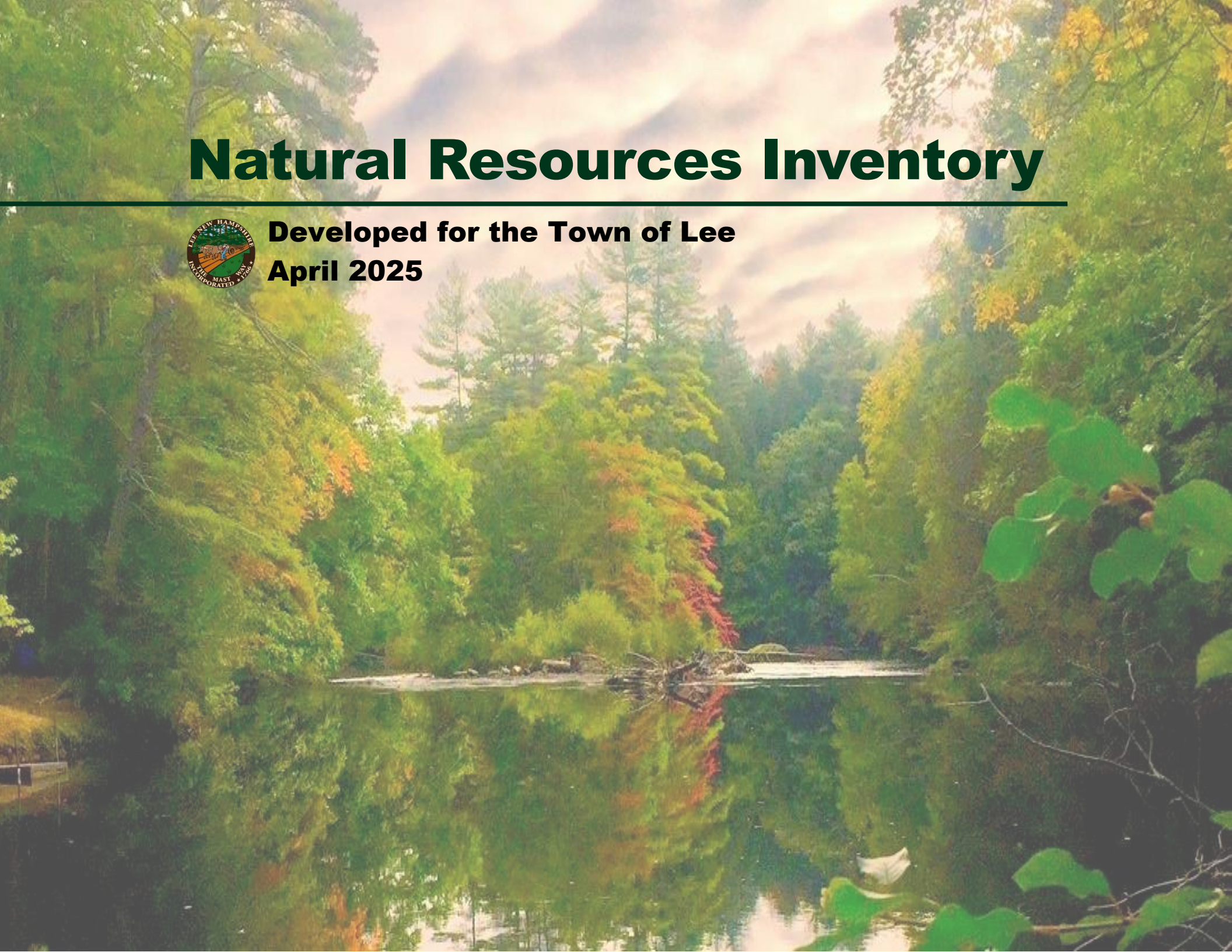
Natural Resources Inventory

Developed for the Town of Lee
April 2025



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STRAFFORD Regional Planning Commission
PREP Piscataqua Region Estuaries Partnership

Table of Contents

Section 1: Introduction

Natural Resource Inventories (NRI) are a critical tool for proactive land use planning. An NRI analyzes the natural landscape of a community using current data and best available science, considers local and regional context and goals, and translates this information into an actionable document that highlights natural resource management priorities.

RSA 36-A:2, which is the enabling statute that allows municipalities to establish a conservation commission, states that a conservation commission, "*shall conduct researches into its local land and water areas…shall keep an index of all open space and natural, aesthetic or ecological areas within the city or town…and shall keep an index of all marshlands, swamps, and all other wet lands in a like manner, and may recommend…a program for the protection, development, or better utilization of all such areas*."

The Lee NRI provides a comprehensive reference to inform decision making processes for the Select Board, Conservation Commission, Planning Board, Zoning Board, town staff and landowners to create a resilient future in the Town of Lee. Additionally, the NRI provides supporting documentation for the Town's Master Plan.

The Town of Lee takes pride in the rural nature of our town, the beauty of our natural areas, farmlands, and rivers. Each year these resources are nibbled at little by little. To identify the most significant natural resources, farm or historic properties, or the most strategic lands for the protection of our surface and groundwater, the Conservation Commission has also developed a conservation checklist to help evaluate properties for conservation consideration. As funds are limited as to what can be protected, it is important that the most important projects are brought before the Town.

In addition, as other Boards and Commissions carry out their duties, it is strongly recommended that these conservation priorities be kept in mind. Lee is central to major regional ecological resources that connect the Towns of the seacoast.

Actions in Lee have an impact not only within our borders, but on the region as well.

1.1 Community Outreach

The early stage of this study included ways in which community input was collected. The first was a community survey which received great participation yielding 103 completed surveys. The results of the survey are included in Appendix C.

The second was through a community forum held on April 9, 2024. Approximately 33 people attended the event to share their views, including priorities, of the natural environment in Lee.

A third opportunity for public input was on July 31, 2024, which was to review the NRI draft and provide local information to be included in the final inventory. Members of the steering committee, Conservation Commission and public were invited to attend and provide comments on the draft.

