with the three basic necessities: water, food and shelter. In addition, you should avoid using and/or spraying broad-spectrum insecticides. The broad-spectrum insecticides are not selective in that they will kill not only the pest but the beneficial as well. Even the organic pesticides will kill the beneficials. A list of the more important beneficial insects we should encourage can be found at https://extension.unh.edu/resource/beneficial-insects-new-hampshire-farms-gardens-fact-sheet.

2.8 Climate Change

Climate is the measure of weather in the same place over the long term (30 years or more). Scientists are finding that the average temperature in NH has been steadily rising due to man-made causes, namely fossil fuels. Climate change is occurring world-wide. It is happening in New Hampshire and is changing our environment. We are having rising temperatures, more extreme weather causing fluctuating precipitation from rain, snow, ice and drought. Drought and heavy rains both affect our farming communities. Extreme weather causes damage to our infrastructure and homes and businesses that is very expensive to repair. People have lost their homes due to the extreme weather, such as heavy snow on roofs, heavy rain causing flooding on roads and highways and in basements, and an increase in allergies and disease. Old culverts were not sized to accommodate the increased amount of stormwater runoff associated with more intense rainfalls. The incidence of Lyme's disease in NH is often the highest in the country. Mosquito born illness are increasing. (NH Department of Health and Human Services: How Climate Affects Community Health: https://www.dhhs.nh.gov/dphs/climate/index.htm)

NH Fish and Game Wildlife Action Plan has a section on climate change: https://www.wildlife.state.nh.us/climate/index.html

NHDES has information on climate change:

- This interesting introduction to climate change in NH is excellent. It describes in simple language how climate change is affecting NH. https://www.youtube.com/watch?v=ktcVNlN
- NH DES also has a page with tools to help communities adapt to climate change. https://www.des.nh.gov/organization/divisions/air/tsb/tps/climate/toolkit/adaptation.htm

2.9 Relevant Plans and Reports

2.9.1 Focus Areas in Fremont Identified in The Land Conservation Plan for NH's Coastal Watersheds Plan

The Land Conservation Plan for New Hampshire's Coastal Watersheds was released in July 2006 by The Nature Conservancy, Society for Protection of New Hampshire Forests, Rockingham Planning Commission and Strafford Regional Planning Commission. The plan identifies areas that represent the best remaining opportunities to conserve critical ecological, biological, and water resources of New Hampshire's coastal watersheds. Four principal resource analyses and maps were developed that capture key natural resources features: forest ecosystems, freshwater systems, irreplaceable coastal and estuarine resources, and critical plan and wildlife habitat. These maps were integrated into what is known as resource co-occurrence model. From these data, 75 conservation focus areas were identified in the 46 towns in the coastal watersheds. Fremont contains two of these conservation focus areas: Spruce Swamp and Upper Exeter River. The features of these areas are described below and identified on Map 9.

2.9.1.1 Spruce Swamp Conservation Focus Area

This focus area is 1,850 acres in Fremont and contains a portion of a 670-acre unfragmented forest block and a 1,700-acre unfragmented forest block identified as a Tier 2 priority in the Wildlife Action Plan. The area has aggregated forest block totaling 8,400 acres and 3.3 miles of 1st order river and streams.

Separated sedge, a plant of conservation concern in New Hampshire is in this focus area. Significant wildlife habitats include floodplain forest, marsh, and peatland. The focus area also has an exemplary natural community, which is the fen system found in Spruce Swamp, and 6.2 acres of farmland of statewide importance.

2.9.1.2 Upper Exeter River Conservation Focus Area

This focus area is 3,010 acres and is located in Fremont, Chester, Danville, and Sandown. It contains a 740-acre unfragmented forest block, a portion of an 800-acre unfragmented forest block, a portion of a 2,110-acre unfragmented forest block, and a 1,300-acre block identified as a Tier 2 habitat in the Wildlife Action Plan. The focus area is located within a 24,700-acre aggregated forest block. The Area has 6.5 miles of 1st order river or stream, 1.9 miles of 2nd order river or stream, and 7.1 miles of 4th order river or stream. The focus area also contains a Great Blue Heron rookery, an animal of conservation concern. Vesper sparrow, another animal of conservation concern, is also found in the focus area. Significant wildlife habitat includes floodplain forest, grassland, marsh, peatland, and ridge/talus. The Area has 299.8 acres of high yield aquifer (maximum transmissivity > 1,000 sq. ft/day). There are 71.2 acres of prime farmland and 72.3 acres of farmland of statewide importance in this focus area.

2.9.2 Regional Master Plan

The Rockingham Planning Commission (RPC) completed a Regional Master Plan for the 27 communities in the RPC region in 2015. This plan includes a natural resources chapter which identifies significant threats to natural resources in the region, discusses principles and policies for natural resource management, and recommends the chapter be adopted as part of a Town's Master Plan. Significant threats to natural resources in the region include fragmentation and sprawl, threats to water quality, threats to wildlife, and threats to the working landscape. https://www.therpc.org/regional-community-planning/regional-master-plan/natural-resources

2.9.2.1 Threats to Fremont's Natural Resources

Climate Change

Rising temperatures, extreme weather, fluctuating precipitation including rain, snow, ice and drought are causing the migration of animals and diseases as animals move to cooler climates. An example of this migration is the wooly adelgid, a non-native invasive insect. It has been found in Fremont since 2016. It has been found in Glen Oakes by Charles Moreno. Once a tree is infected, it will die within 4-10 years. Treatments are available but there is no cure. The treatments must be repeated regularly.

The rising temperatures of climate change are causing an increase in mosquito populations and an increase in mosquito borne diseases such as Equine Encephalitis and West Nile virus. Climate change is causing more extreme weather which causes more flooding. When severe weather occurs, there is potential for damage to roads, culverts, power lines and homes. Heavy equipment is needed to repair the damage, causing an impact on the environment including wetlands and habitat. There are things that municipalities can do to manage the effects and NHDES provides tools to assist. See the Climate Change section above.

Wetland Contamination

Wetland contamination is a very serious threat to Fremont because of the large number of wetlands, the plants and wildlife that depend on them, and role wetlands play in recharging the aquifers from which

Fremont residents obtain drinking water. As the wetland buffer size required for development decreases, the vulnerability of wetlands increases. In order to protect the wetlands, the buffers must also be protected.

Stormwater Runoff

Construction of roads, parking lots, and buildings increase the amount of stormwater runoff by decreasing the land area available to absorb precipitation and snowmelt. Stormwater runoff often contains chemical pollutants such as fertilizers, herbicides, and insecticides applied to lawns or oil residues from parking lots and roads, and physical pollutants such as eroded soil. The stormwater flows into the nearest surface water and carries the pollutants with it. The chemical pollutants can be toxic to animals and plants that live in the streams and rivers. The eroded soil can increase the turbidity of the water body. Turbidity is soil or sediment particles suspended in the water itself. High levels of these particles, or high turbidity, can also harm fish and other animals that live in the streams and rivers.

Because there is often a connection between groundwater and surface water, with surface water recharging the surrounding groundwater and vice versa, chemical pollutants in surface water can migrate into groundwater. Chemicals pollutants carried by stormwater runoff into wetlands can also leach into groundwater. In turn, contaminated groundwater can seep into streams and rivers and contaminate these water bodies.

Because Fremont residents obtain their drinking water from wells, it is important to protect the water quality in both groundwater and surface water to ensure that Fremont residents are not drinking harmful chemicals. Chemical pollutants in water generally cannot be seen or smelled. For this reason, unless the groundwater or surface water is sampled and analyzed in a laboratory, one does not know if harmful chemicals are present.

Groundwater contamination

All Fremont residents depend on private water wells for drinking water. Towns that supply drinking water to their residents must test the drinking water and ensure that the water meets standards specified by the Safe Drinking Water Act. This act, however, does not apply to private wells. People who use private wells need to test the water quality themselves (collect a sample and send it to a laboratory) to determine if they are drinking potentially harmful chemicals.

Depending on how they manage their chemicals and waste streams, businesses, even small ones (for example, gas stations), can inadvertently contaminate the underlying groundwater. There are federal and state regulations that govern the investigation and cleanup of contamination caused by businesses. For sites that are known to be contaminated, there are programs in place to monitor groundwater quality and make sure that people are not drinking the contaminated water. However, there is no guarantee that all contaminated groundwater has been identified. There are no requirements for water testing of businesses, old or new, even if they are on the potential contamination source list kept by NH DES. Although NH DES monitors these sites, that monitoring is minimal. Without water testing, it is impossible to know what contaminants are in the aquifers.

Development

Residential and commercial development affects 115 species of greatest conservation need and 22 habitats primarily because of habitat loss. Among the 200 threats identified within this category, 28 were ranked as high, 92 as medium, and 80 as low (see Table 4-14, NH Wildlife Action Plan). Among those most threatened species in NH include: New England cottontail, Karner blue butterfly, Blanding's and spotted

turtles. Habitats that are rated at the highest level of risk in Fremont include Appalachian oak-pine forests, Shrub and scrub wetlands, and vernal pools. Development of uplands, freshwater marshes, and shrub wetlands is likely to be extensive, serious to catastrophic, and occur in the short-term.

Failing septic systems cause harm to plants, wildlife and humans. There is no requirement for septic tank testing in NH. Leakage from a septic tank could be affecting a neighbor's health. Leakage from a septic tank carries many pollutants with it and affects wildlife in streams and rivers and our Great Bay Estuary as well as municipalities downstream that obtain their drinking water from the river or stream.

Urban sprawl, where houses and commercial buildings are spread out in a community, increase habitat degradation. In times past, homes and businesses were located within a close distance to town, leaving large, unfragmented blocks of land that attracted wildlife. Now, our lots are large and spread out, partly to protect the residents' private wells. Fremont is beginning to address sprawl in that the zoning now allows conservation subdivisions, however, builders are not required to permanently protect the conservation areas. It is important that the voters understand that land uses that are allowed by zoning with conditional use permits will not prohibit that land use.

https://www.wildlife.state.nh.us/wildlife/documents/wap/chapter4-development.pdf

Roads and Highways

Roadkill has a major impact on animals. Fast-growing, invasive vegetation often replaces natural vegetation on roadsides. Moving equipment often carries the seeds of invasive species. Herbicides, salt and other chemicals used on or next to roads seep into groundwater. Salt corrodes the metal on vehicles and infrastructure like bridges, causing potentially harmful metals to runoff along with oil and other fluids from the vehicles into nearby streams, rivers, and wetlands. These chemicals can harm the plants and animals that live there. The roads divide (or fragment) habitats, making it difficult for animals that need multiple habitats to get from one to another safely. The same goes for animals that need a large range. Fragmented habitat means they will not be able to move through the landscape and may disappear from an area.

Unpaved Roads

Even unpaved roads can harm the surrounding environment. Chemicals with which the roads are treated can runoff into surface water and leach into groundwater. Road dust can blow into nearby surface water and clog the gills of fish and other aquatic animals and prevent photosynthesis by aquatic plants. Often the shoulders of municipal roads are bare, causing stormwater to transport eroded soil to adjacent streams, rivers, and wetlands.

Dams

By blocking woody debris, dams can prevent nutrients from reaching downstream habitats. Water levels rise during floods and cause roadside flooding that can damage habitat and structures. The water temperature rises causing a decrease of oxygen in the surface water. Most dams completely block the passage of fish unless a structure, such as a fish ladder, has been constructed.

Culverts and Bridges

Culverts and bridges have traditionally been designed to enable water to flow under roads. The transport of sediment and the passage of aquatic species have not been considered. Excess sediment that accumulates in a portion of a stream or river can clog the gills of fish and other species. Culverts that are

undersized or too shallow can clog and cause flooding. Best management practices for routine maintenance of roads to minimize the effects of these necessary structures on wildlife and habitats can be found at: https://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/documents/RR_V.9_FINAL_3-14-19.pdf.

Invasive Species

Fremont has many locations that have invasive plants and animals. Bittersweet is being found all around Town and is extremely hard to get rid of once it settles in. It crowds out native plants. The wooly adelgid is attacking hemlock trees. Once a hemlock tree is attacked, it will die within 4 to 10 years. If left unmanaged, these invasive species will alter habitat and promote loss of native species, both plant and animal.

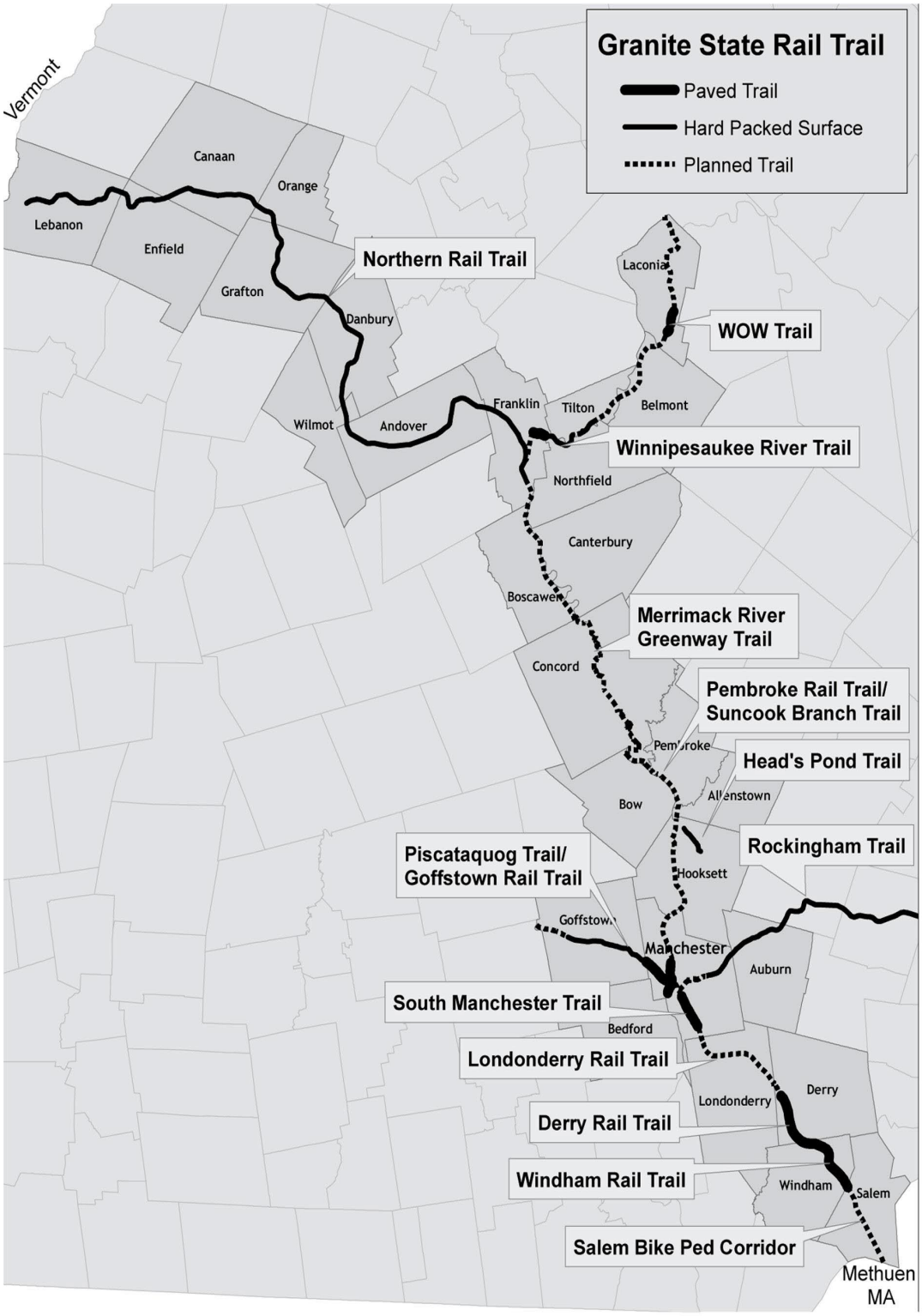
2.9.2.2 Recreational Rail Trail

Fremont has great access to sections of the state abandoned railroads trail system. On the Rockingham Rail Trail, one can go from Route 107 south to Derry or north to Epping to the junction of the Fremont Branch and the Portsmouth Branch. The Portsmouth Branch goes east through Epping to Newfields or west from Epping to Lake Massabesic. The total distance from Lake Massabesic in Manchester to the Rockingham Depot in Newfields is 25.3 miles. The rules of use vary from section to section of the trails, and the rules periodically change as sections of the abandoned rail beds are developed. Check on the rules of use for each section at: https://www.nhstateparks.org/visit/recreational-rail-trails/rockingham-recreational-rail-trail,-fremont-branch.

Fremont's rail trails connect to the Granite State Trail System, part of which is still being developed. This system not only provides recreational and nature observation opportunities, but it provides wildlife with connectivity. The Granite State Rail Trail System is comprised of trail segments in connecting communities.

Other Rail Trail resources may be found here:

https://www.facebook.com/GraniteStateRailTrail and https://www.gsrtnh.org/. Below is a Rail Trail Map that can be found online.



Map by Craig Tufts, principal transportation/GIS planner, CNHRPC.

3.0 Recommended Goals and Actions

The Fremont Conservation Commission recommends that the actions listed below be taken to further the protection of natural resources in Fremont.

3.1 Land Conservation

- Update the open space plan for undeveloped land in Fremont, incorporating the recommendations from the Land Conservation Plan for New Hampshire's Coastal Watersheds and the NH Fish and Game Wildlife Action Plan.
- Continue pursuing the protection of 25% of undeveloped land.
- Improve communication and outreach to surrounding communities to increase connectivity of conserved land.
- Focus on preserving the integrity of the Exeter and Piscassic Rivers and Spruce Swamp by protecting the undeveloped uplands surrounding these areas.
- Integrate ecological integrity and wildlife habitat into all aspects of town planning, including zoning and land use regulations and site plan review.
- Recommend connections between wetland complexes and unfragmented blocks in Fremont and surrounding communities.
- Update the Funding Summary and Future Funding Projections from the Fremont CTAP Open Space Report annually to ensure availability of future funds and open space preservation regulations are in-line with Town conservation goals.

3.2 Water Resources - Wetlands

- Strengthen local land use regulations to increase protection around wetlands, including vegetative buffers around wetlands, by adopting best management practices where/if appropriate.
- Improve enforcement of existing wetland protection regulations.
- Strengthen wetland zoning regulations to reduce the number of special exceptions and variances that are being granted.
- Protect wetland "clusters" by carefully reviewing future projects occurring in adjacent uplands and requiring conditions of subdivision or site plan approval for wetland protection to state on the plan and each deed "no further alteration of wetland areas permitted". A wetland cluster may be connected wetlands or several wetlands that are adjacent to each other.
- Protect the Exeter and Piscassic River and Spruce Swamp watersheds and prevent stormwater runoff from harming this area.
- Conduct a hydrology study for the drainage of Spruce Swamp watershed.

3.3 Water Resources – River and Stream Corridors

- Preserve and restore riparian buffers along river corridors.

- Ensure enforcement of RSA 483-B, Shoreland Water Quality Protection Act https://www.des.nh.gov/organization/divisions/water/wetlands/cspa/index.htm
- Ensure enforcement of RSA 483, the Rivers Management Protection Act, which established the NH Rivers Management and Protection Program https://www.des.nh.gov/organization/divisions/water/wmb/rivers/
- Identify and implement best management practices for managing storm water runoff.

3.4 Water Resources – Drinking Water Supply and Groundwater

- Protect water resources to protect future drinking water supply.
- Ensure strict enforcement of septic system design to prevent future septic failures.
- Restrict chemical pesticide and herbicide use.
- Educate residents about stormwater management.

3.5 Wildlife Habitat

- Ensure developers work with the Planning Board to be aware of all possible consequences that may occur as a result of change to land cover.
- Minimize the effect of development on the ecosystem by developing a conservation district to protect water quality and wildlife habitat.
- Maintain a wildlife inventory baseline in Town Forest areas for the purpose of monitoring change over time.

3.6 Natural Communities

- Protect natural communities identified in the NH Fish and Game Wildlife Action Plan and the Land Conservation Plan for New Hampshire's Coastal Watersheds.
- Document invasive species within Fremont

3.7 Soil Conservation

- Ensure construction sites utilize best management practices to minimize soil erosion and sedimentation. https://www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-03-42.pdf
- Regulate building construction on slopes to minimize soil erosion and stormwater runoff.
- Encourage parking lot design that minimizes unfiltered runoff.
- Encourage use of cover crops to protect against soil erosion.

3.8 Scenic Resources

- Identify and protect scenic views.

- Develop a landscaping ordinance, especially for businesses and in the village district, to reduce stormwater runoff and protect the character and scenic beauty of Fremont.

3.9 Public Outreach and Education

- Instruct the public regarding how to protect vernal pools.
- Organize yearly cleanup efforts of the Town Forests.
- Sponsor yearly/periodic walks through the forest to enable residents and interested citizens to learn about Spruce Swamp and the Town Forests.
- Sponsor events to educate residents about septic tank maintenance.
- Educate residents about stormwater management and the harmful impacts of chemical pesticides and storm water runoff on our surface water and drinking water supply.

3.10 Climate Change

- Fremont is a small Town with limited resources, however there are things that can be done to manage climate change.
- Have at least one activity per year, perhaps in conjunction with the energy group, to educate people about *Climate Change* in Fremont and the impact that energy used efficiently and from alternative sources, such as solar, can have on the environment.
- Give incentives to developers for using energy efficient construction minimizing the amount of fossil fuels needed in the household. Continue using incentives for building conservation subdivisions. Conservation subdivisions help to prevent sprawl (lot sizes are large, leaving very little undeveloped land). Conservation subdivisions can help maintain established wildlife corridors for animals.
- Map hazard areas and hazards (flood, floodplain) with at risk-structures and develop an inventory of public buildings and infrastructure that may be at risk.
- Review land use ordinances to insure protection of health and safety of residents from climate change impacts.
- Encourage development outside of the 500-year floodplain.

3.11 Wildlife Corridors

- Incorporate 'connect the coast priorities' into Fremont land use planning documents. (see map 15 and the report: https://ecologicalconnectivity.com/sites/default/files/project_files/nh-connect-the-coast-report.pdf)
- Give priority to road and stream crossing intersection projects to provide connectivity benefits for both aquatic and land animals.
- Seek funding to ensure high quality project results that improve wildlife corridors.
- Consider wildlife corridor connections when evaluating potential conservation properties.

3.12 Invasive Species

- Hire a professional to complete an inventory of invasive species on Town-owned properties and to develop and implement a long-term plan to control them.
- Continue to educate the public regarding the importance of controlling and eliminating invasive species and how to do so. Include outdoor demonstrations to enable the public to recognize the invasive species.

NH GIS Viewers

These online tools can be used by the anyone without GIS software to access GIS data and corresponding maps. They enable users to combine on a map layers of interest to them. A layer represents a particular theme of geographic information. Examples of layers include rivers, terrain, wildlife habitat, political boundaries, and building footprints. The maps are based on the most recent data as opposed to static, hardcopy maps.

In order to save or print projects an ESRI public account is needed (ESRI is the company that created the GIS software used by these viewers). It's easy and free for the general public to setup an account.

https://www.arcgis.com/sharing/rest/oauth2/signup?client_id=arcgisonline&redirect_uri=http://www.arcgis.com&response_type=token

One ESRI account is all you need to use most of the tools/viewers.

You may need to enable popups for a site if windows are not opening.

The data accessible from each of these tools varies. Many of the tools enable the uploading of additional data layers.

UNH NH GRANIT

GRANIT is NH's data clearinghouse or warehouse for NH GIS data. Much, but not all, GIS data is available through GRANIT. For example, much of the data maintained by NHDES is not found in GRANIT. The tools make it possible to bring together and combine data that are from different sources.

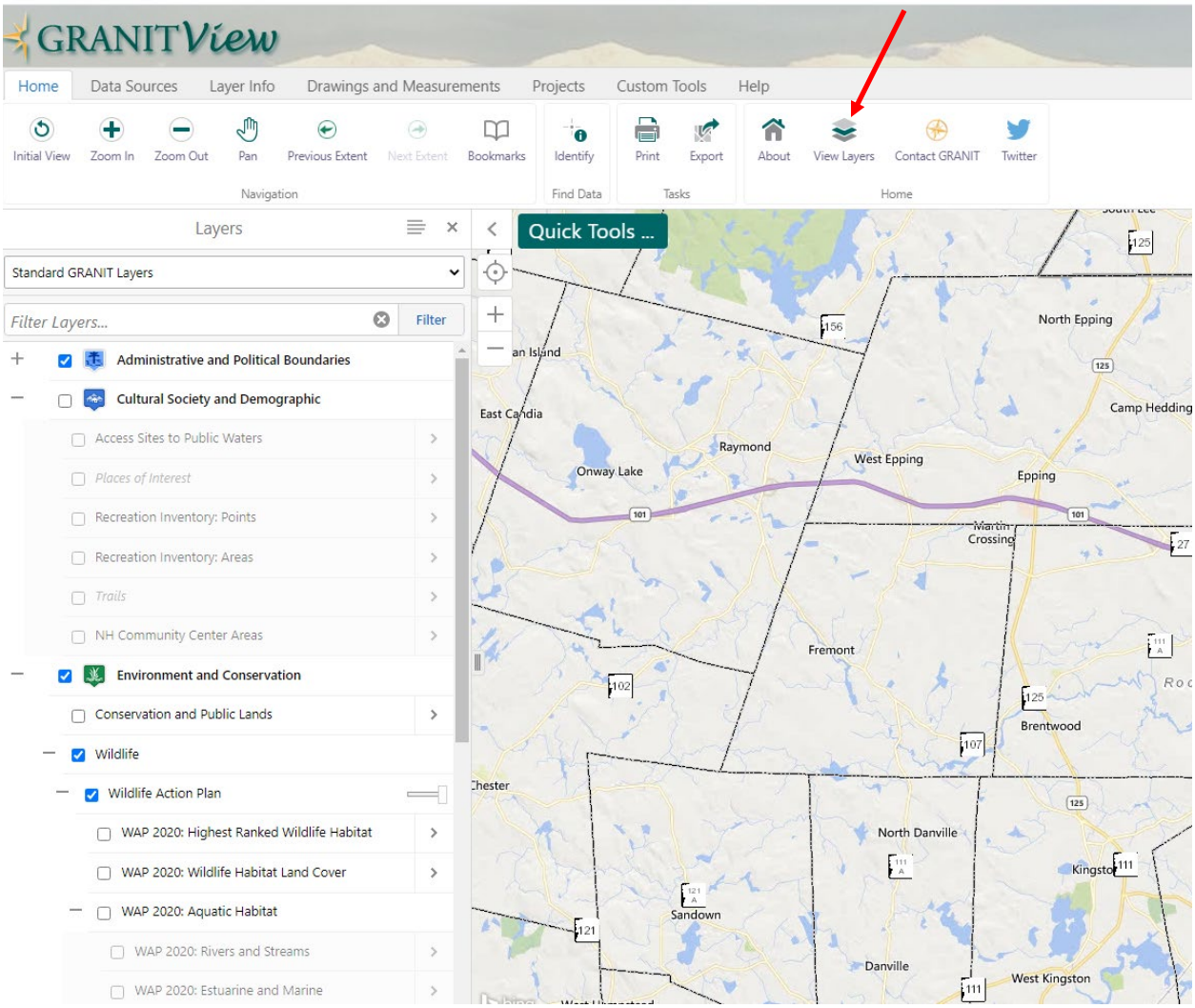
Most of the tools/viewers are similar in how they work. Reading the GRANIT tutorial will enable you to find your way in all of the viewers. To read information about each of the data layers including when the layer was developed or updated and the attributes of that layer.