Community Forum, April 2024

Community Forum, April 2024

Section 2: Water Resources

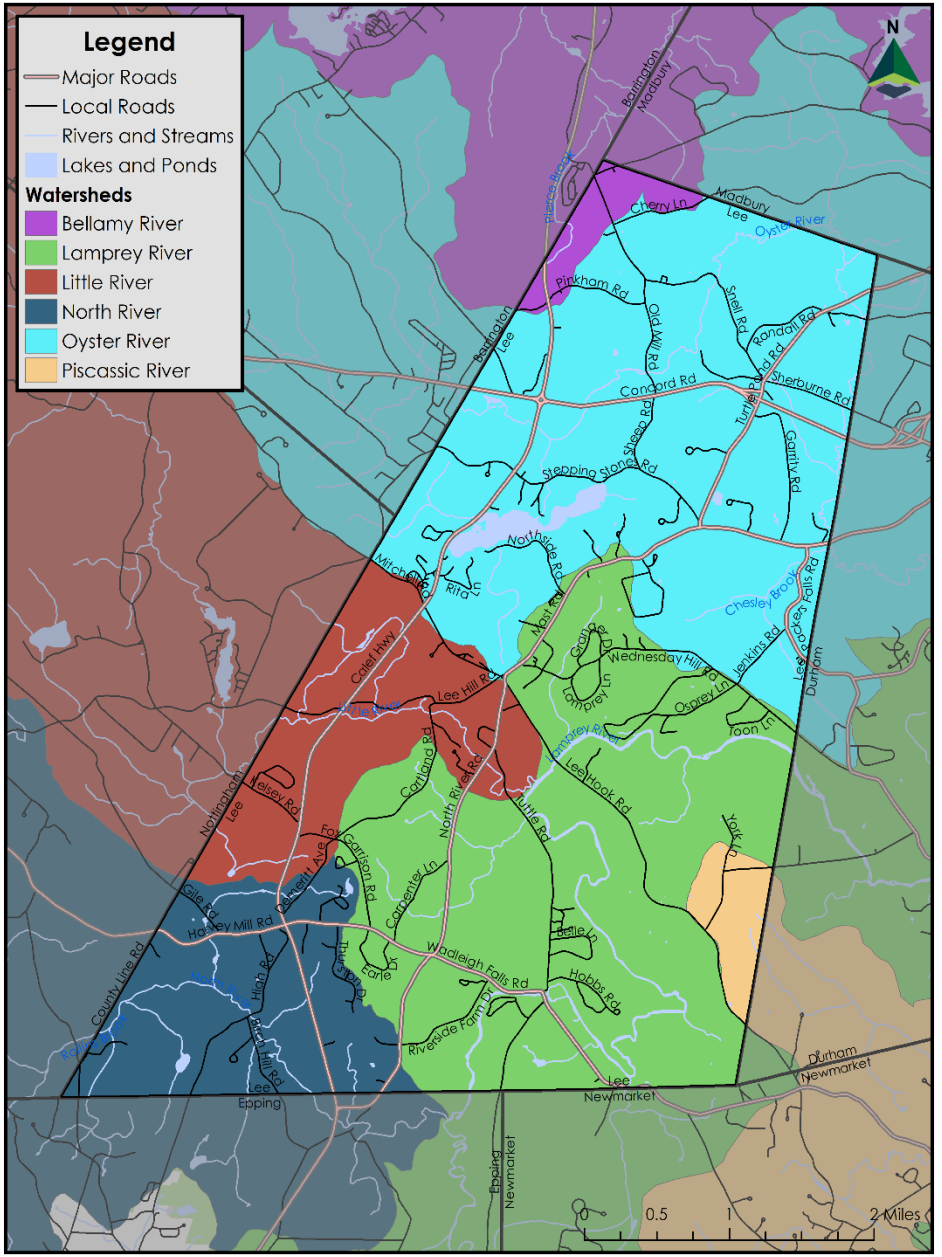
2.1 Water Resources Special Study

Water resources include surface and ground waters including streams, rivers, waterbodies, wetlands, groundwater aquifers, and flood zones. In addition to standard environmental data resources presented in this section, FB Environmental (FBE) conducted an in-depth special study and Geographical Information System (GIS) analysis of water resources and water quality protection within the Town of Lee. The analysis identifies areas in the Town where these resources are most concentrated. The results are intended to guide future conservation efforts focused on protecting drinking water resources, and designated water resource protection areas such as shoreland conservation and protection zones, wellhead protection areas, wild and scenic river designations, impaired surface waters, and groundwater reclassification areas, among others.

To identify the density of water resources in Lee, FBE conducted a co-occurrence analysis. A co-occurrence analysis identifies areas with the highest density of resources within a given area utilizing GIS. These high-density areas contain multiple and overlapping resources and resource protection areas. Ultimately, the final compilation can serve as an aid in identifying zones to expand conservation efforts while protecting water resources and water quality for the community to use and enjoy into the future.

Spatial data (i.e., GIS data layers for surface waters, wetlands, streams, etc.) used in the GIS analysis were kept in polygon form to maintain feature shapes

Figure 1: Watersheds in Lee



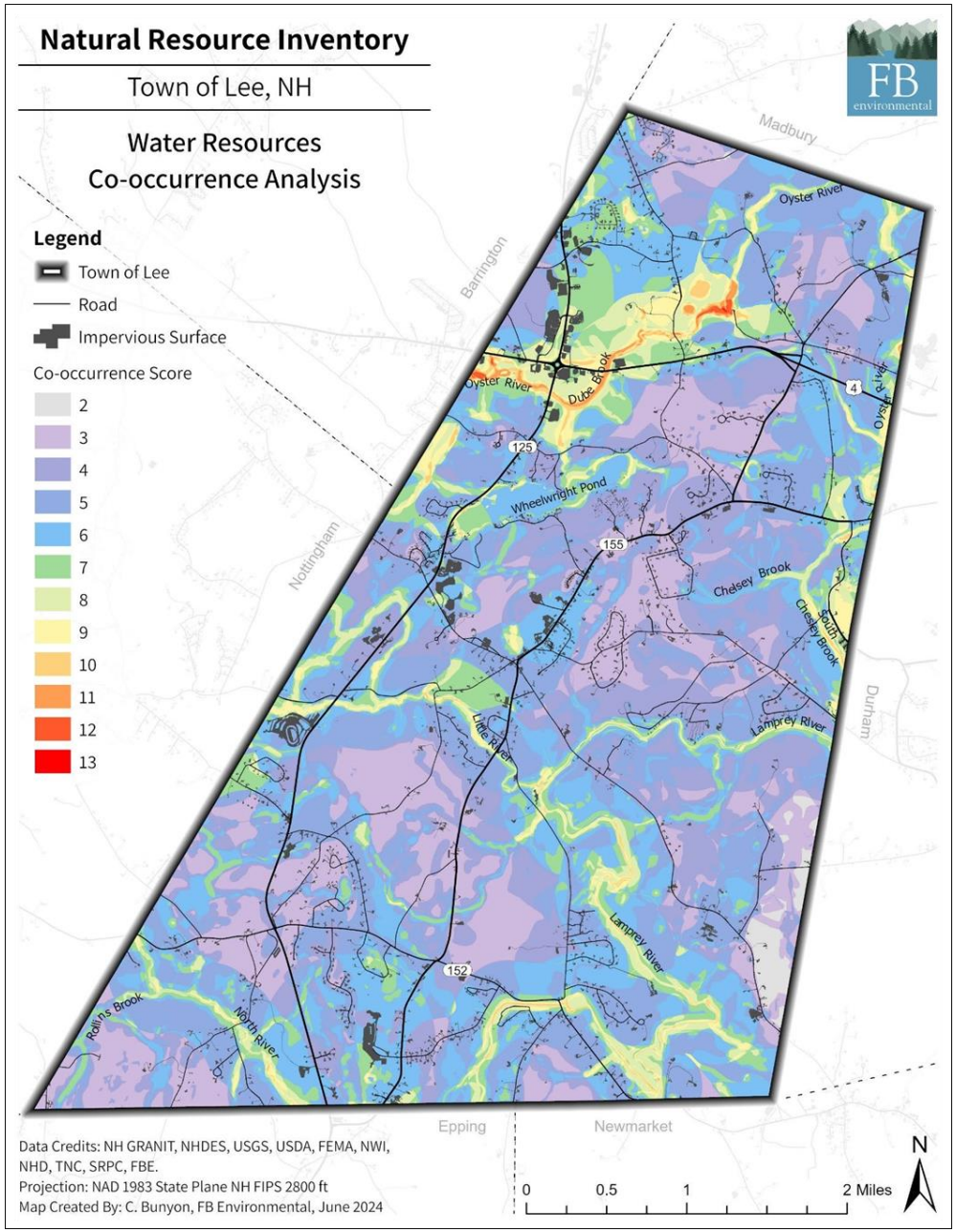
and accuracy. To visually display the density gradation, each data layer was categorized into one of two categories. If the feature of interest (i.e., a surface water), was present, those polygons were given a value of 1. If a feature was absent (i.e., no surface water), those polygons were given a value of 0. The data layers were then stacked, and a “union” analysis tool transposed the layers into a single data layer where each numeric value was added together for every polygon. The higher the score, the more resources were present.

The study included 19 spatial data layers related to water resources and water quality protection from the NH Geographically Referenced Analysis and Information Transfer System (NH GRANIT), U.S. Geological Survey (USGS), U.S. Department of Agriculture (USDA), U.S. Federal Emergency Management Agency (FEMA), New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFG), Strafford Regional Planning Commission (SRPC), and The Nature Conservancy (TNC). The full list of data layers used is in the NRI Supplemental Study: Water Resource Analysis in Appendix A.

Study Findings

With a possible range of co-occurrence scores from 0 to 19, scores of 2 through 13 were found within the Town of Lee. Having the lowest score of 2 indicates that at least two of the water resources are present throughout the entire town. 90% of the town has between 3 and 7 of these water resources. Only 0.89% of Lee has 10 or more of these resources.

Figure 2: Co-occurrence Analysis



The highest concentration of water resources – the highest co-occurrence scores – can be found along the Oyster River southwest and northeast of the Lee Traffic Circle. Resources found here include a combination of the following 13 resources: wetlands, wet soil conservation zone, Shoreland Conservation District, FEMA Flood Hazard Areas, Wellhead Protection Areas, a surface water with an impairment and buffer, a Designated River and its buffer, Groundwater Reclassification Areas GA2, stratified drift aquifers, the Aquifer Conservation District, high priority water supply lands, source water protection areas for surface water sources, and areas not serviced by the municipal drinking water utility. Other high co-occurrence areas include the areas surrounding the North River, Lamprey River, Little River, South Chesley Brook, and the Oyster River on the northeastern side of town.

Study Recommendations

1. Water Resources and Water Quality Protection Through Conservation

Land conservation is essential to the health of a region or town, particularly for the protection of water resources, enhancement of recreation opportunities, vitality of local economies, and preservation of wildlife habitat. Land conservation is one of the best methods in preserving water quality and water resources for future generations (Kreye, Adams, & Escobedo, 2014), though it is only one of the methods for doing so. The forests and wetlands provide vast ecological benefits to water quality including nutrient retention and uptake, and stormwater diversion and infiltration. The Town of Lee has many areas of conserved land which overlay areas with a high density/concentration of water resources (i.e., high co-occurrence scores).

2. Water Resources and Water Quality Protection Through Regulation Updates

Currently, the Town of Lee has an Aquifer Conservation District which encompasses areas “having the potential to yield groundwater” to “protect [their] known aquifers by preventing adverse land use practices…” (Town of Lee, NH, 2023). Certain activities are prohibited within this conservation district including the subsurface storage of petroleum, outdoor storage of road salts, dumping of snow containing road salts, septage disposal, solid waste disposal, storage, discharge, or disposal of hazardous or toxic materials, automotive services, and earth removal (Zoning Ordinance, Town of Lee, NH, 2023).

The NHDES and NH Office of Energy and Planning developed a Model Groundwater Protection Ordinance to assist NH communities in developing town-specific regulations for the protection of stratified-drift aquifers. The model ordinance also includes language on allowable/permittable, conditional, and prohibited land uses, as well as exceptions within the groundwater protection areas, and provides guidelines for maintenance and inspections. The model also explains how wellhead protection areas may be reclassified for eligibility of higher protections. The wellhead protection areas within Lee currently do not overlap with existing groundwater classifications (i.e., GAA, GA1, GA2).

<u>The study recommends the Town of Lee first expand the Aquifer Conservation District to include all groundwater and aquifer areas, and then strengthen the regulation.</u> The expanded district should encompass the area where the stratified drift aquifer expands around the Lee Traffic Circle and Oyster River, as well as the area where the Groundwater Reclassification Area GA1 extends around Chesley Brook and Jenkins Road.

3. General Regulation Recommendations

Regulations through municipal zoning and ordinances such as low impact design (LID) strategies that prevent polluted runoff from new and re-development projects are equally important as land conservation. Local land use planning and zoning ordinances can be the most critical components of water resource protection. These ordinances and regulations should consider incorporating climate change resiliency strategies for protecting water quality and improving infrastructure based on temperature, precipitation, water levels, wind loads, storm surges, wave heights, soil moisture, and groundwater levels (Ballestero, Houle, Plus, & Barbu, 2017). There are nine strategies that can aid in minimizing the adverse effects associated with climate change and include the following (McCormick & Dorworth, 2019):

- Installing Green Infrastructure and Nature-Based Solutions
- Using LID Strategies
- Minimizing Impervious Surfaces
- Encouraging Riparian Buffers and Maintaining Floodplains
- Protecting and Re-establishing Wetlands
- Encouraging Tree Planting
- Promoting the Use of Native Vegetation in Landscaping
- Slowing Down the Flow of Stormwater
- Coordinating Infrastructure, Housing, and Transportation Planning

Conclusion to the Special Study

The Town of Lee has numerous freshwater resources including stratified drift aquifers, reclassified groundwater areas, wetlands, rivers, streams, and ponds. These resources are delicate and valuable and can be easily impacted by overuse or misuse. The co-occurrence analysis of water resources revealed that the town has at least two hot-spots/high-density zones of water resources occurring near the Oyster River southwest and northeast of the Lee Traffic Circle, and along Oyster River south and northeast of the Lee Traffic Circle. The major riverways (the North River, Lamprey River, Little River, South Chesley Brook, and the Oyster River) in town were also identified as high co-occurrence areas.

The protection of water resources comes from a variety of approaches including land conservation, education, and ordinance/zoning/regulation updates. Though this analysis focuses on only the Town of Lee, it is imperative to acknowledge that many of the water resources in Lee are aquifers, rivers, and streams that begin and flow or extend into adjacent communities. In addition to in-Town improvements to regulations, practices, and expansion of land conservation, collaborations between Lee and the neighboring towns of Nottingham, Barrington, Madbury, Durham, Newmarket, and Epping, will be essential to the protection of Lee's shared water resources.

The full report can be found in Appendix A.

2.2 Watersheds

Watersheds can generally be defined as an area of land where water drains to one common point; precipitation that falls in the defined area will all eventually reach this point.[i]

Watersheds are delineated nationally by the United States Geological Survey using the Hydrologic Unit Code (HUC) system, based on surface hydrologic features. For each level in the hierarchy, two digits are added to the HUC. This system classifies the country into 22 regions, 245 subregions, 405 basins, 2,400 subbasins, 19,000 watersheds, and 105,000 sub watersheds.

The HUC for regions are assigned two digits, subregions are assigned four digits, basins are assigned six digits, subbasins are assigned eight digits, watersheds are assigned 10 digits, and sub watersheds are assigned 12 digits. There are six HUC-12 sub watershed that extend through Lee.

Sub watershed	Acres	% of Town
Oyster River	4,759.70	36.8%
Lamprey River	4,159.40	35.5%
North River	1,599.79	12.4%
Little River	1,476.09	11.4%
Piscassic River	259.49	2.0%
Bellamy River	240.82	1.9%
Total (Town of Lee)	12,927.29	100.0%

The Lamprey and Oyster River watersheds together encompass 72.3% of the Town. The Little River and North Rivers add another 23.8% of watershed area. The Piscassic River and the Bellamy River contribute 3.9% of the watershed area.

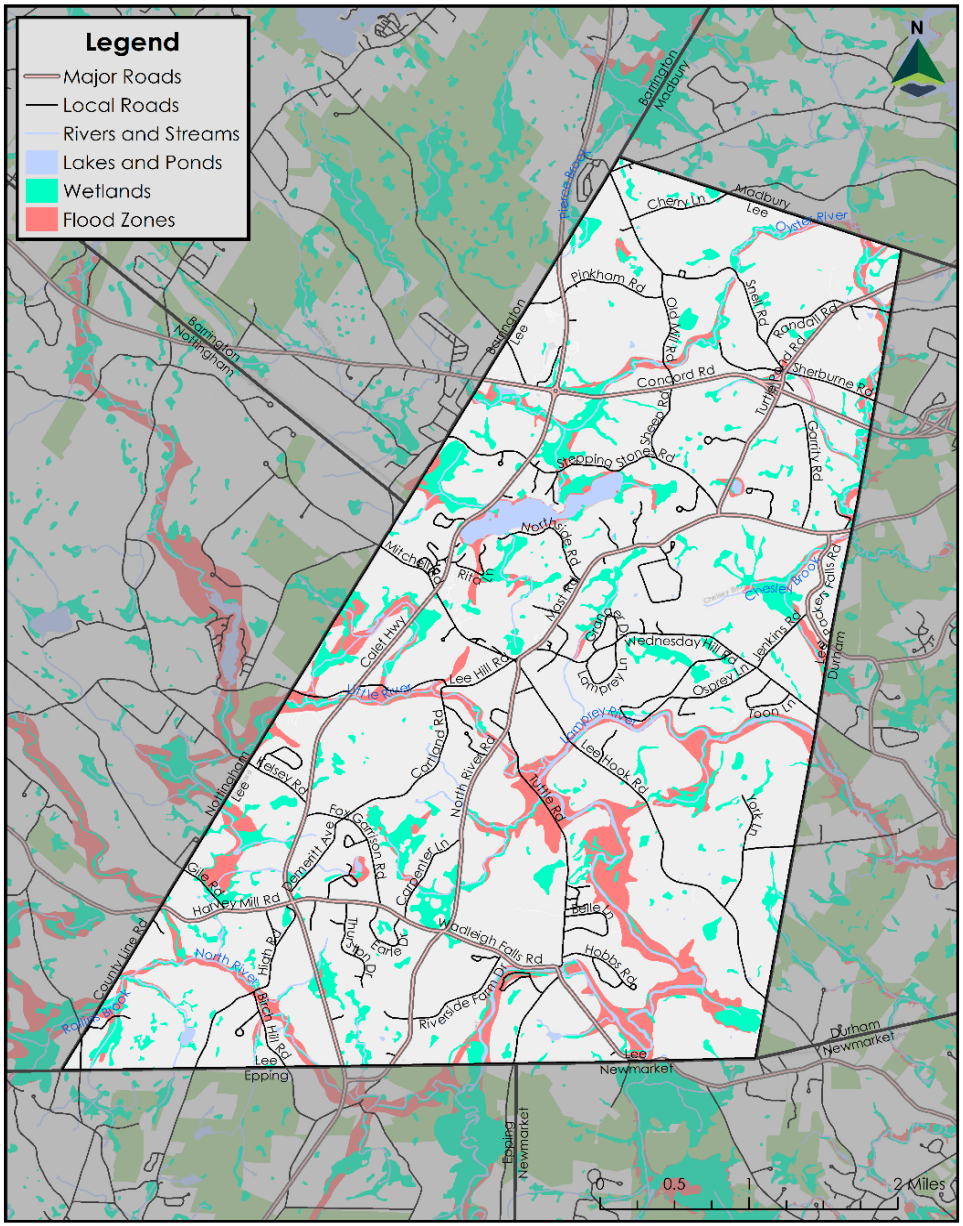
2.2.1 Surface Waters

Surface waters are waters which are visible on the Earth's surface, such as wetlands, rivers, streams, ponds, and lakes. Surface waters are defined by the state of New Hampshire as, "perennial and seasonal streams, lakes, ponds, and tidal waters within the jurisdiction of the state, including all streams, lakes, or ponds bordering on the state, marshes, water courses, and other bodies of water, natural or artificial."