GRANITView

The GRANITView web mapping application provides access to key NH GRANIT data layers along with a suite of tools to navigate and interact with those data layers.

https://granitview.unh.edu/html5viewer/index.html?viewer=granit_view

Click on “View Layers” to see what data is available.



Tutorial on “How to Use GRANITView”

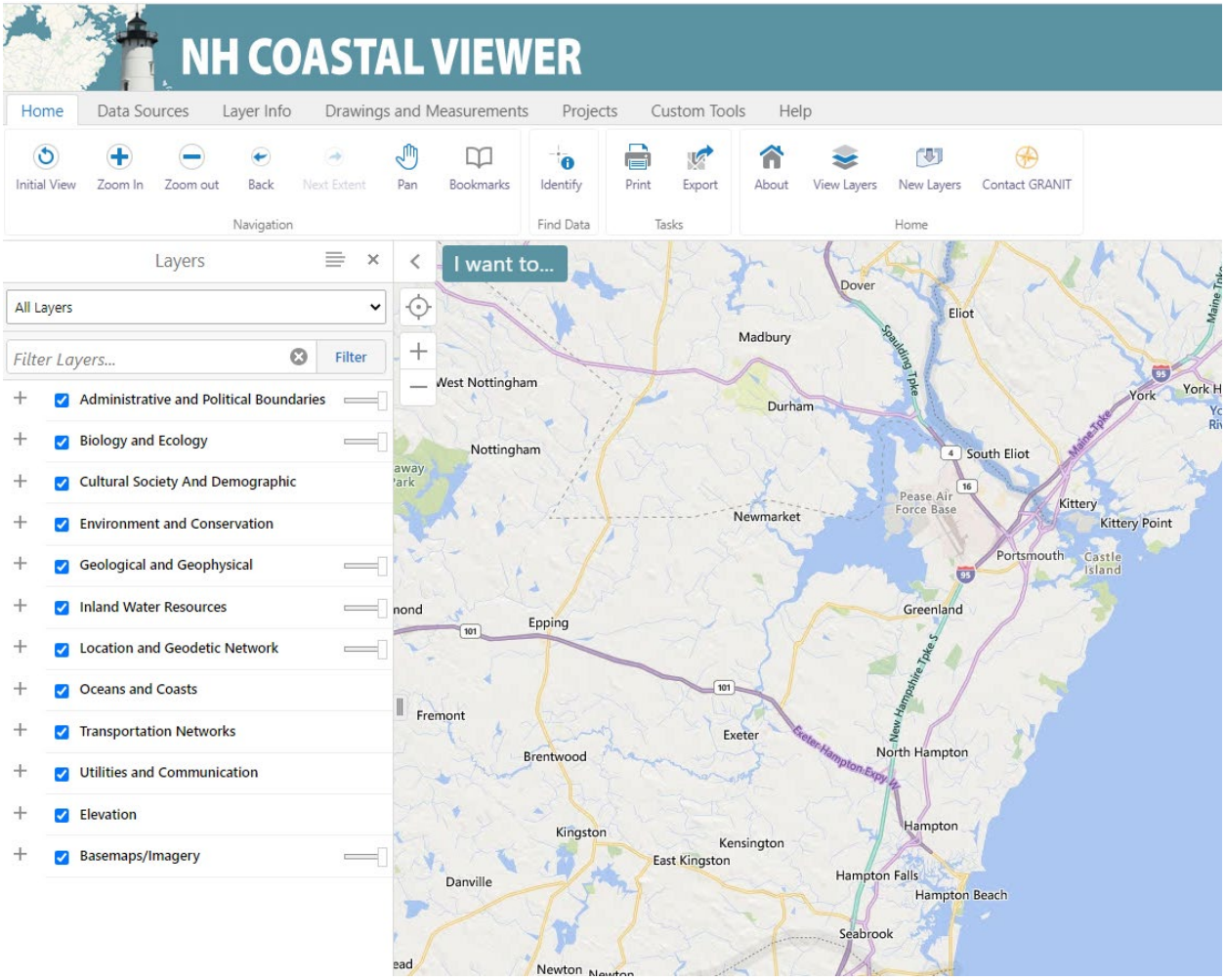
https://granitweb.sr.unh.edu/MetadataForViewers/GRANITView/RelatedDocuments/GettingStarted_GRANITView_HTML5.pdf

The NH Coastal Viewer

This tool brings together an unprecedented number of data sets from a variety of organizations.

The Coastal Viewer

http://nhcoastalviewer.unh.edu/Html5Viewer/index.html?viewer=NHCoastalViewer



About the Coastal Viewer

http://www.granit.unh.edu/nhcoastalviewer/

Tutorial on “How to Use the Coastal Viewer”

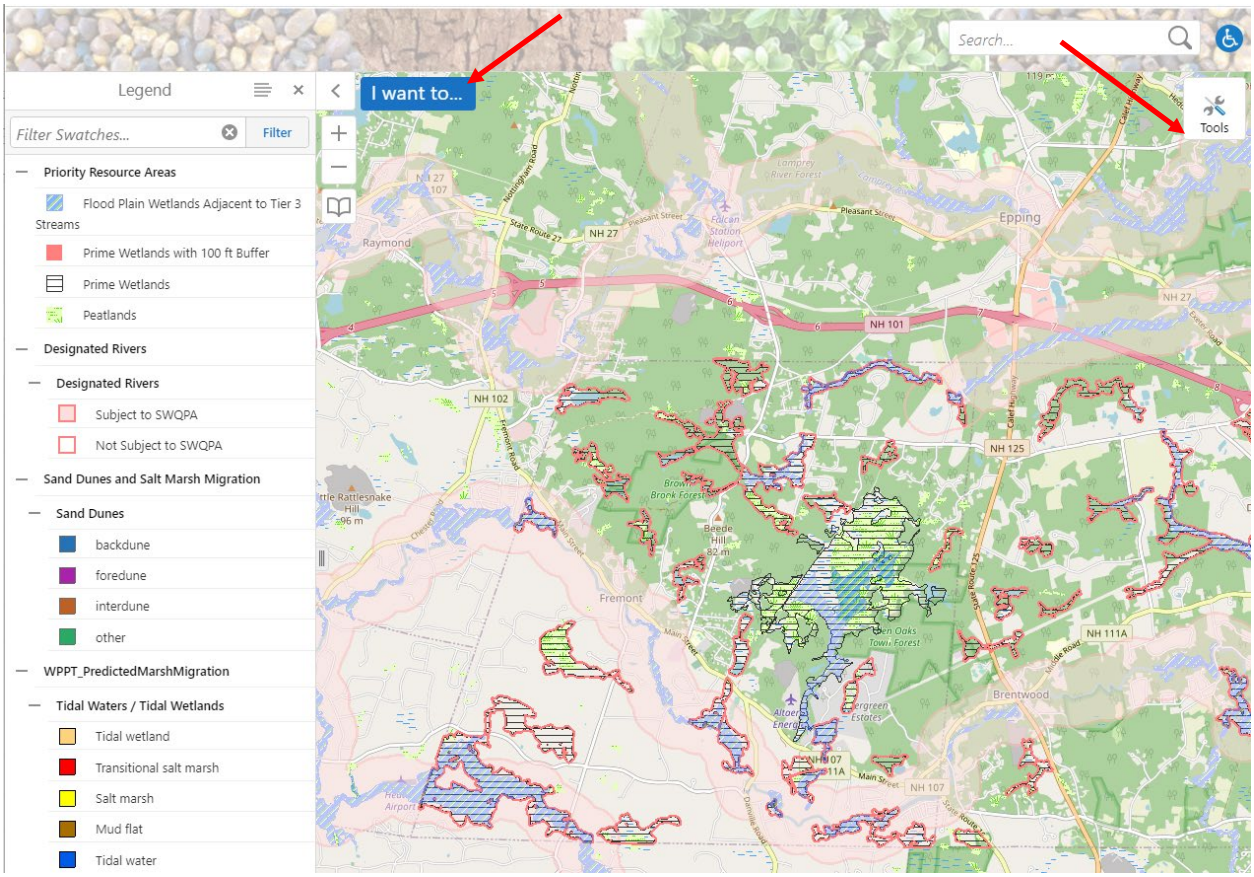
https://granit.unh.edu//nhcoastalviewer/GettingStarted.pdf

NH DES Tools

NH DES Wetlands Permit Planning Tool

This tool can be used the information needed about the wetland permitting process, e.g. hazardous waste sites, potential contamination sites, protected rivers, Groundwater classification areas, well-head protection areas, surface water impairments and much more.

https://nhdeswppt.unh.edu/



NH DES OneStop Environmental Database (EMD)

The EMD contains data for surface water, groundwater, drinking water, air, waste, soils, sediments, habitats, toxicity and for biological sampling. Programs within NHDES and outside sampling groups submit data to this database.

https://www4.des.state.nh.us/DESOnestop/BasicSearch.aspx

NHDES OneStop Data Mapper

The NHDES OneStop Data Mapper is a viewer for displaying OneStop data in an interactive map format. This is not the same as the NH DES Planning Tool.

https://www4.des.state.nh.us/onestopdatamapper/onestopmapper.aspx

NH DES PFAS Sampling Results

This interactive map allows the user to access the PFAS water quality data that is in the NHDES Environmental Monitoring Database. By zooming in and clicking on a point of interest, the user may observe the concentrations of PFOA, PFOS, PFHXS, PFNA, and Total PFAS that were detected in the sample. Sites that have performed PFAS screening are also available in the mapper. By clicking on a site, the user may obtain the site number. The site number may be used to query the NHDES OneStop Environmental Database. Note that Fremont has sites that contain PFAS.

PFA Sampling Results Map

https://nhdes.maps.arcgis.com/apps/View/index.html?appid=66770bef141c43a98a445c54a17720e2&extent=-73.5743,42.5413,-69.6852,45.4489

NH Aquatic Restoration Mapper

The mapper enables the identification and assessment of stream crossing structures that need to be replaced. Some of the data includes photos of the structure being assessed. The projects can be prioritized based on safety, infrastructure resilience and aquatic habitat restoration. There are 20,000 stream crossings in NH many of which are old, damaged and undersized. The ARM Program (Aquatic Resource Mitigation) helps fund projects that will restore fish and wildlife passage while reducing flood hazards and expensive road damage.

https://nhdes.maps.arcgis.com/apps/webappviewer/index.html?id=21173c9556be4c52bc20ea706e1c9f5a

NH SADES

Stream Crossing Viewer – NH Sades has created a viewer that accompanies the Stream Crossing Initiative. Four agencies have combined and made available their data including NH DOT. This means that users of the viewer can combine layers from these agencies to make maps.

https://nhsades.maps.arcgis.com/apps/webappviewer/index.html?id=72dd57d3274e4d64abb5136a0a678db7

About the NH Stream Crossing Initiative - Read the details below.

https://www.nhsades.com/

Surface Water Quality Assessment Report Cards

The Clean Water Act requires each state to complete two reports every two years based on water quality assessments of surface waters in the State. These reports are submitted to the U.S. EPA. Interactive viewers are available to examine the data. Note that each report year has a different viewer.

https://nhdes.maps.arcgis.com/apps/webappviewer/index.html?id=d1ba9c5ec85646538e032580e23174f7

For more information about this program, see

https://www.des.nh.gov/organization/divisions/water/wmb/swqa/index.htm XXXX

Evaluating Wetlands by the NH Method and Corresponding Mapping Tool

This Method and Map Tool present information about New Hampshire wetlands and related data sets. It enables the production of maps combining various features of interest for anyone wanting to learn more about wetlands and their landscape settings.

http://nhwetlandsmapper.unh.edu/

Read About the Method

https://nhmethod.org/

NH Fish and Game

NH Fish and Game Wildlife Action Plan Maps

The NH Wildlife Action Plan includes a set of two maps available for use by conservation planners, landowners, land trusts, biologists and others. These maps include:

- Habitat Land Cover Map: shows where the different types of wildlife habitat are located throughout the state.
- Highest Ranked Habitat by Ecological Condition Map: shows where habitats in the best ecological condition in the state are located, based on biodiversity, arrangement of habitat types on the landscape, and lack of human impacts.

https://wildlife.state.nh.us/wildlife/wap-using-maps.html

Wildlife Action Plan Community Maps (all)

https://wildlife.state.nh.us/maps/wap.html

Habitat Land Cover Map for Fremont - 2020

https://wildlife.state.nh.us/maps/wap/fremont8x11habitat.pdf

Highest Ranked Habitat by Ecological Condition for Fremont - 2020

https://wildlife.state.nh.us/maps/wap/fremont8x11scoring.pdf

Aquatic Habitats Data Layer – Town maps for this layer are not provided however they can be created using the data available on GRANIT.

https://wildlife.state.nh.us/wildlife/wap-aquatic-habitats.html

List (spreadsheet) of Potential Species found in habitats of Fremont (find Fremont in the table then click on 'species.')

https://wildlife.state.nh.us/maps/wap.html

The Fish Survey Interactive Mapping Tool

New Hampshire Fish and Game biologists maintain a database of fish survey records. Fish data has been collected at over 4,000 sites since 1983. The data is used in fisheries management, conservation planning, water quality assessments, ecological research, education, and a variety of other applications. Click on the dots on the right edge of the information panel to see descriptions and pictures of the fish.

https://nhfg.maps.arcgis.com/apps/MapJournal/index.html?appid=d6549e90155b441fa0e29bdc44eebc2b

NH DOT Data Viewer (NH Department of Transportation)

GIS Interactive Maps - NH Roads and Projects Viewer

https://nhdotprojects.sr.unh.edu/

It can also be found at https://www.nh.gov/dot/ under the Project Center.