Surface waters in New Hampshire are governed by the New Hampshire Department of Environmental Service Administrative Rules.

The map to the right illustrates these different water bodies in Lee, including rivers and streams, lakes and ponds, wetlands[1], and floodplains.
The following subsections characterize each surface water type and describe the prominent habitat which occurs within them. See Section 3.1 for in depth habitat profiles.

Figure 3: Water Resources



[1] These are generalized wetlands delineated from a national wetland inventory and additional jurisdictional wetlands subject to the Town's local regulations that exist in areas not shown on the map.

2.2.2 Rivers & Streams

Lee has both coldwater and warmwater rivers and streams. Coldwater rivers maintain relatively low temperatures throughout the year, even during summer months. They support a unique ecosystem adapted to colder temperatures, often including species of fish, such as brook trout, which require cold, well-oxygenated water to thrive. They also support stream salamanders, longnose sucker, and burbot. In Lee, as well as other southern New Hampshire communities, coldwater rivers and streams depend on the influence of groundwater to maintain appropriate temperatures.

Warmwater rivers encompass a broad spectrum of temperatures, ranging from above 68 degrees in the summer to cooler temperatures in the winter. They are not as consistently cold as coldwater rivers, and therefore do not support coldwater species. Warmwater rivers vary in size, gradient, and substrate, but are often found in watersheds with abundant wetland systems.

2.2.3 Lakes & Ponds

Lee has only warmwater lakes and ponds. These differ from lakes and ponds with coldwater habitat as they do not have cold, well-oxygenated water in the summer and therefore do not support coldwater fish species. These lakes and ponds vary in size, shape, and depth and include substrate such as boulder, sand, and mud.

Underwater vegetation provides spawning and nursery habitat for several fish species. Invertebrates living in underwater vegetation provide feed for turtles, fish, and amphibian species. Waterfowl and wildlife may use these lakes and ponds as nesting areas where shorelines are undeveloped.

2.2.4 Wetlands & Vernal Pools

Wetlands

Wetlands are rich habitats with immense benefits for nature and people. They absorb and slow floodwaters, filter sediments and pollutants; recharge groundwater; host a myriad of uncommon plants, animals, and aquatic life; serve as scenic backdrops and sites for recreation and education. Wetlands come in a variety of types, but all have three things in common: soils that are saturated sometime during the growing season; most of the vegetation is adapted to these saturated soils; and the soils in the area are periodically or permanently inundated with water during the growing season.

The U.S. Army Corps of Engineers, NH State Department of Environmental Services, and the Town of Lee regulate the impacts to wetlands due to development. The State issues permits for wetlands impacts with input from the Town's Conservation Commission. Impacts to wetlands are also regulated through the Lee's of Wet Soils Conservation Zone (Article XV of the Zoning Ordinance)

There are 1,327.9 acres (10.3%) in Lee that are classified as wetlands. In addition to the waters associated with Great Bay, rivers and streams, the Town hosts several other wetland types of significance as described in the NH Wildlife Action Plan.

Vernal Pools

Vernal pools are seasonal wetlands subject to periods of flooding and drying. Generally small, and isolated from other wetlands, the pools can be found in almost every habitat type and are used by many species of wildlife. Species such as fairy shrimp, wood frogs, spotted salamanders, and others are dependent on vernal pools. The surrounding uplands are crucial habitat for most of the year for vernal pool dependent species. Since it is easy to overlook vernal pools during the dry season they rarely show up on maps.

Find details about vernal pool species and vernal pool documentation in the NH Fish & Game Wildlife Action Plan. (reference in the NRI End Notes)

2.2.5 Floodplains

Floodplains are areas adjacent to water bodies, typically rivers or streams, that are prone to flooding during periods of heavy precipitation or water flow. Floodplains serve important ecological and hydrological functions. They act as natural buffers, absorbing excess water during floods and reducing the impact of flooding on nearby property. As such, development in the floodplain can exacerbate flood risks and environmental degradation by disrupting natural floodplain functions. In addition to reducing flood risk and providing floodwater storage, floodplain functions include groundwater recharge, nutrient cycling, and serving as hotspots for biodiversity.

There are approximately 1,568.35 acres (or 12.1%) of land in Lee that are within the 100-year floodplain. For floodplain locations, see Figure 3, Water Resources Map.

Both the State and the Town regulate the development that happens within the floodplain. During development reviews consideration is given to potential property losses based on available and applicable Federal flood insurance inundation risk zones.

2.3 Aquifers/Groundwater

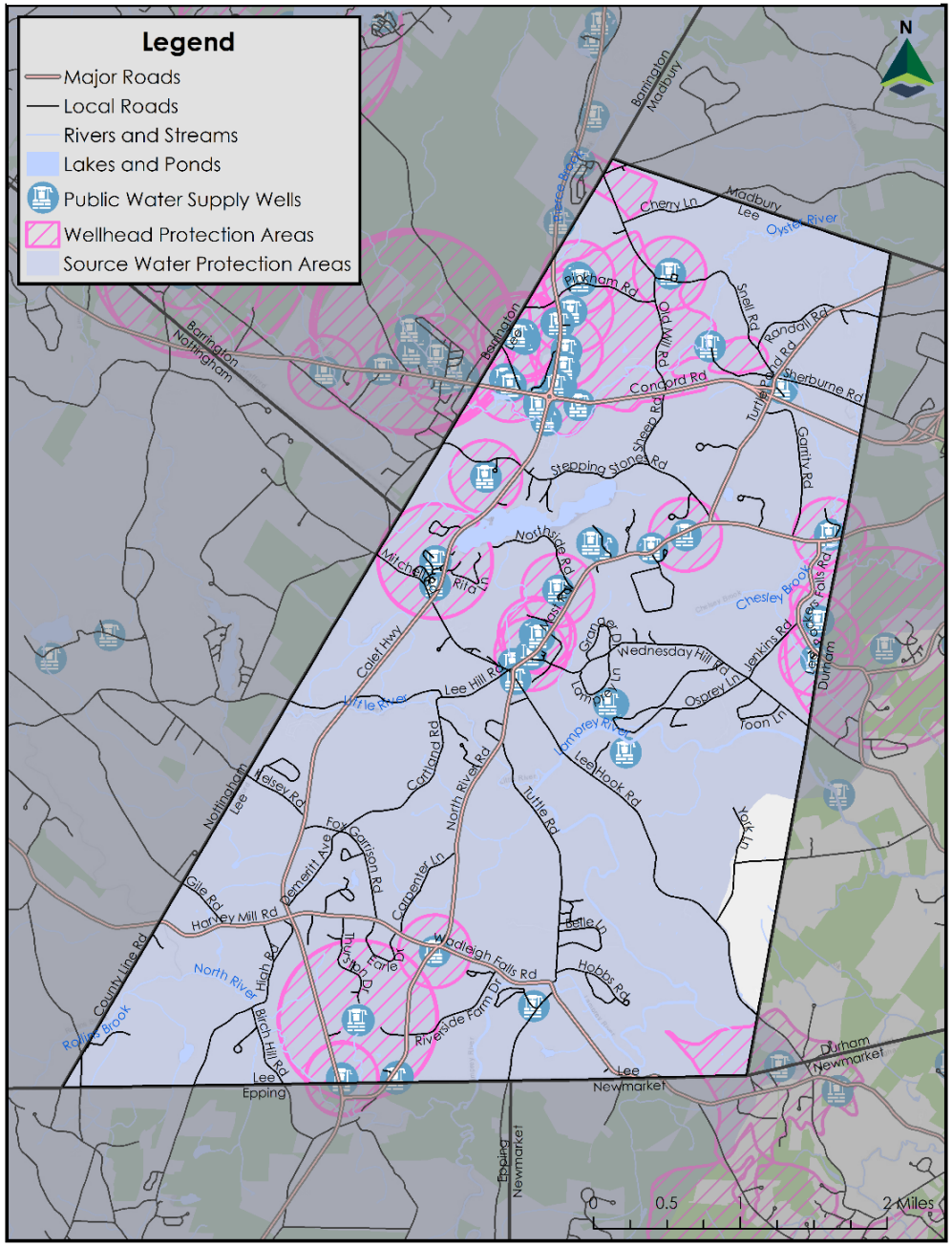
Nearly all of Lee residents rely on groundwater for their drinking water supply. There are approximately 1,529 wells in town. As temperatures shift and rainfall patterns become more erratic due to climate change, and the population continues to grow, groundwater is becoming an increasingly important resource to protect to remain resilient to climate impacts.

Public input collected during the NRI Community Survey and the NRI Workshop showed a strong concern for clean, safe drinking water. A comment received summed it up by stating *"Wells/drinking water is dependent on neighbors making smart choices such as use of fertilizers, pesticides, detergents/cleaners, and septic maintenance".*

As groundwater is vulnerable to contamination, the State's Wellhead Protection Program enables the town to delineate Wellhead Protection Areas (WHPAs), pictured on the map to the right. These areas are afforded higher protections through local regulation to avoid contamination.[ii]

Currently, the Town of Lee has an Aquifer Conservation District that encompasses areas "having the potential to yield groundwater" to "protect [their] known aquifers by preventing adverse land use practices…" (Town of Lee, NH, 2023). Certain activities are prohibited within this district including the subsurface storage of petroleum, outdoor storage of road salts, dumping of snow containing road salts, septage disposal, solid waste disposal, discharge, or disposal of hazardous or toxic materials, automotive services, and earth removal (Zoning Ordinance, Town of Lee, NH, 2023).

Figure 4: Drinking Water



Soil Drainage

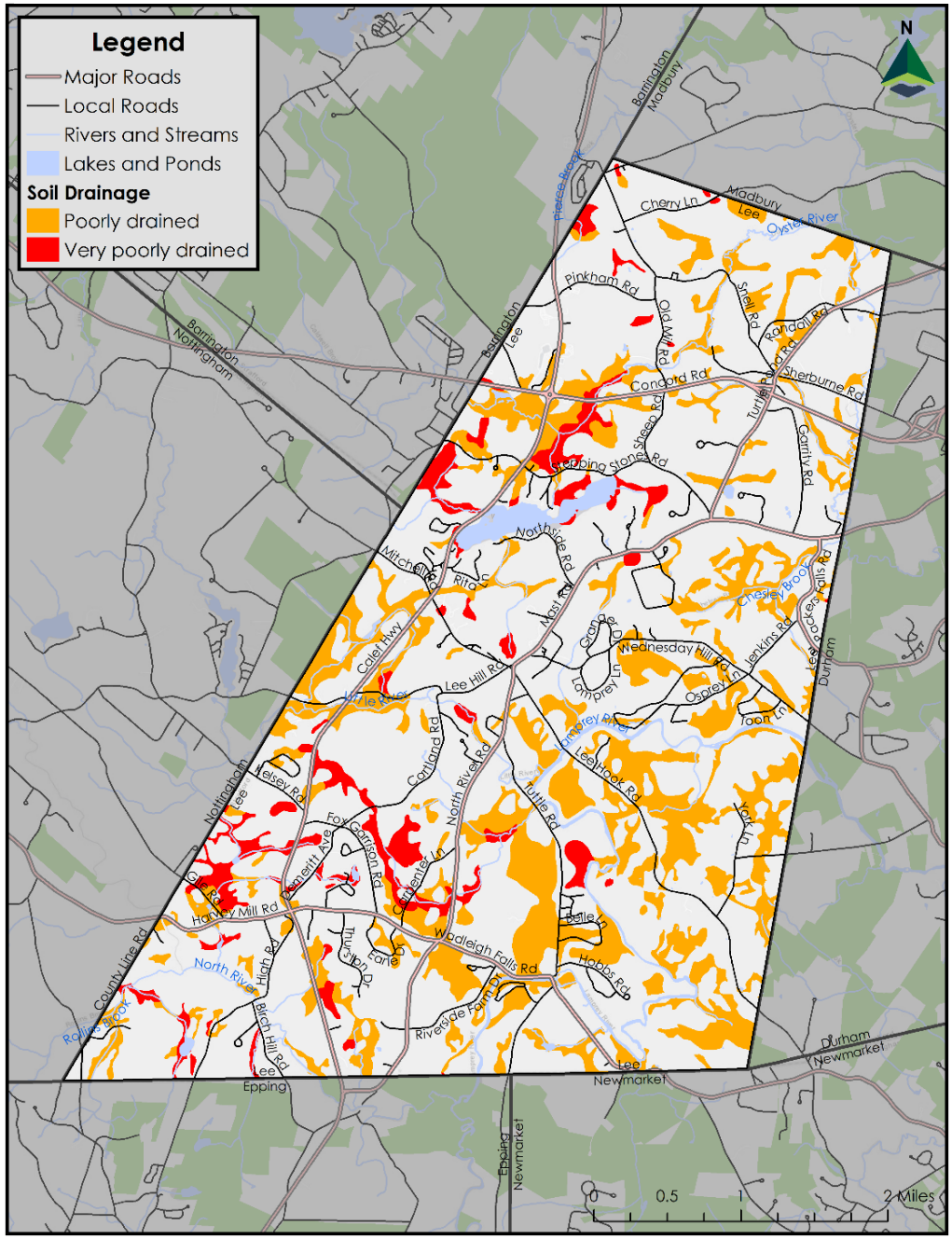
Soil drainage is a function of gravity and air spaces in the soil. Sandy soils drain quickly because of the coarse grains, while clay and compacted soils drain much slower due to the dense nature and smaller air pockets.

Poorly drained and very poorly drained soils are characterized by their limited ability to allow water to infiltrate and drain. Poorly drained soils typically have slow drainage rates due to high water tables or impeded drainage caused by compacted layers, clayey textures, or shallow bedrock. They often retain water for prolonged periods after precipitation events, leading to waterlogging and reduced oxygen availability for plant roots. Very poorly drained soils exhibit even slower drainage rates and are often saturated for extended periods, leading to prolonged anaerobic conditions. Very poorly drained soils may exhibit high clay content and compacted soil layers that limit water movement. Poorly and very poorly drained soils often support a variety of wetland habitats.

Poorly drained soils are found in approximately 19% of the town with another 4% very poorly drained soils. Much of these soils are associated with the late glacial period coastal inundation of the NH seacoast region when marine clay layers deposited.

Soil Drainage	Acres	% of Town
Well Drained	5,394.2	41.7%
Moderately Well Drained	1,414.1	10.9%
Poorly Drained	2,468.0	19.1%
Very Poorly Drained	544.2	4.2%