NH DOT (NH Department of Transportation) Data Catalog

https://www.nh.gov/dot/org/projectdevelopment/planning/gis-data-catalog/index.htm

Map metadata guide

https://www.nh.gov/dot/org/projectdevelopment/planning/gis-data-catalog/documents/map-metadata-guide.pdf

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The USDA Natural Resources Conservation Service Soil Survey (USGS)

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. Soil surveys can be used for general farm, local, and wider area planning.

https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/home/?cid=nrcs142p2_053620#:~:text=Soil%20Data%20Viewer%20is%20

NH Big Tree Map – UNH Cooperative Extension

This map shows the locations of the big trees that are accessible to the public. By clicking on a location arrow, a photo of the tree will pop up.

https://unhcoopext.maps.arcgis.com/apps/Shortlist/index.html?appid=bc24f6238db1475e9d6bc3ef2d061c0f

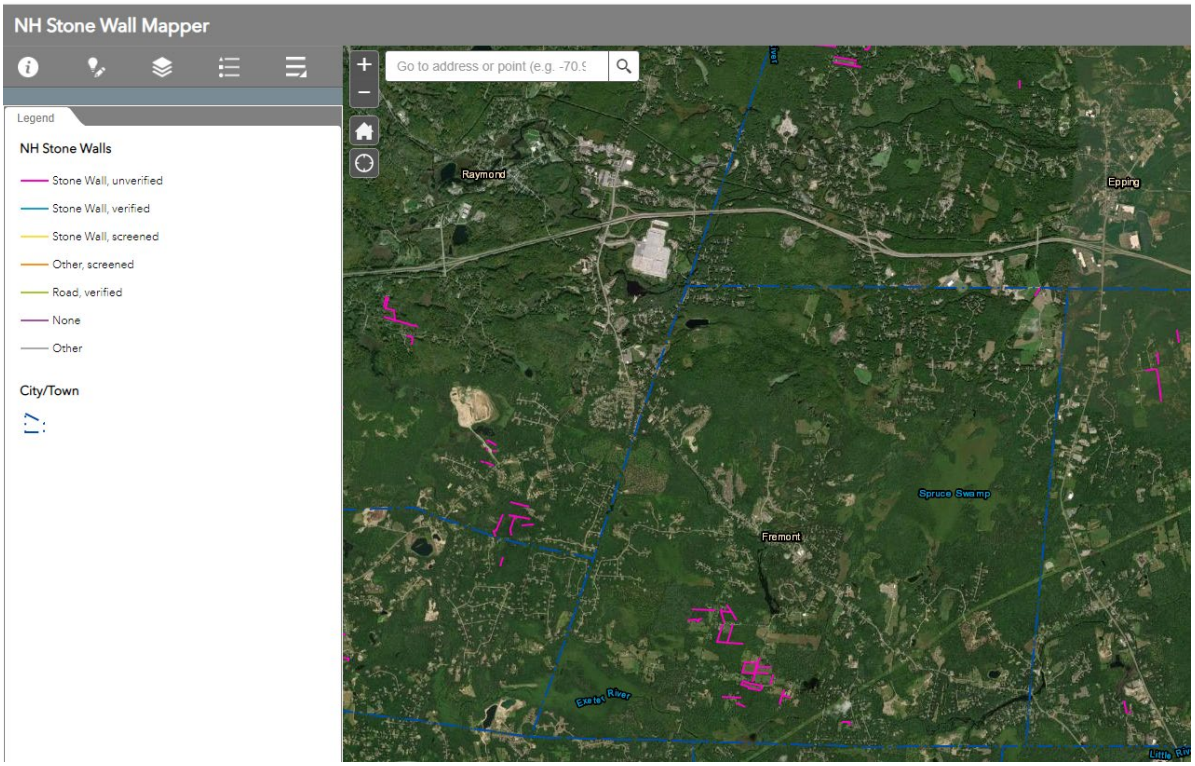
More about the Big Tree Program

https://extension.unh.edu/programs/nh-big-trees

Stone Wall Mapper

Stone Wall Map

https://nhdes.maps.arcgis.com/apps/webappviewer/index.html?id=f4d57ec1a6b8414190ca0662456dffb0



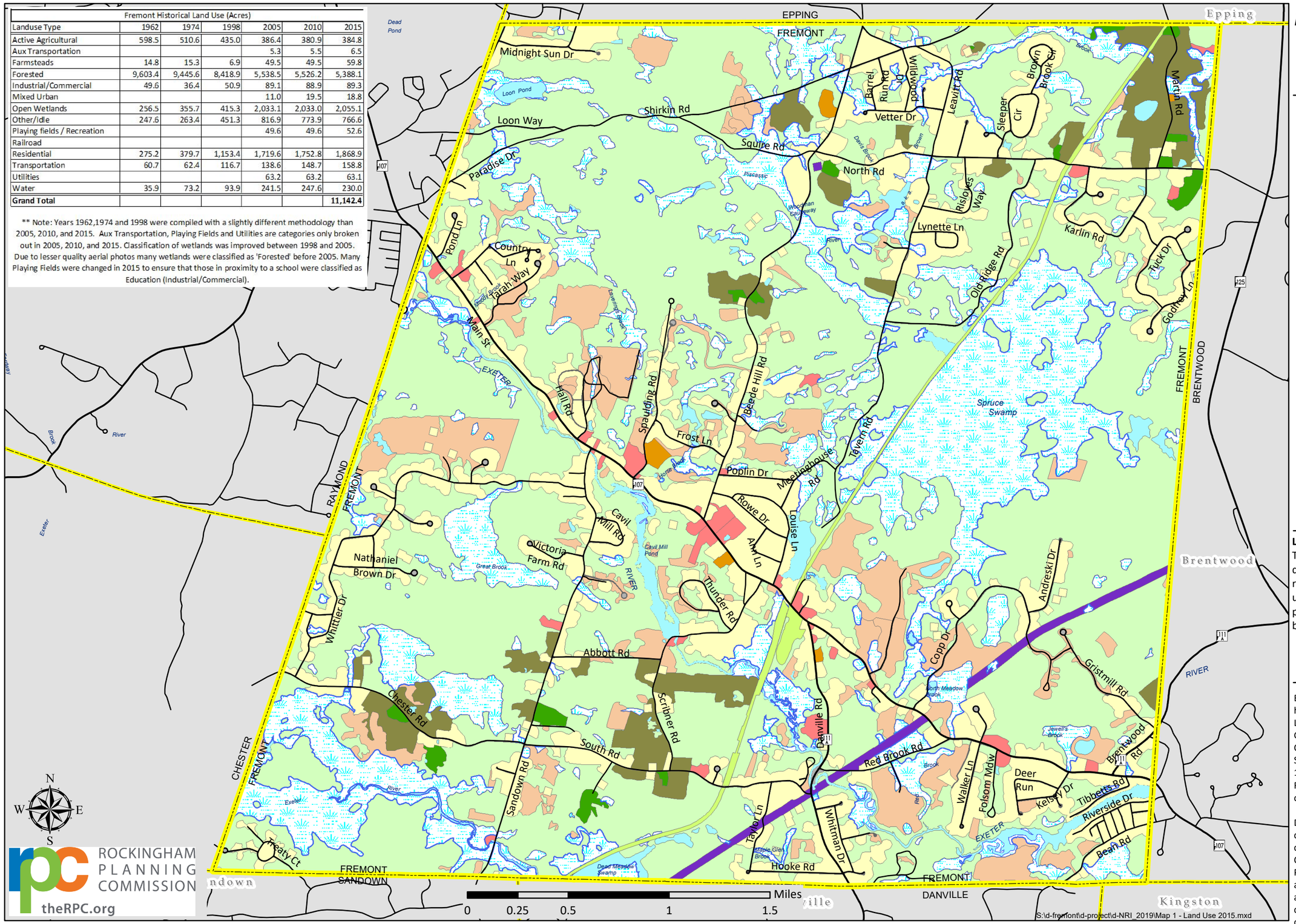
Getting Started with the Stone Wall Mapper (Tutorial)

https://granit.unh.edu/resourcelibrary/specialtopics/stonewalls/GettingStarted_NHStoneWallMapper.pdf

Map 1 - Land Use 2015

Fremont Historical Land Use (Acres)						
Landuse Type	1962	1974	1998	2005	2010	2015
Active Agricultural	598.5	510.6	435.0	386.4	380.9	384.8
Aux Transportation				5.3	5.5	6.5
Farmsteads	14.8	15.3	6.9	49.5	49.5	59.8
Forested	9,603.4	9,445.6	8,418.9	5,538.5	5,526.2	5,388.1
Industrial/Commercial	49.6	36.4	50.9	89.1	88.9	89.3
Mixed Urban				11.0	19.5	18.8
Open Wetlands	256.5	355.7	415.3	2,033.1	2,033.0	2,055.1
Other/Idle	247.6	263.4	451.3	816.9	773.9	766.6
Playing fields / Recreation				49.6	49.6	52.6
Railroad						
Residential	275.2	379.7	1,153.4	1,719.6	1,752.8	1,868.9
Transportation	60.7	62.4	116.7	138.6	148.7	158.8
Utilities				63.2	63.2	63.1
Water	35.9	73.2	93.9	241.5	247.6	230.0
Grand Total						**11,142.4**

** Note: Years 1962,1974 and 1998 were compiled with a slightly different methodology than 2005, 2010, and 2015. Aux Transportation, Playing Fields and Utilities are categories only broken out in 2005, 2010, and 2015. Classification of wetlands was improved between 1998 and 2005. Due to lesser quality aerial photos many wetlands were classified as 'Forested' before 2005. Many Playing Fields were changed in 2015 to ensure that those in proximity to a school were classified as Education (Industrial/Commercial).



Natural Resource Inventory
Fremont, NH
2020

2015 Land Use

- Active Agricultural
- Aux Transportation
- Farmsteads
- Forested
- Industrial/Commercial
- Mixed Urban
- Open Wetlands
- Other/Idle
- Playing fields / Recreation
- Railroad
- Residential
- Transportation
- Utilities
- Water

Land Use 2015

This 2015 Land use was accomplished by screen digitizing land use/land cover polygons at a recommended display scale of 1:2,400 (1"=200') using 1-foot resolution, natural color aerial photography, acquired in April of 2015, as the background.

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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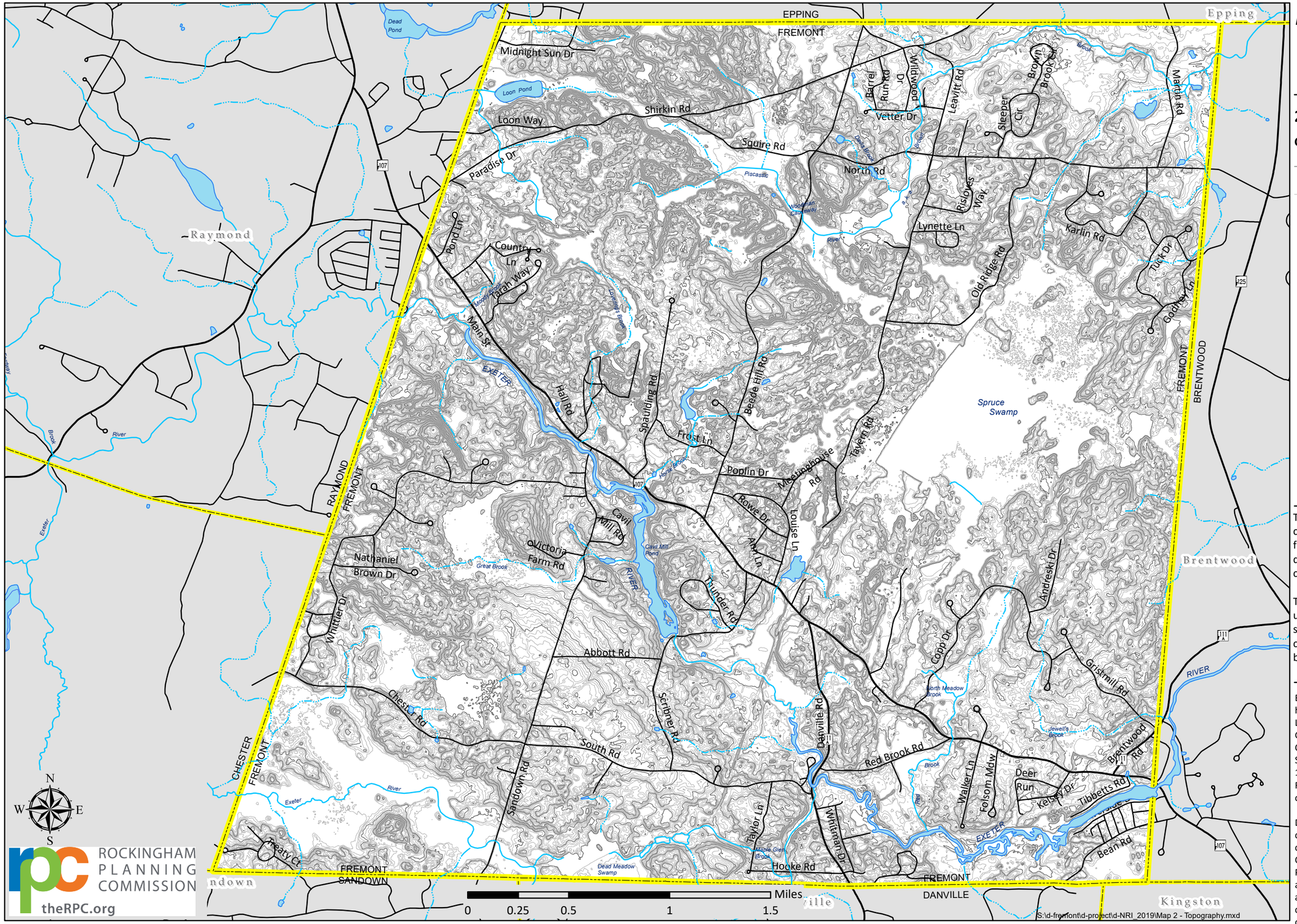
Map 2 - Topography



Natural Resource Inventory
Fremont, NH
2020

2011 Contours 2' From LiDAR

Contour

- Major Contour (10')
- Interval contour (2')

This data set represents raw, 2-foot bare earth contours (isolines). The data set was extracted from a regional elevation contour data set derived from the Coastal New Hampshire LiDAR collection (2011).