Figure 5: Soil Drainage



Section 3: Habitat Types

3.1 NH Wildlife Action Plan

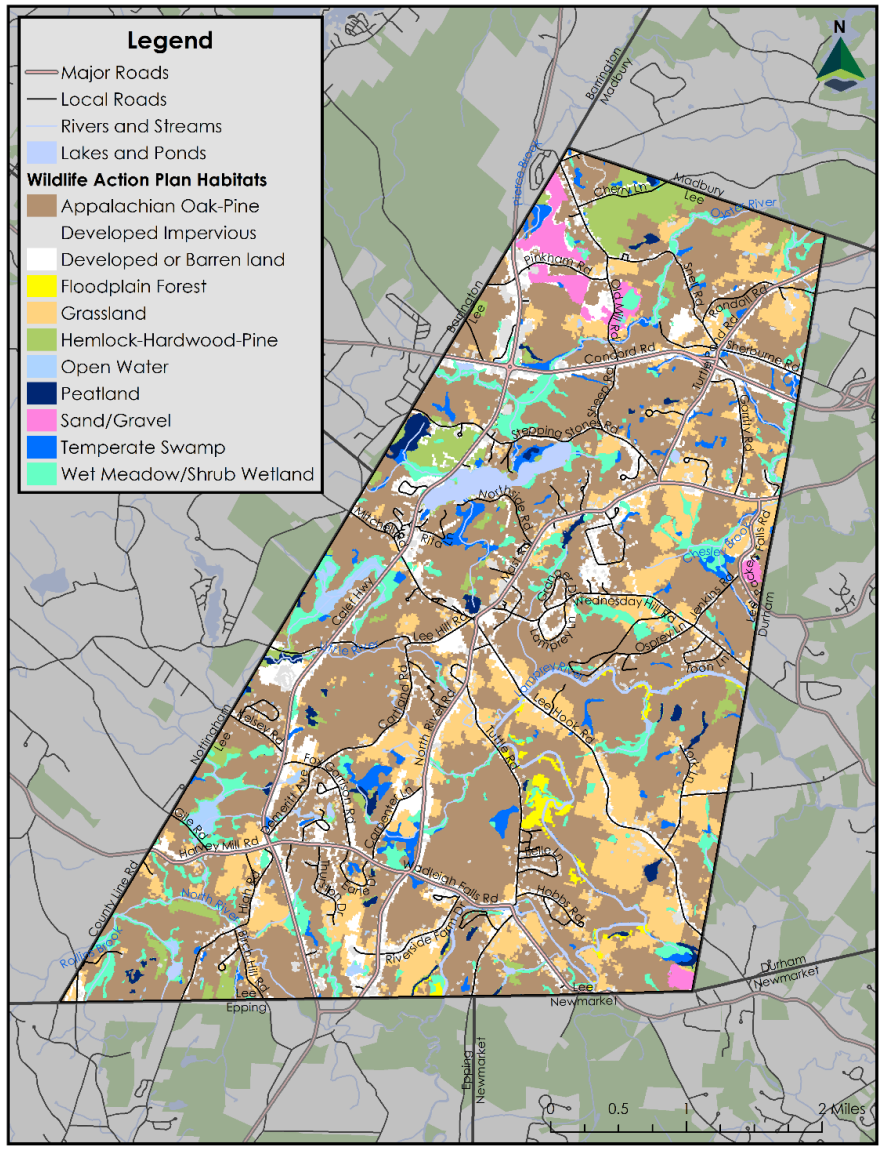
The New Hampshire Wildlife Action Plan (WAP) is the state's foundational document for species and habitat conservation. Section 3 is based upon the 2015 NH WAP with updated landcover data from 2020, and includes a brief description for each habitat type, flora and fauna present in that habitat. Refer to the NH Fish & Game Wildlife Action Plan for details (reference in the NRI End Notes). The NH WAP is currently being updated for the 2025 revision.

There are 11 predominant habitat types within the Town of Lee. Due to the town's latitude, terrain and coastal proximity, the forest area falls within two combined habitat classifications. The broad category classification named in the NHWAP of "Appalachian Oak-Pine Forest" is represented on the landscape along with the "Hemlock-Hardwood -Pine" and comprises a combined 55% of the land area.

The habitat descriptions established in the NHWAP, while regionally accurate, can be adjusted to more represent actual conditions of the Lee forests as follows:

WAP Habitats	Acres	% of Town
Appalachian oak-pine	6,684.64	51.7%
Grassland	1,765.48	13.7%
Developed or Barren	1,220.74	9.4%
Developed-impervious	992.72	7.7%
Marsh and shrub wetland	791.75	6.1%
Hemlock-hardwood-pine	452.53	3.5%
Temperate swamp	325.39	2.5%
Open water	304.29	2.4%
Sand/gravel	159.27	1.2%
Peatland	141.81	1.1%
Floodplain forest	88.67	0.7%
Total (Lee)	**12,927.27**	**100.0%**

Figure 6: Wildlife Action Plan Habitat Landcover



Appalachian Oak-Pine Forests

Acres: 6,684.6
51.7% of Lee's land area

The Appalachian Oak-Pine Forest System in New Hampshire includes several oak species found prominently in Lee such as black oak and white oak as well as hickories. Pitch pine and black birch are another component of this type. These species are not widespread in New Hampshire because they are typically found in a dry and warm climate in elevations below 900 feet. These forests have substrates that include nutrient-poor soils, sandy glacial tills and shallow-to-bedrock tills. Appalachian Oak-Pine Forests provide habitat to 104 vertebrate species in New Hampshire including 8 amphibians, 12 reptiles, 67 birds, and 17 mammals.

Threats common to these habitats include habitat conversion and degradation from development, sand and gravel excavations and habitat degradation from insects, warming conditions and invasive species.

Grasslands

Acres: 1,765.48
13.7% of Lee's land area

Grasslands are areas dominated by grasses with little shrub or tree cover. These include fields, croplands, pastures, airstrips, landfills and similar areas. Native grassland plant species in New Hampshire include aster, big bluestem, little bluestem, goldenrod and meadowsweet. Grasslands serve as a breeding and nesting area for several bird species. Many of these bird species are declining and require large expanses of habitat for nesting, exemplifying the importance of conserving networks of land that improve habitat connectivity. Grasslands also provide habitat to species of conservation concern including the Black Racer, Smooth Green Snake, Northern Leopard Frog, and Wood Turtle, among others. This habitat is especially important in supporting pollinators.

Threats common to these habitats include: habitat and species impact from pesticides and insecticides; habitat impacts from invasive species; habitat conversion to cropland or sod; and habitat degradation from mowing at improper times of the year. Very little of the grassland in Lee is natural. If left unmowed, it will return to forest.

Developed Land

Developed or Barren Land

Developed Land
Acres: 1,220.7
9.4% of Lee's land area

Barren Land
Acres: 992.7
7.7% of Lee's land area

Developed areas are not considered a key wildlife habitat in New Hampshire and are generally considered a risk to wildlife, however, they are still important to consider because some species have demonstrated the ability to adapt to life in certain types of development. Examples of these adaptations are listed below.

- Chimney swifts may roost in large chimneys within developed areas.
- Little and big brown bats often use attics and abandoned buildings for raising pups.
- Turtles sometimes lay eggs in residential lawns and gardens.
- Fox, skunks, groundhogs, and opossum find shelter and nesting areas under porches.

Barren land, as defined by the National Land Cover Database, are areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.

Wet Meadow & Shrub Wetlands

Acres: 791.8
6.1% of Lee's land area

The wet meadow and shrub wetlands habitat are grouped into the following categories: meadow marshes, emergent marshes, and shrub-scrub wetlands.

Meadow marshes, or wet meadows, are dominated by herbaceous vegetation, most notably sedges, typically less than three feet in height. These systems are wet for most of the growing season but do not experience frequent flooding. Emergent marshes are also dominated by herbaceous vegetation but experience seasonal fluctuations in water levels above typical surface level. Species of note in this system include Blanding's turtle, spotted turtle, American black duck, American bittern, Virginia rail, sora, least bittern, common gallinule, great-blue heron, red-winged blackbird, muskrat, mink, and spring peeper.

Shrub-scrub wetlands are dominated by woody vegetation such as saplings and shrubs. These systems flood often in the springtime and may contain areas of standing water. Flora present in this system include highbush blueberry, winterberry shrub thicket, buttonbush shrubland, and alder-dogwood-arrowwood alluvial thicket. Wildlife of note in the shrub-scrub system include Blanding's turtle, spotted turtle, American woodcock, gray catbird, moose, and several breeding amphibians. Invertebrate present in marsh and shrub wetland systems include worms, mollusks, crustaceans, mayflies, caddisflies, dragonflies and damselflies, and water beetles, among others.

Threats common to these habitats include species impact from insecticide use (mosquito treatment); and habitat degradation from sedimentation, stormwater runoff, and fertilizers.

Hemlock-Hardwood-Pine

Acres: 452.5
3.5% of Lee's land area

Hemlock-Hardwood-Pine forests are forests with dry sandy soils. These are transitional forests between the northern hardwood-conifer forest at higher elevations and the Appalachian-oak-pine forests at lower elevations. White pine, hemlock, red oak and American beech are common. Red oak and white pine are often found on dry, sandy soils in lower elevations. The hemlock forests are usually found in rocky areas and ravines while the beech forests are found on coarse washed tills.

There are approximately 140 vertebrate species in the state that are found in this habitat type including 15 amphibians, 13 reptiles, 73 birds, and 39 mammals.