These 2-foot contours were developed for visual use and comparison with other GIS data sets. The suitability for technical, scientific, or other finished cartographic purposes is unknown and should not be assumed.

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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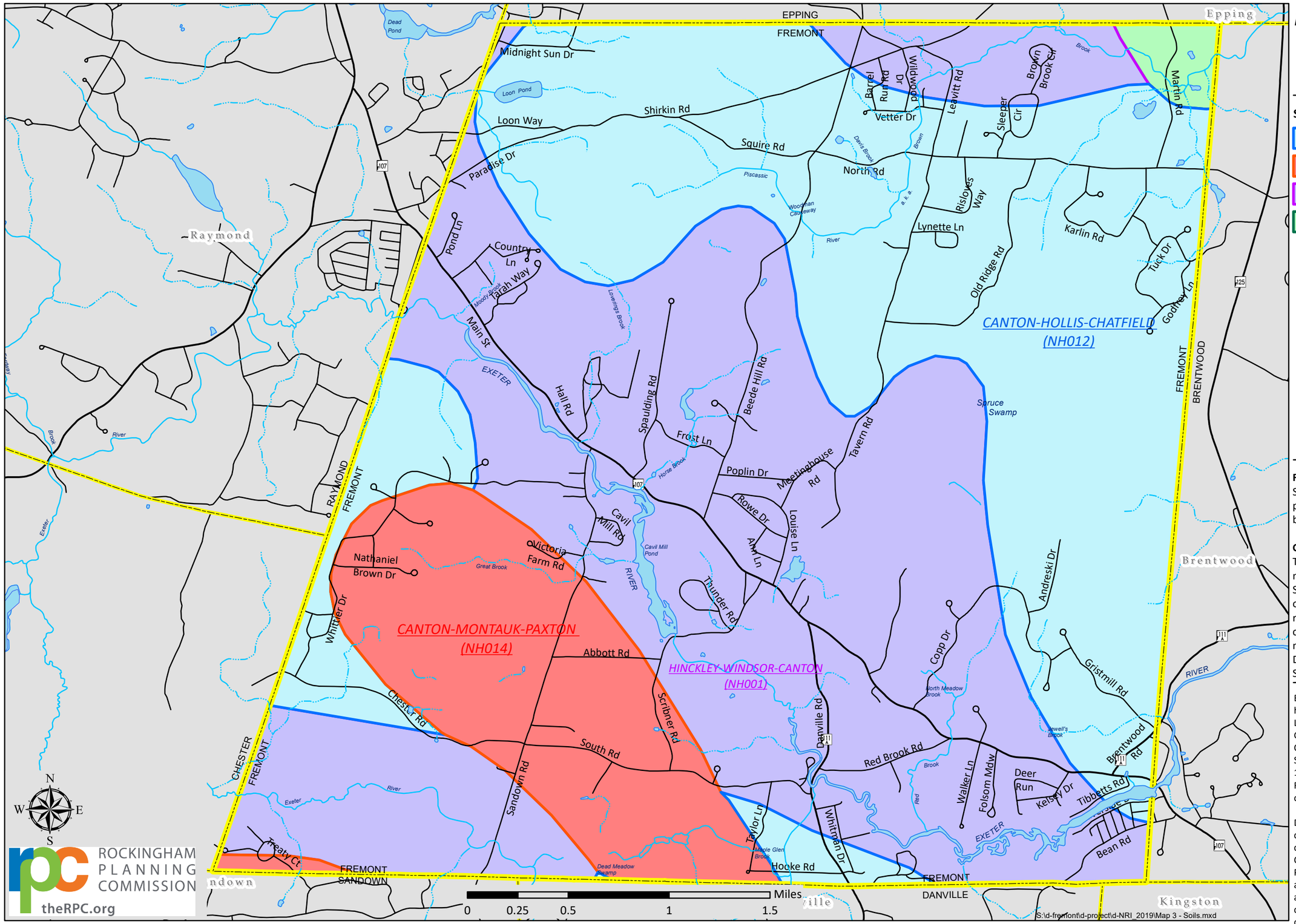
Map 3 - Soils (NRCS, 1994, 2006)



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Natural Resource Inventory
Fremont, NH
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Soil Type

- CANTON-HOLLIS-CHATFIELD (NH012)
- CANTON-MONTAUK-PAXTON (NH014)
- HINCKLEY-WINDSOR-CANTON (NH001)
- SCITICO-ELDRIDGE-DEERFIELD (NH002)

Rockingham Soils

Soil boundaries from NRCS county soil surveys, published at varied scales.All features distributed by Complex Systems Research Center,Durham, NH

Generalized Soil

This data set is a digital general soil association map developed by the National cooperative Soil Survey. It consists of a broad based inventory of soils and nonsoil areas that occur in a repeatable pattern on the landscape and that can be cartographically shown at the scale mapped. This data was published by the U.S. Department of Agriculture,Soil Conservation Service in 1994.

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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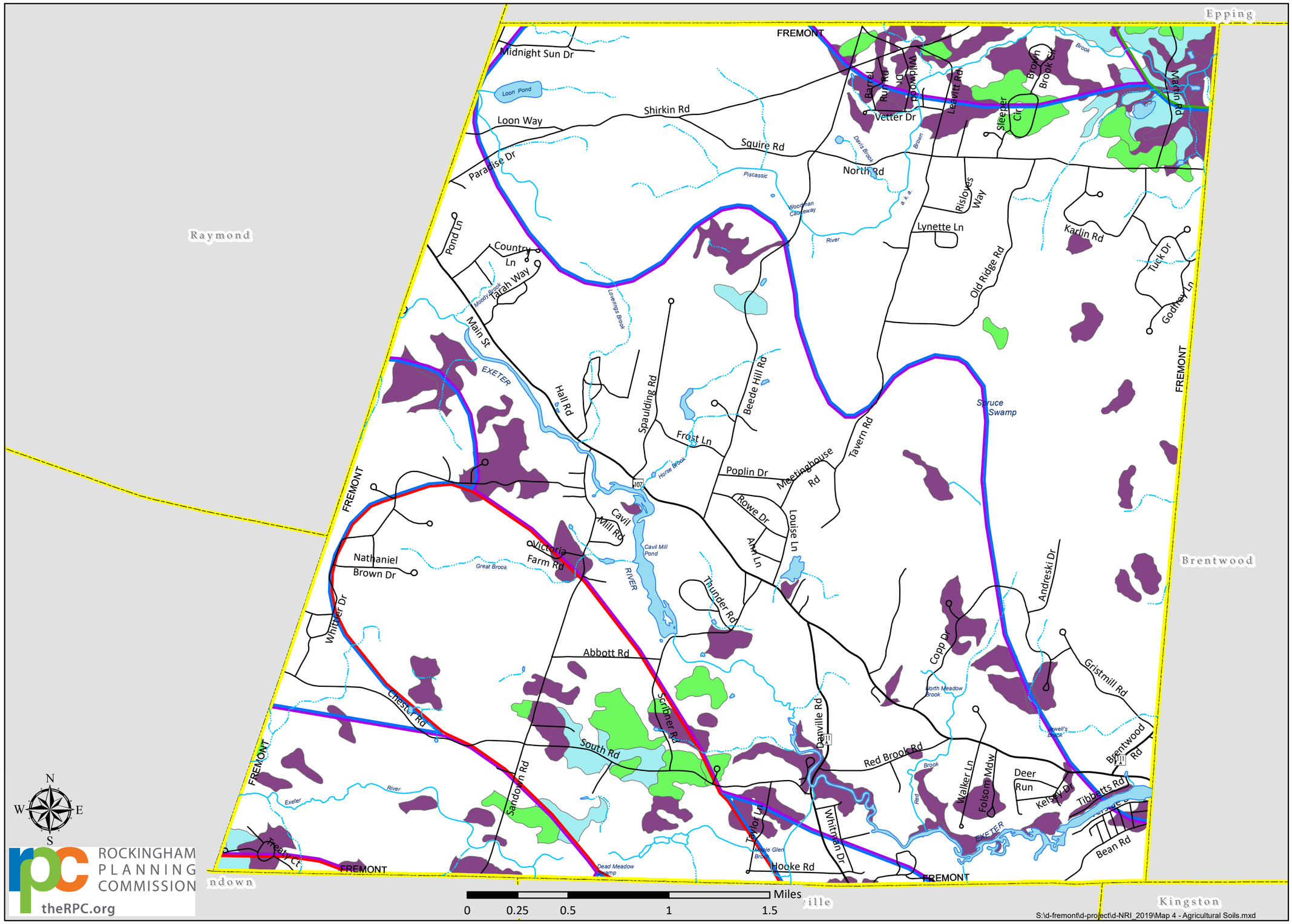
Map 4 - Agricultural Soils (NRCS 1994, 2006)



Natural Resource Inventory
Fremont, NH
2020

General Soils Type

- CANTON-HOLLIS-CHATFIELD (NH012)
- CANTON-MONTAUK-PAXTON (NH014)
- HINCKLEY-WINDSOR-CANTON (NH001)
- SCITICO-ELDRIDGE-DEERFIELD (NH002)

Agricultural Soil Class

- All areas are prime farmland
- Farmland of local importance
- Farmland of statewide importance

Agricultural Soils

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops they have an adequate and dependable water supply from precipitation or irrigation.

Additional Farmland of Statewide Importance nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable.

Additional Farmland of Local Importance
In some local areas there is concern for certain additional farmlands for the production of food, feed, fiber, forage, and oilseed crops, even though these lands are not identified as having national or statewide importance.

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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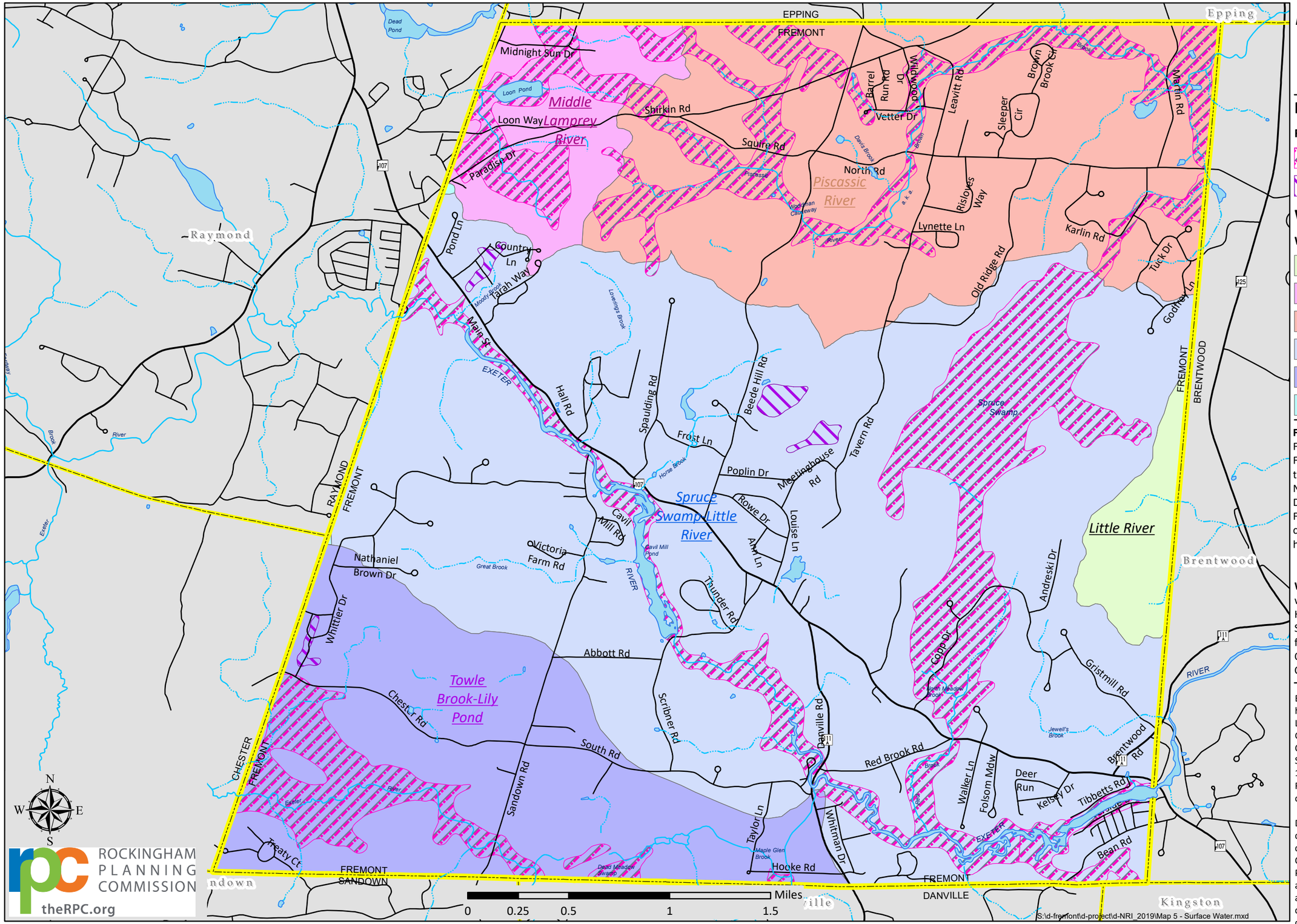
Map 5 - Surface Water, Watersheds, FEMA Flood Hazard Areas



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Natural Resource Inventory
Fremont, NH
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FEMA Flood Hazard Zones

Flood Hazard Zone

- 1% Annual Risk (100 Year Flood)
- 0.2% Annual Risk (500 Year Flood)

Watersheds

Watershed (HUC 12)

- Little River
- Middle Lamprey River
- Piscassic River
- Spruce Swamp-Little River
- Towle Brook-Lily Pond
- Watson Brook

Flood Hazard Zones
Flood Hazard Areas on this map are FEMA Q3 Flood Data. This information was extracted from the Federal Emergency Management Agency, National Flood Insurance Program, Q3 Flood Data DISC 23 (Maine, New Hampshire, Vermont). For more information about flood hazard areas, consult the following website: http://www.fema.gov.

Watersheds (HUC 12)
were delineated and automated by the New Hampshire Department of Environmental Services, Water Resources Division. Source maps for this data layer are USGS 1:24,000 Topographic Quadrangle maps and USDA Natural Resources Conservation Service 1:250,000 watershed maps.

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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Map 6 - Groundwater, Aquifers (USGS 1992)

Public Water Supply Wells
Mapped by the NH Department of Environmental Services. They consist of wells and surface water intake locations. Development of this data is ongoing; last updated May 2017.

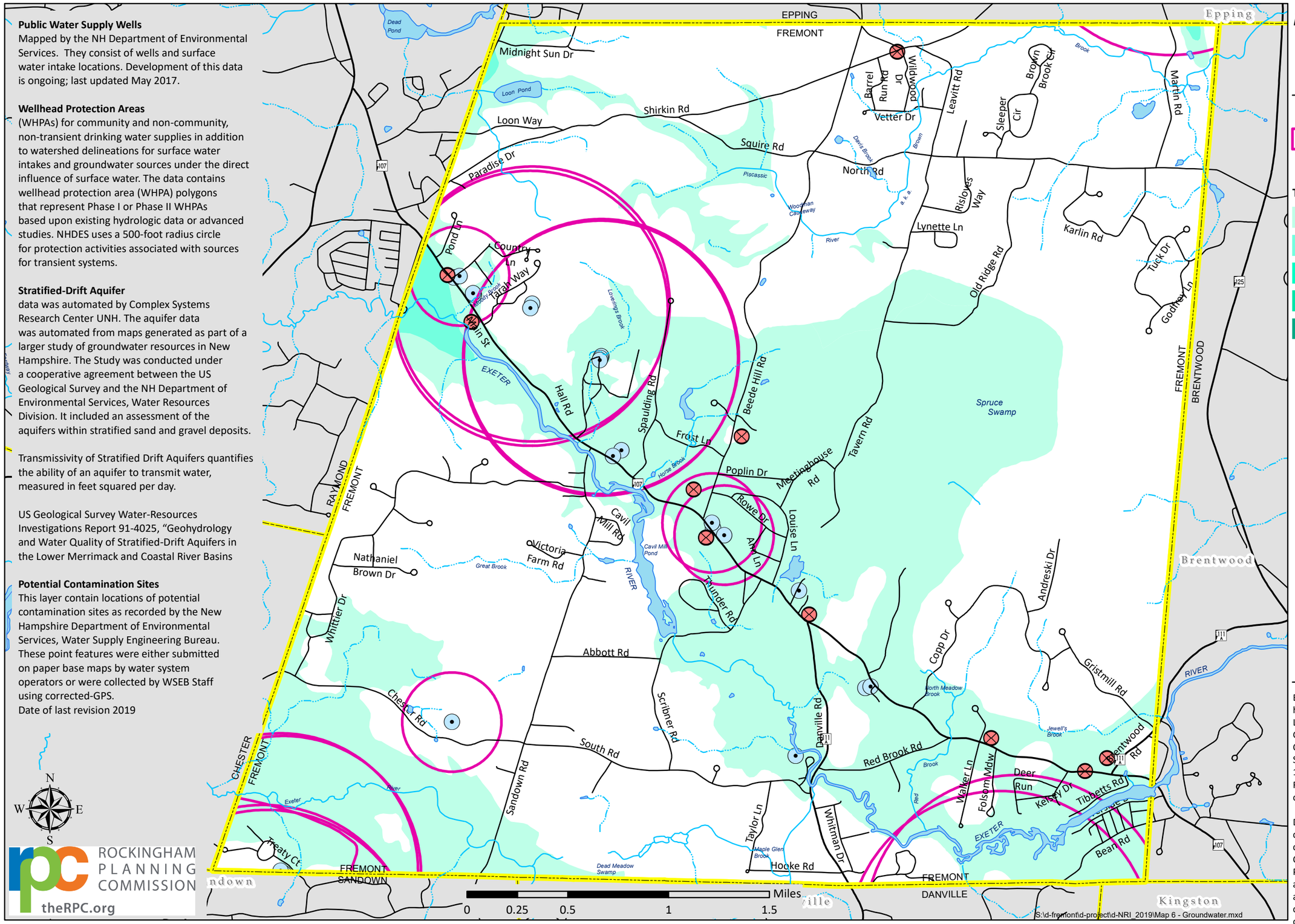
Wellhead Protection Areas
(WHPAs) for community and non-community, non-transient drinking water supplies in addition to watershed delineations for surface water intakes and groundwater sources under the direct influence of surface water. The data contains wellhead protection area (WHPA) polygons that represent Phase I or Phase II WHPAs based upon existing hydrologic data or advanced studies. NHDES uses a 500-foot radius circle for protection activities associated with sources for transient systems.

Stratified-Drift Aquifer
data was automated by Complex Systems Research Center UNH. The aquifer data was automated from maps generated as part of a larger study of groundwater resources in New Hampshire. The Study was conducted under a cooperative agreement between the US Geological Survey and the NH Department of Environmental Services, Water Resources Division. It included an assessment of the aquifers within stratified sand and gravel deposits.

Transmissivity of Stratified Drift Aquifers quantifies the ability of an aquifer to transmit water, measured in feet squared per day.

US Geological Survey Water-Resources Investigations Report 91-4025, "Geohydrology and Water Quality of Stratified-Drift Aquifers in the Lower Merrimack and Coastal River Basins

Potential Contamination Sites
This layer contain locations of potential contamination sites as recorded by the New Hampshire Department of Environmental Services, Water Supply Engineering Bureau. These point features were either submitted on paper base maps by water system operators or were collected by WSEB Staff using corrected-GPS.
Date of last revision 2019



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Natural Resource Inventory
Fremont, NH
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- Potential Contamination Sources
- Wellhead Protection Areas
- Public Water Wells (NHDES 2017)

Transmissivity

- Less than 500
- 500 to 1000
- 1000 to 2000
- 2000 to 3000
- Greater than 3000

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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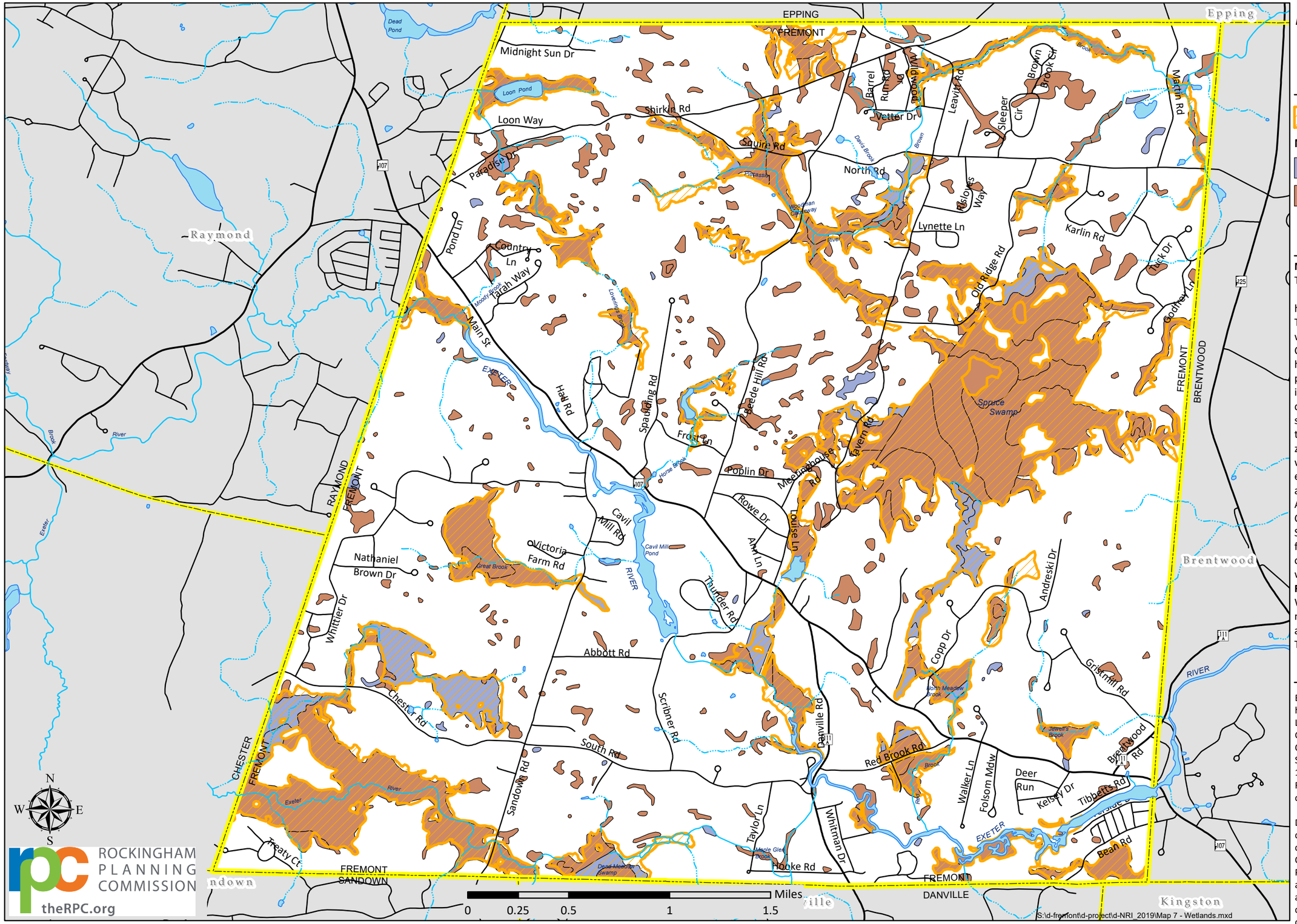
Map 7 - Wetlands



Natural Resource Inventory
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Prime Wetlands (West, 2007)

National Wetland Inventory

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

National Wetlands Inventory

This data set represents the extent, approximate location and type of wetlands and deepwater habitats in the conterminous United States. These data delineate the areal extent of wetlands and surface waters as defined by Cowardin et al. (1979). Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and near shore coastal waters. By policy, the Service also excludes certain types of "farmed wetlands" as may be defined by the Food Security Act or that do not coincide with the Cowardin et al. definition. Contact the Service's Regional Wetland Coordinator for additional information on what types of farmed wetlands are included on wetland maps.

Fremont Adopted Prime Wetlands

Wetlands represented in this dataset were mapped by West Environmental in 2007, and adopted by the Town of Fremont at Town Meeting in 2008.