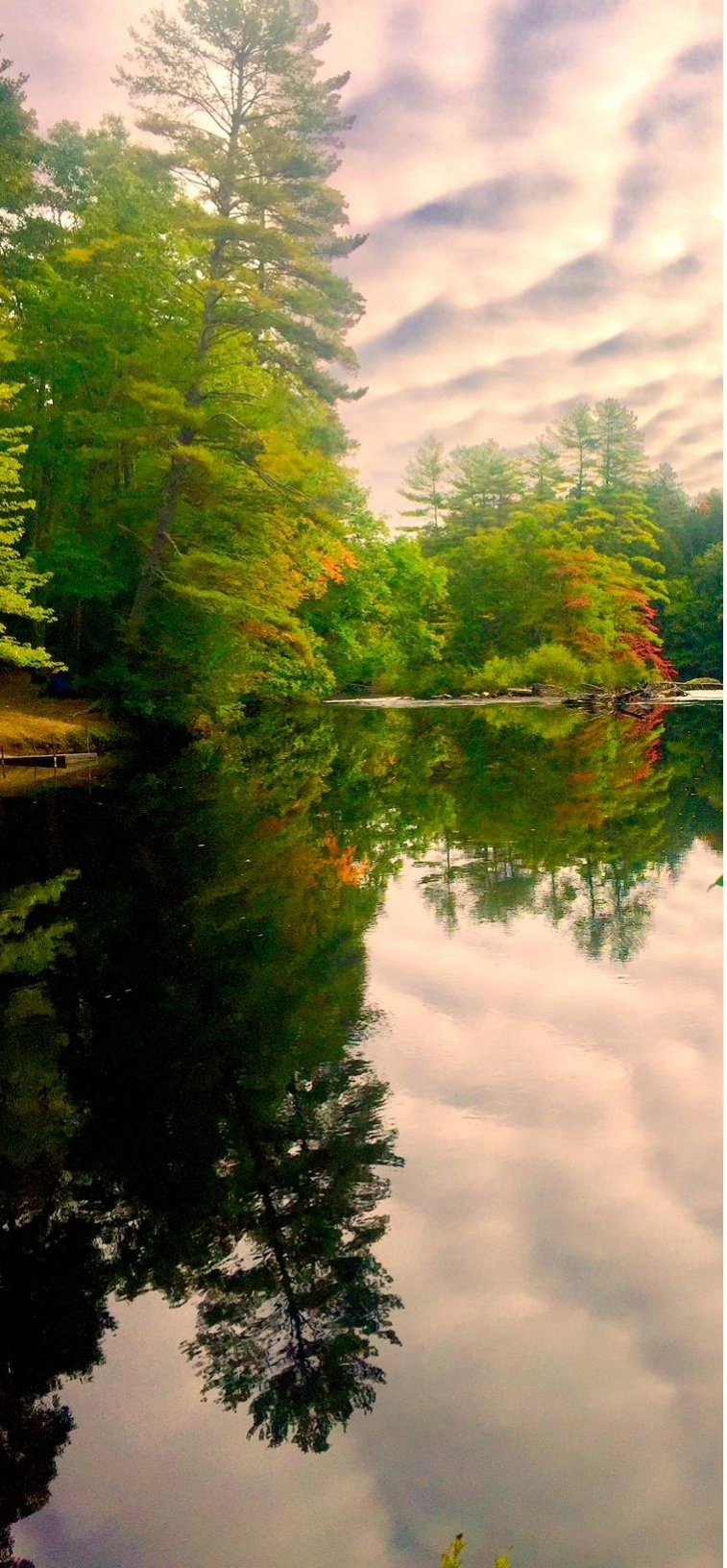
Common threats to these habitats include habitat degradation and mortality from: insect pests, notably hemlock woolly adelgid; impacts from new powerlines and energy sources; invasive species; climate change impacts; and fragmentation due to development.

Temperate Swamps

Acres: 352.4
2.5% of Lee's land area

Temperate swamps are comprised of forested wetlands and can be distinguished as three systems including the temperate peat swamp, coastal conifer peat swamp, and temperate minerotrophic swamp system. Temperate peat swamps include red maples, highbush blueberries, and winterberries. Black gum may also be present. The coastal conifer peat swamp system is dominated by the Atlantic white cedar. Temperate minerotrophic swamps are dominated by red maples, but in contrast to peat swamps, have less acidic mineral soils more diverse flora with more herbaceous species.

Threats include habitat degradation from insect pests, sedimentation, fertilizers, and stormwater runoff; habitat conversion from wetland filling for new development; and species impact from insecticide use (mosquito control).



Open Water

Acres: 304.3
2.4% of Lee's land area

Open water habitat is defined by the National Land Cover Database as areas of open water, generally with less than 25% cover of vegetation or soil. This habitat may include different wetland system types or other surface water classifications.

Open water in southern New Hampshire falls under the category of Warmwater Lakes and Ponds and Warmwater Rivers and Streams. These open waterbodies have an average water temperature of 68 degrees and above.

Major Open Water bodies in Lee are: Wheelwright Pond, Lamprey River, North River, Little River, and Oyster River.

Threats common to open water habitats include:

- habitat degradation from altered flow regimes due to water level management
- habitat degradation from stormwater runoff, fertilizers, agricultural practices, and point source pollution
- nutrient loading from improper septic maintenance
- shoreline development
- fragmentation from impassable dams
- water withdrawals

Floodplain Forests

Acres: 88.68
0.7% of Lee's land area

Floodplain Forests are areas found typically around lakes and streams. They are dry most of the time but serve as an overflow area during heavy rain events and spring thaw. This community provides many additional benefits due to the periodic flooding of these areas including filtering of pollutants, improving water quality, and erosion control along the riverbanks.

The plant species most often noted are mostly red maple, along with American elm, black ash, black cherry, eastern cottonwood, ironwood, river birch, swamp white oak, and sycamore.

The damp conditions create excellent breeding grounds for insects and amphibians, provide nesting areas and food for birds, and corridors for wildlife to move along unfragmented areas. Wildlife species that are commonly found in these areas include Big Brown Bat, Blanding's Turtle, Blue-Spotted Salamander Complex, Eastern Red Bat, Eastern Ribbonsnake, Hoary Bat, Jefferson Salamander Complex, Moose, Northern Leopard Frog, Purple Finch, several dragonfly species, Spotted Turtle, Tricolored Bat, Veery, Wood Thrush, and Wood Turtle.

The biggest threat to floodplain forests is climate change and severe storms that cause increased flooding which can change plant growth and increase invasive species. Pressures for commercial and residential development also pose a threat with an increase in impervious surfaces.

Peatlands

Acres: 141.8
1.1% of Lee's land area

Peatlands include bog and fen plant communities. They differ primarily by their position in the landscape and the source and mineral content of the water. They tend to be acidic and nutrient poor. The Lee Bog is a notable peatland. Peatlands are important habitats for carbon removal by storing it away and slowly releasing it into the atmosphere, thereby helping to reduce greenhouse gases. Vegetation found in peatlands includes American larch, leather leaf, northern white cedar, and sphagnum moss. The wildlife species that typically inhabit peatlands include several species of birds, insects, and reptiles.

Threats common to these habitats include species impact from insecticide use (mosquito treatment), contaminants from stormwater runoff, groundwater and surface water withdrawals, high temperatures and extended periods of drought, and land development.

Sand and Gravel

Acres: 159.3
1.2% of Lee's land area

While not listed as key wildlife habitat in New Hampshire, these areas have been known to provide habitat to some species. Abandoned sand and gravel excavation areas are dry parcels that lack the soil health needed to regrow vegetation, and therefore often support shrubland and grassland habitats for longer periods of time than areas with healthy soils. Examples of wildlife adaptations include:

- Blanding's, spotted, and wood turtles nesting areas
- Black racers, hognose snakes, and smooth green snakes utilizing the diverse vegetative structure and laying eggs in bare sandy areas.
- Tiger beetles using exposed sandy areas provided by excavation areas.
- New England cottontail using dense regenerating shrubland habitat.
- Nesting and migration habitat for shrubland and grassland birds.

Highest Ranked Habitats

The 2020 Wildlife Action Plan analyzes 169 species of greatest conservation need and 27 habitats which support those species and separates them into three tiers.