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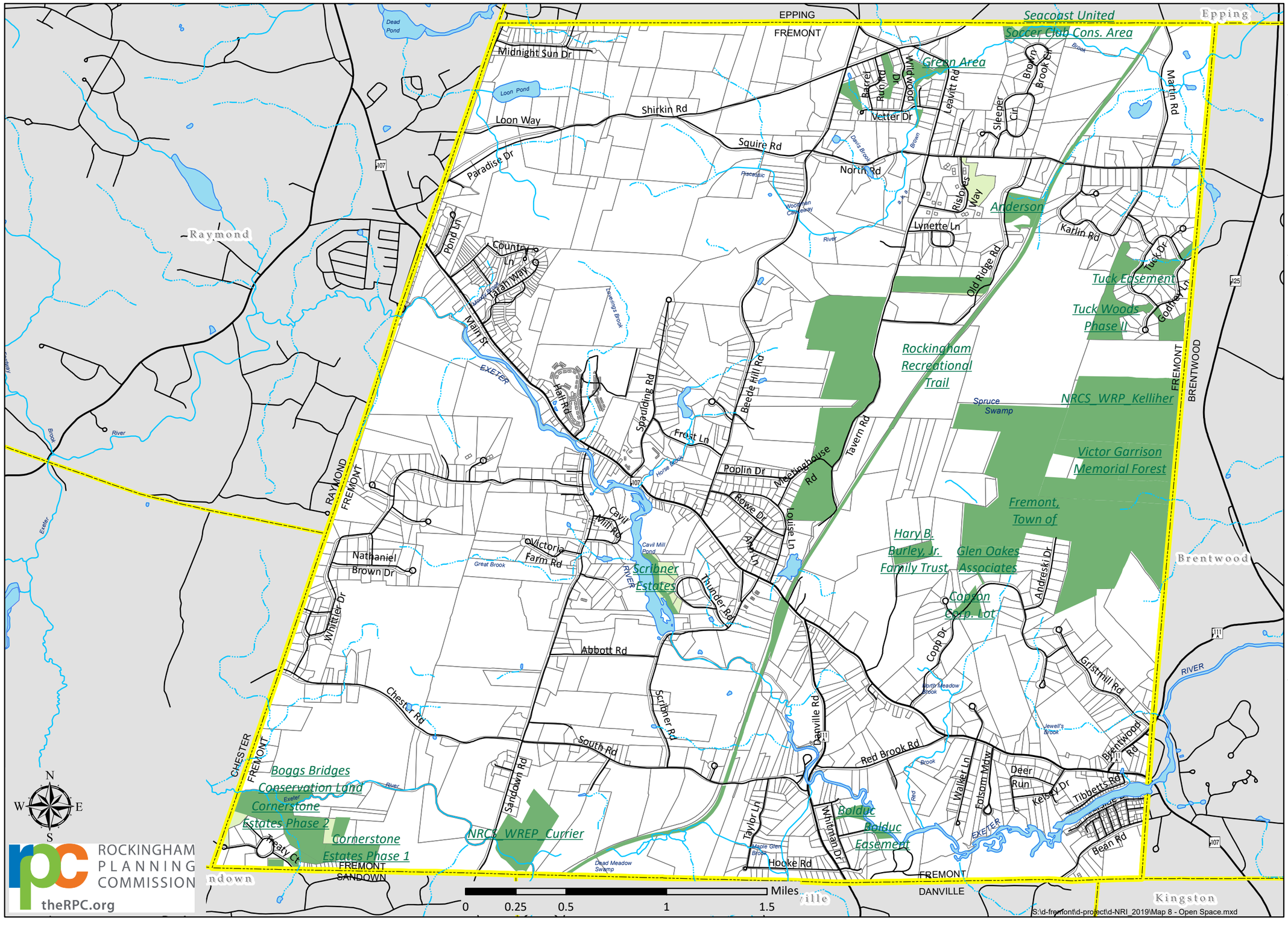
Map 8 - Conservation Land, Easements, Public Land and Open Space



Natural Resource Inventory
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Conservation Land (GRANIT 2018)

Unverified Conservation Lands (RPC)

Fremont Tax Parcels (4/2016)

Conservation and Public Lands
The conservation lands data layer describes parcels of land of two or more acres that are mostly undeveloped and are protected from future development. Unique or adjoining smaller parcels, as well as selected state-owned parcels, may also be included.

Non GRANIT Conservation Land
This dataset was created via a collaboration between the Fremont Conservation Commission and the Rockingham Planning Commission for many years.

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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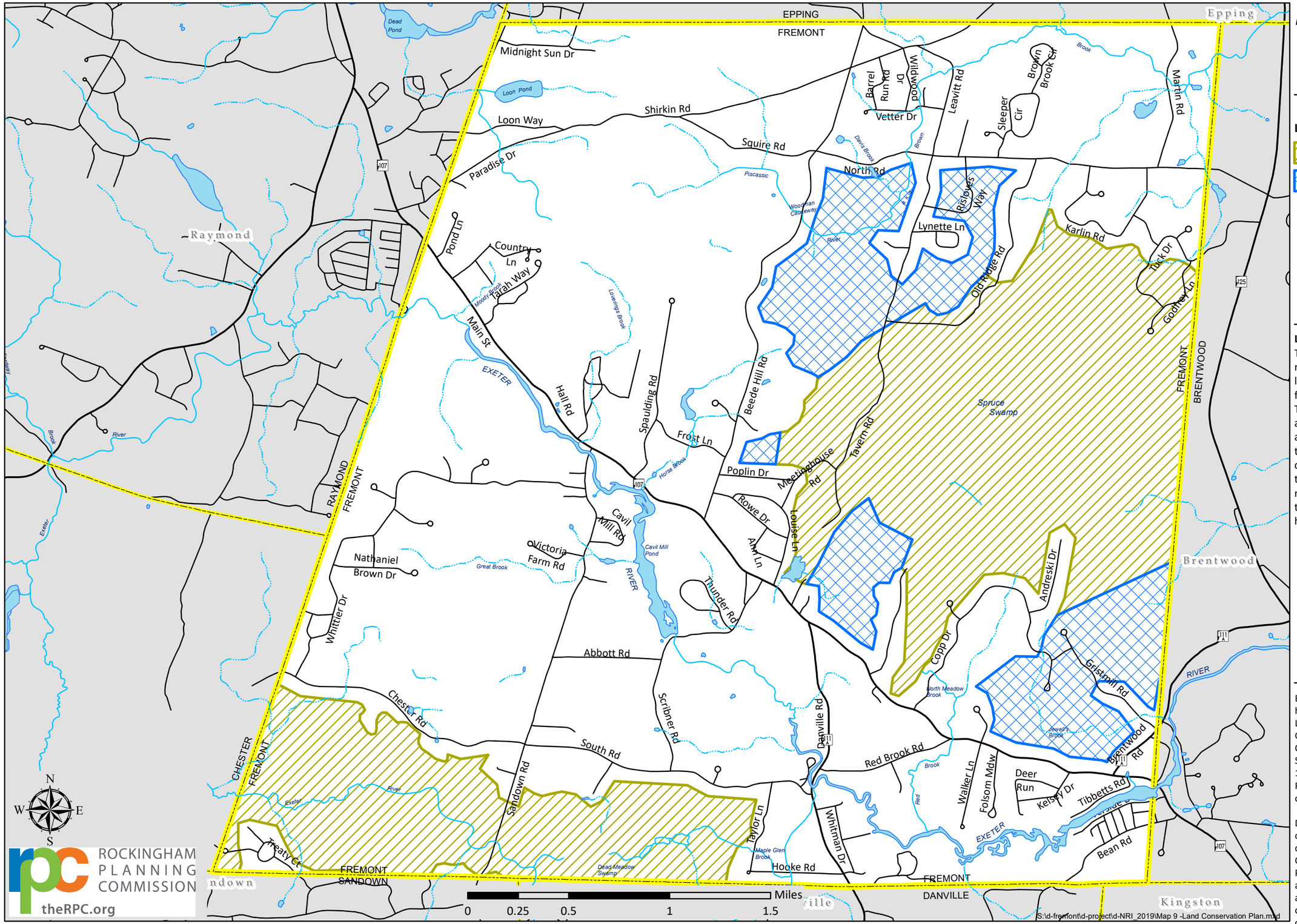
Map 9 - Land Conservation Plan (2006, 2016)



Natural Resource Inventory
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Land Conservation Plan for NH (2006, 2016)

- Core (Highest Value)
- Landscape (High Value)

Land Conservation Plan for NH

This dataset integrates best-available natural resource data with expert judgment to prioritize land protection to protect water quality, habitat, farms and forests, and recreational open space. The resultant data is broken down into 2 levels, a Core Area that is the highest ranked areas and Supporting Natural Landscape, which is the second tier of habitat. The Core habitat contains the essential natural resources for which the focus area was identified. The supporting natural landscape is comprised of natural lands that buffer and sometimes link core areas and help to maintain habitat and ecological processes.

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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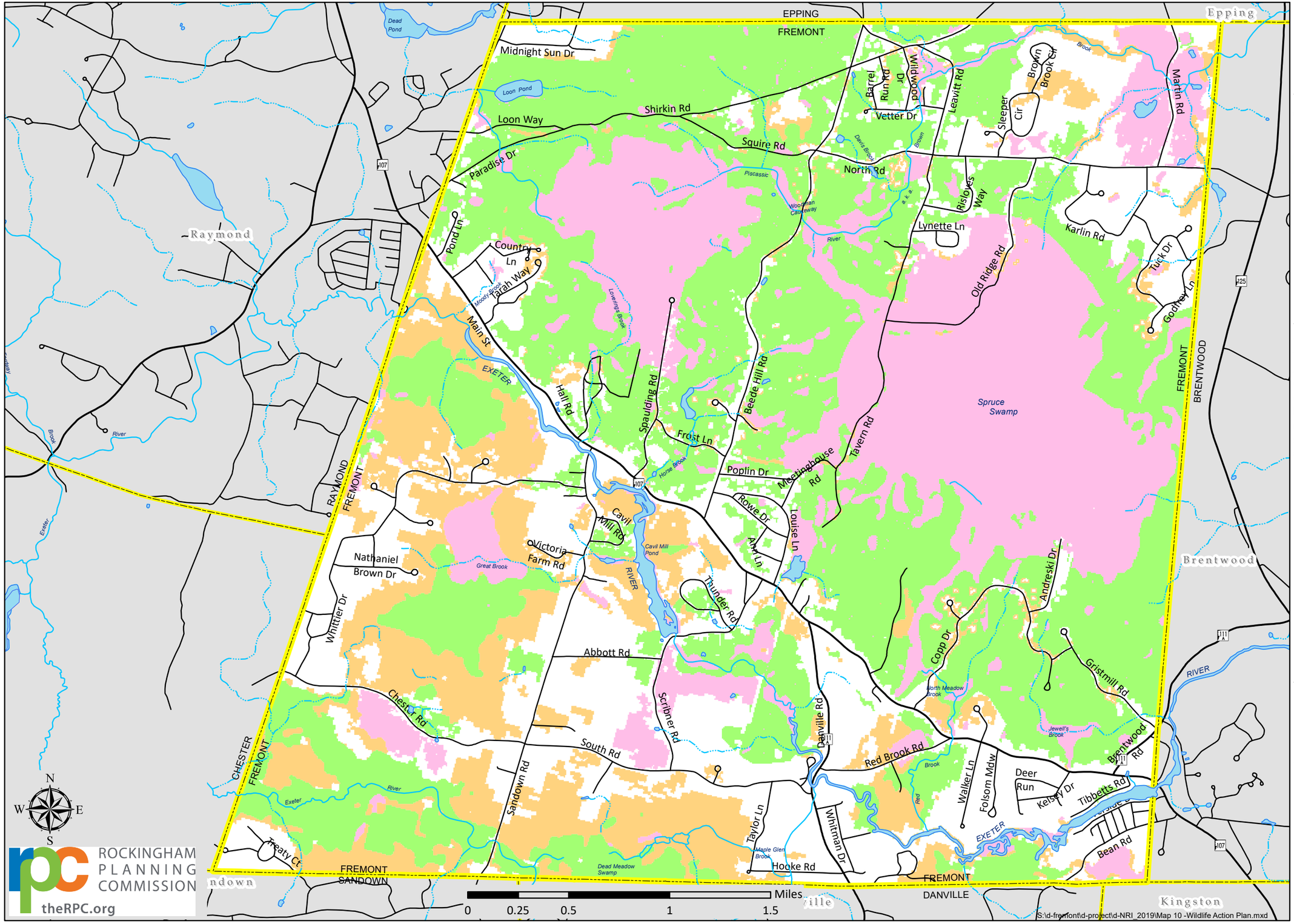
Map 10 - NH Fish and Game - Wildlife Action Plan (2020)



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Natural Resource Inventory
Fremont, NH
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Wildlife Action Plan 2020

- Tier 1 - Highest Ranked Habitat in NH
- Tier 2 - Highest in Biological Region
- Tier 3 - Supporting Landscapes

Wildlife Action Plan 2020

The NH Fish and Game released the NH Wildlife Action Plan in 2005, it was subsequently updated in 2010, 2015 and 2020. This data was created by aggregating the highest quality habitats within each habitat type and then reranking based on co-occurance.This data shows the most critical wildlife habitat locations and thus, important wildlife areas.

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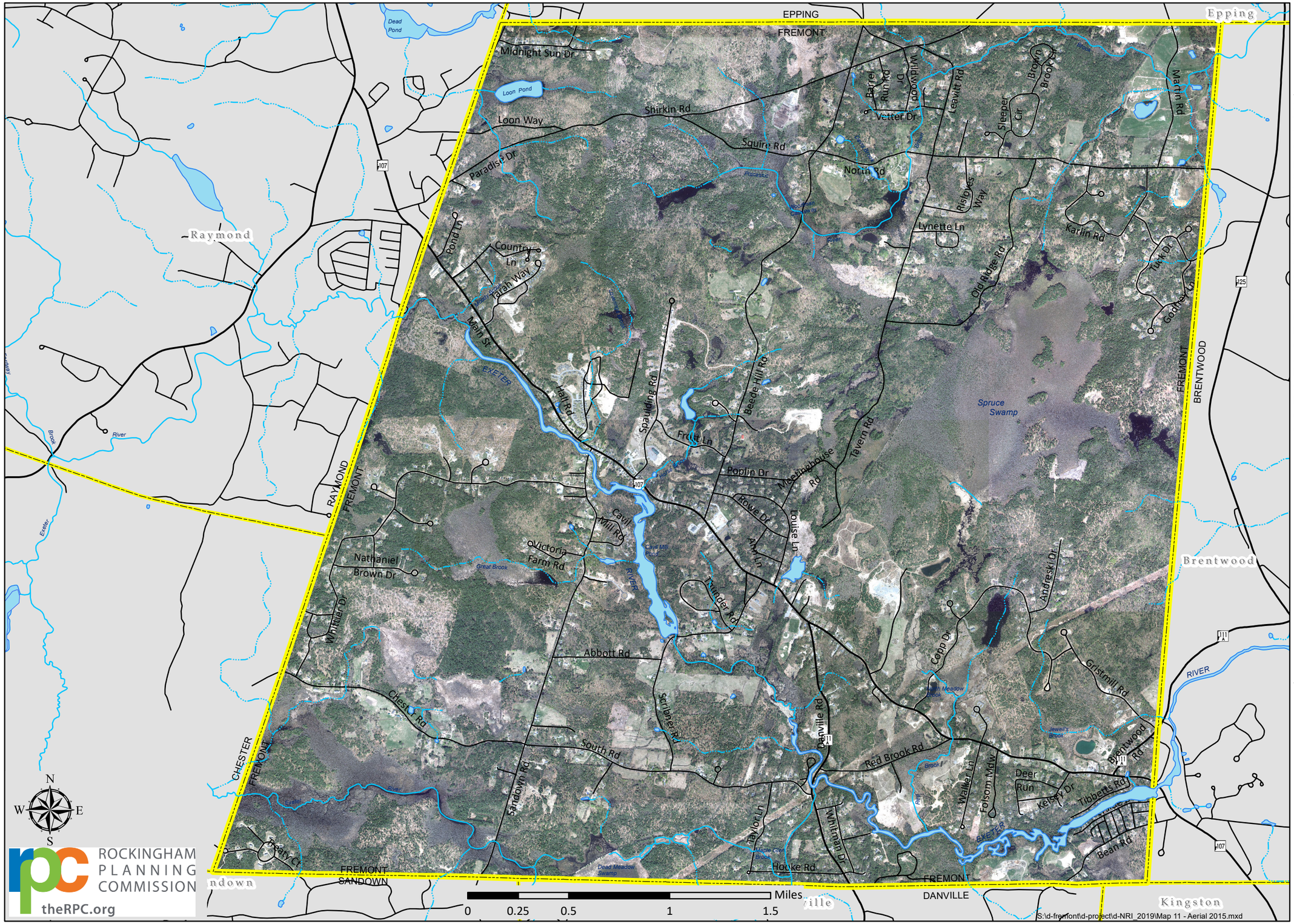
Map 11 - Aerial Photo (USGS/ NHDoT 2015)



Natural Resource Inventory
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2015 NHDOT / USGS 1' Aerial Photo
The New Hampshire Department of Transportation partnered with the US Geological Survey (USGS) and additional state and federal partners to acquire high resolution, leaf-off, color, aerial photography.
This 1' (.35m) GSD multispectral digital orthoimagery was compiled to meet a 3.0 meter (9.84') horizontal accuracy at 95% confidence level based on NSSDA testing guidelines.
These images were geometrically corrected to achieve a uniform scale. Each frame was adjusted for topographic relief, lens distortion and camera tilt.
The NH Department of Transportation shall not be held liable for any errors in this data. This includes errors of omission, errors of commission, content errors, and relative and positional accuracy errors in the data. This data should not be construed to be a legal document. Primary sources from which this data was compiled must be consulted for verification of information contained in this data. This data is in the public domain, and may not be resold.

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Map 12 - Impervious Surfaces (UNH Complex Systems, 2015)

Natural Resource Inventory
Fremont, NH
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Impervious Surfaces 2015

Impervious Surfaces 2015 (UNH)
This impervious cover data set covers the 52 towns of the Piscataqua Region Estuaries Partnership (PREP) and identifies human-made surfaces that do not allow water to permeate through them. Naturally occurring impervious cover, such as exposed bedrock, is not included in the impervious class.The data set was derived by interpreting 1-foot resolution orthophotography, acquired in 2015, and delineating and updating impervious cover features.

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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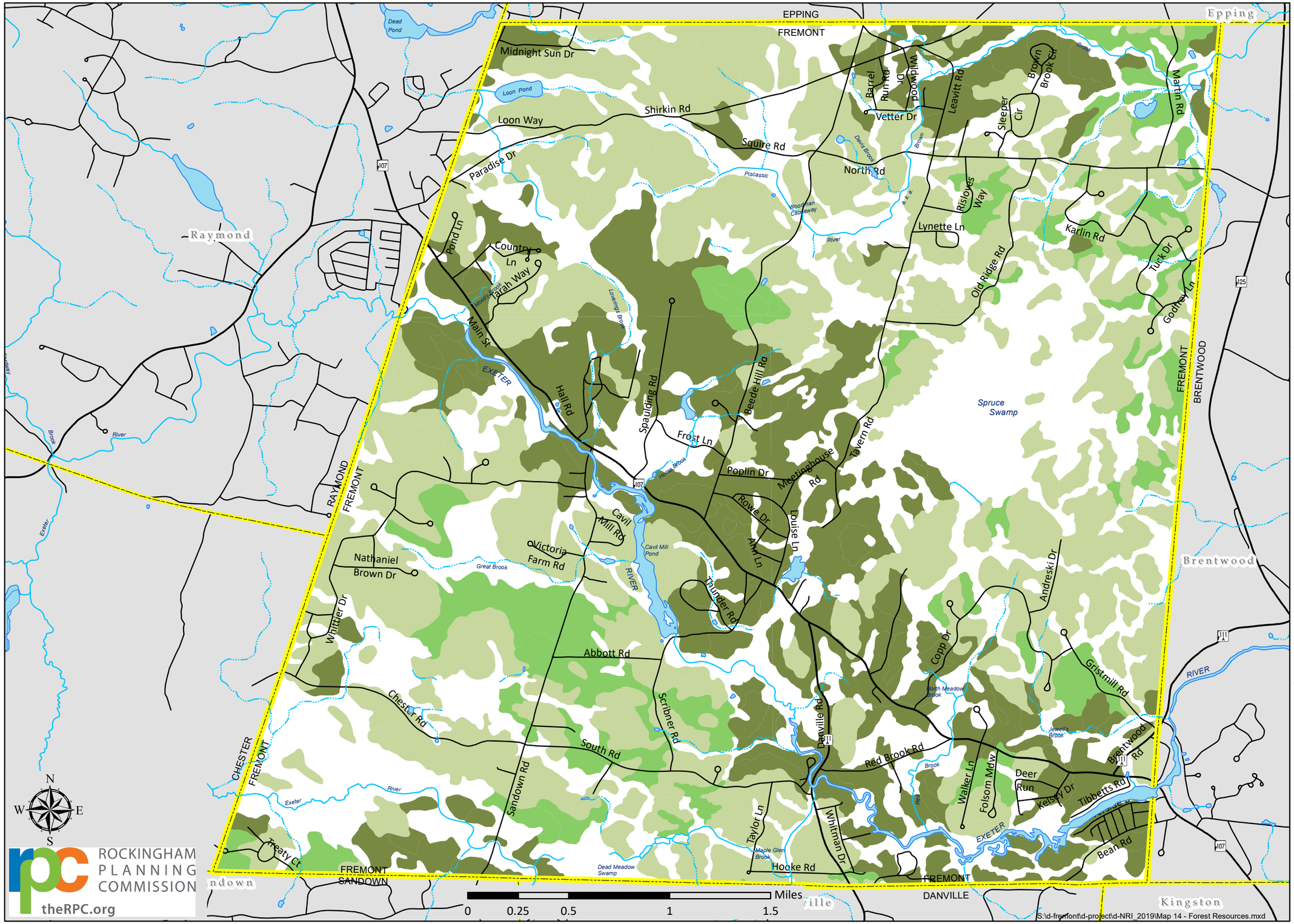
S:\d-fremont\d-project\d-NRI_2019\Map 12 - Impervious Surfaces 2015.mxd

Map 14 - Forest Soil Types



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S:\d-fremont\d-project\d-NRI_2019\Map 14 - Forest Resources.mxd

Natural Resource Inventory
Fremont, NH
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Productive Forest Soils

- IA — *Fertile, deep, loamy , moderately well and well-drained, with few limitations for forest management, best suited to hardwoods.*
- IB — *Loamy and sand soils over sandy textures. Moderately well and well-drained soils. Primarily suited to hardwoods.*
- IC — *Somewhat droughty, less fertile sands and gravel derived from glacial outwash, excessively well-drained, ideally suited to softwoods, especially white pine.*

Productive Forest Soils

IA
This group consists of the deeper, loamy textured, moderately well, and well-drained soils. Generally, these soils are more fertile and have the most favorable soil moisture

IB
The soils in this group are generally sandy or loamy over sandy textures and slightly less fertile than those in group IA. These soils are moderately well and well drained. Soil moisture is adequate for good tree growth, but usually not as abundant as in group IA soils.

IC
The soils in this group are derived from coarse textured, infertile glacial deposits of outwash sands and gravels. The soils are somewhat excessively to excessively drained and moderately well drained.

Base Features (transportation, political and hydrographic) were automated from the USGS Digital Line Graph data, 1:24,000, and archived in the GRANIT database at Complex Systems Research Center, Institute for the study of Earth, Oceans and Space, University of New Hampshire, Durham, NH; 1992-1999. The roads have been updated by Rockingham Planning Commission and by NH Dept. of Transportation through ongoing efforts.

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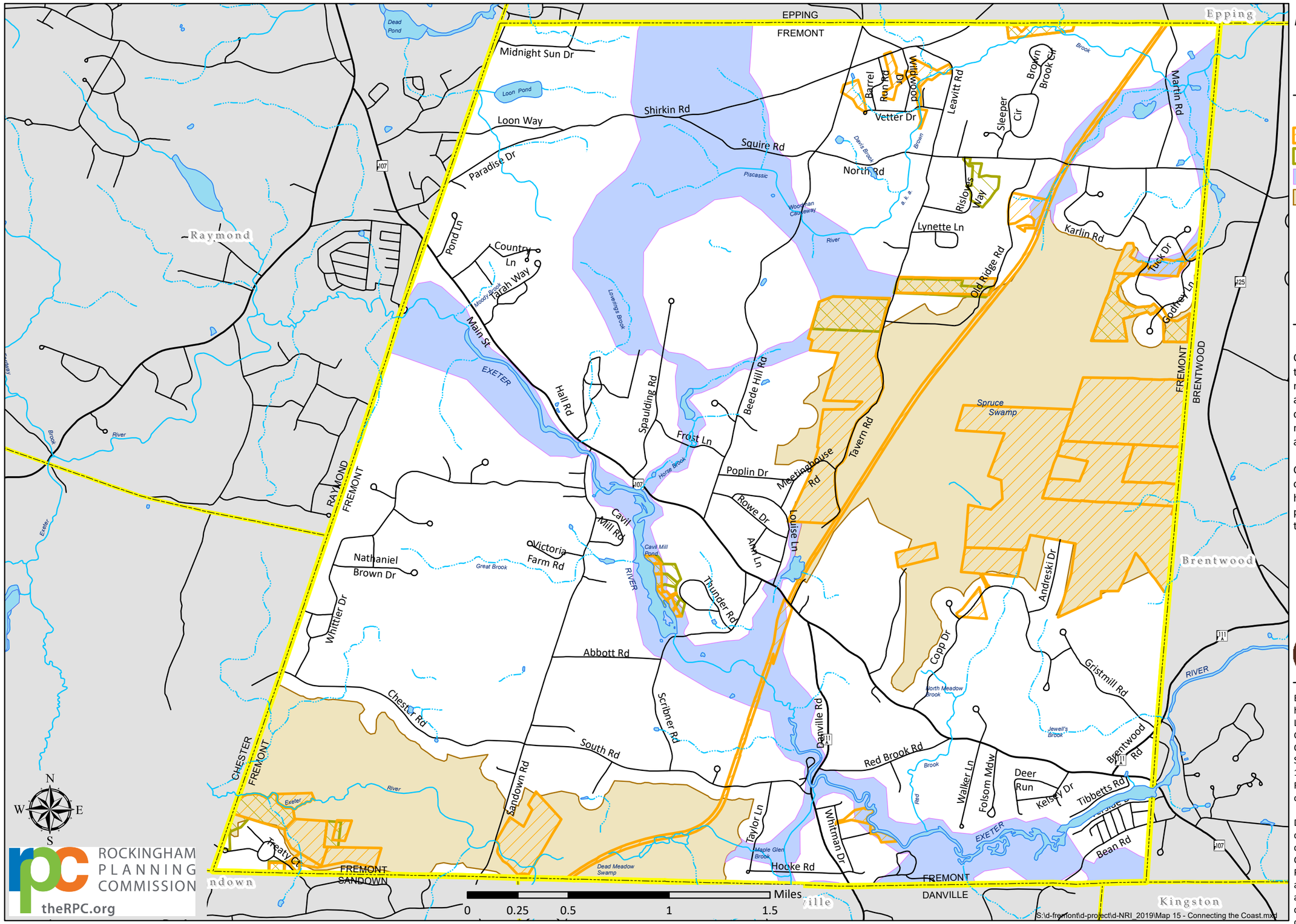
Map 15 - Connecting the Coast (TNC, SELT 2019)



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ROCKINGHAM PLANNING COMMISSION
theRPC.org

Natural Resource Inventory
Fremont, NH
2020

- Conservation Land (GRANIT 2018)
- Unverified Conservation Lands (RPC)
- Connecting the Coast - Corridors
- Connecting the Coast - Prioritized Blocks

Connecting the Coast
CTC wildlife corridors identify conservation targets for the protection of a connected network of habitats for wildlife to persist and thrive in the context of a rapidly developing landscape. The network is made of wildlife corridors that connect a series of prioritized habitat blocks.

CTC prioritized habitat blocks represent conservation focus areas for wildlife habitat based on regional conservation plans and state wildlife action plans for the study area.

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

SELT SOUTHEAST LAND TRUST of NEW HAMPSHIRE

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