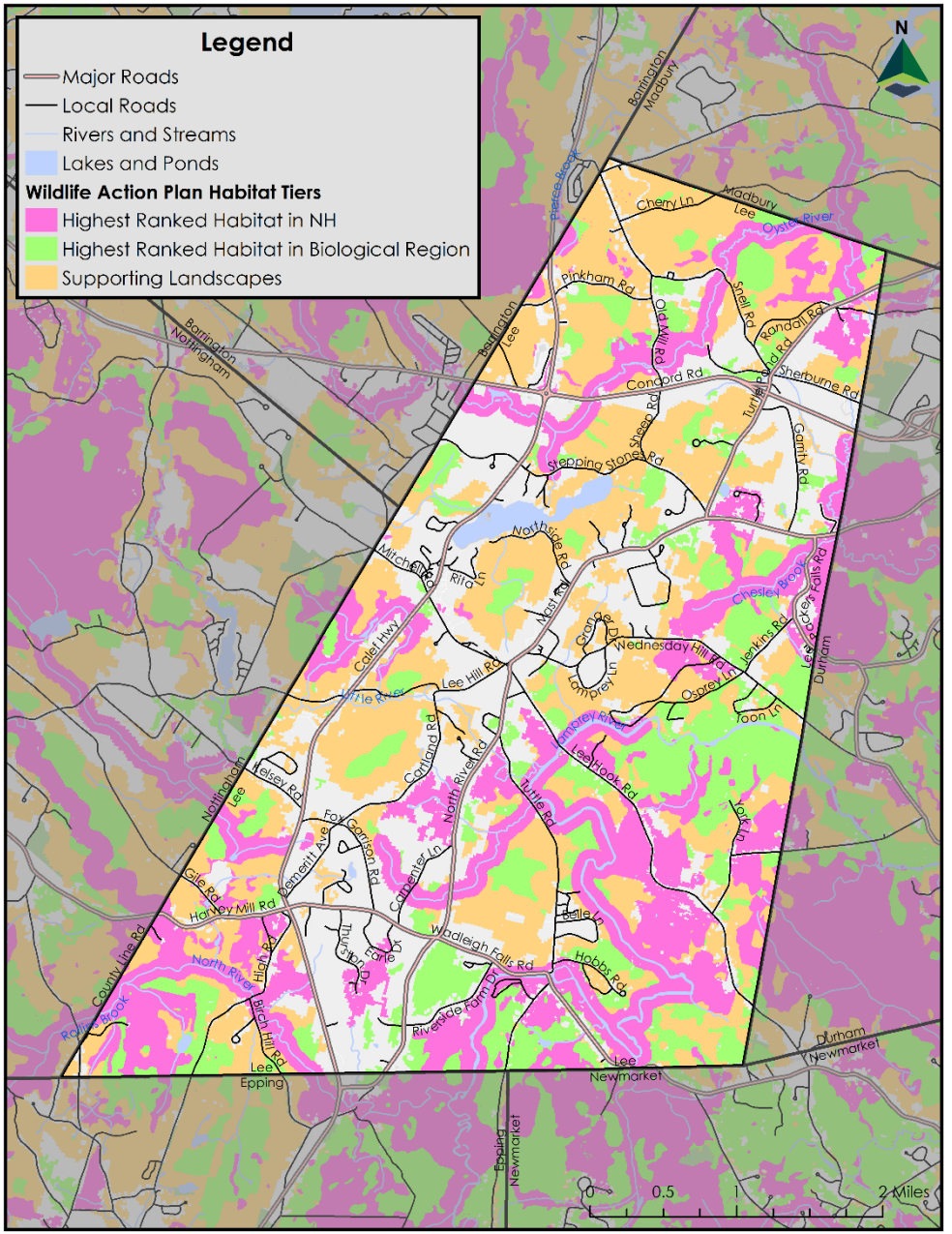
Tier 1 - Highest Ranked in the State by Ecological Condition. Areas with this ranking reflect broad patterns of geomorphology, geologic origin, stratigraphy, regional climate, topography, and natural vegetation.

Tier 2 - Highest Ranked in the Biological Region by Ecological Condition. Areas with this ranking reflect the same as Tier 1, but on a more local or regional scale.

Tier 3 - Supporting Landscapes are areas that enhance the ecological balance and biodiversity of an area.

Tier	Acres	% Tier Conserved per Total Acres
Tier 1	3,132.9	24.2%
Tier 2	1,933.2	15.0%
Tier 3	3,773.1	29.2%

Figure 7: Wildlife Action Plan Tiers



Natural Heritage Bureau

The Natural Heritage Bureau, a bureau of the NH Division of Forests and Lands, maintains municipality specific lists of rare plants and animals and exemplary natural communities. The following table includes those rare plants and animals and exemplary natural communities which exist in Lee.[iii]

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

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

Species or Community Name	Flag	Listed?		~ Reports Last 20 Years
		US	NH	Town
Natural Communities - Palustrine				
Poor level fen/bog system	*	--	--	1
Sycamore floodplain forest	*	--	--	1
Plants				
American featherfoil – *Hottnia inflata*	**	--	E	1
appressed bog-clubmoss - *Lycopodiella appressa*	**	--	E	1
arctic bur-reed - *Sparganium natans*	~	--	T	Historical
Carolina crane's-bill – *Geranium carolinianum*	~	--	E	Historical
crested sedge - *Carex cristatella*	~	--	E	Historical
dwarf huckleberry - *Gaylussacia bigeloviana*	~	--	T	Historical
eight-flowered six-weeks grass - *Vulpia octoflora var. tenella*	~	--	E	Historical
floating manna grass - *Glyceria septentrionalis var. septentrionalis*	~	--	--	Historical
giant rhododendron – *Rhododendron maximum*	~	--	T	Historical
great bur-reed - *Sparganium eurycarpum var. eurycarpum*	**	--	T	1
green rockcress - *Boechera missouriensis*	~	--	T	Historical
incurved umbrella sedge - *Cyperus squarrosus*	***	--	T	1
limestone-meadow sedge - *Carex granularis*	~	--	E	Historical
long-leaved pondweed - *Potamogeton nodosus*	~	--	T	Historical
lopsided rush - *Juncus secundus*	~	--	E	Historical
northern blazing star - *Liatris novae-angliae var. novae-angliae*	~	--	E	Historical
northern tubercled bog-orchid - *Platanthera flava var. herbiola*	**	--	T	1
Nuttall's Reed Grass - *Calamagrostis coarctata*	~	--	E	Historical
Philadelphia panicgrass – *Panicum philadelphicum* ssp. *philadelphicum*	~	--	E	Historical

Species or Community Name	Flag	Listed?		~ Reports Last 20 Years
		US	NH	Town
red-root umbrella sedge - *Cyperus erythrorhizos*	***	--	E	1
round-fruited rosette-panicgrass - *Dichanthelium sphaerocarpon*	~	--	E	Historical
sharp-flowered manna grass - *Glyceria acutiflora*	~	--	E	Historical
slender blue beardless-iris - *Limniris prismatica*	~	--	E	Historical
tufted yellow-loosestrife -*Lysimachia thyrsiflora*	~	--	T	Historical
Virginia three-seeded-mercury - *Acalypha virginica*	~	--	E	Historical
Vertebrates - Mammals				
New England Cottontail - *Sylvilagus transitionalis*	***	--	E	1
Vertebrates - Birds				
Eastern Meadowlark -*Sturnella magna*	**	--	T	1
Grasshopper Sparrow - *Ammodramus savannarum*	**	--	T	1
Marsh Wren - *Cistothorus palustris*	**	--	--	1
Sora - *Porzana carolina*	**	--	SC	1
Vesper Sparrow - *Pooecetes gramineus*	**	--	SC	2
Vertebrates - Reptiles				
Blanding's Turtle - *Emydoidea blandingii*	***	--	E	18
Eastern Hognose Snake- *Heterodon platirhinos*	~	--	E	Historical
Northern Black Racer - *Coluber constrictor constrictor*	**	--	T	1
Spotted Turtle - *Clemmys guttata*	*	--	T	4
Wood Turtle - *Glyptemys insculpta*	***	--	SC	5
Vertebrates - Fish				
American Brook Lamprey - Lethenteron appendix	**	--	E	1
American Eel - *Anguilla rostrata*	**	--	SC	15
Banded Sunfish - *Enneacanthus obesus*	**	--	SC	2
Bridle Shiner - *Notropis bifrenatus*	***	--	T	1
Redfin Pickerel - *Esox americanus americanus*	**	--	SC	2
Swamp Darter - *Etheostoma fusiforme*	~	--	SC	Historical
Invertebrates – Butterflies & Moths				
Phyllira Tiger Moth – *Grammia phyllira*	~	--	SC	Historical
Invertebrates - Mollusks				
Brook Floater – *Alasmidonta varicosa*	****	--	E	1

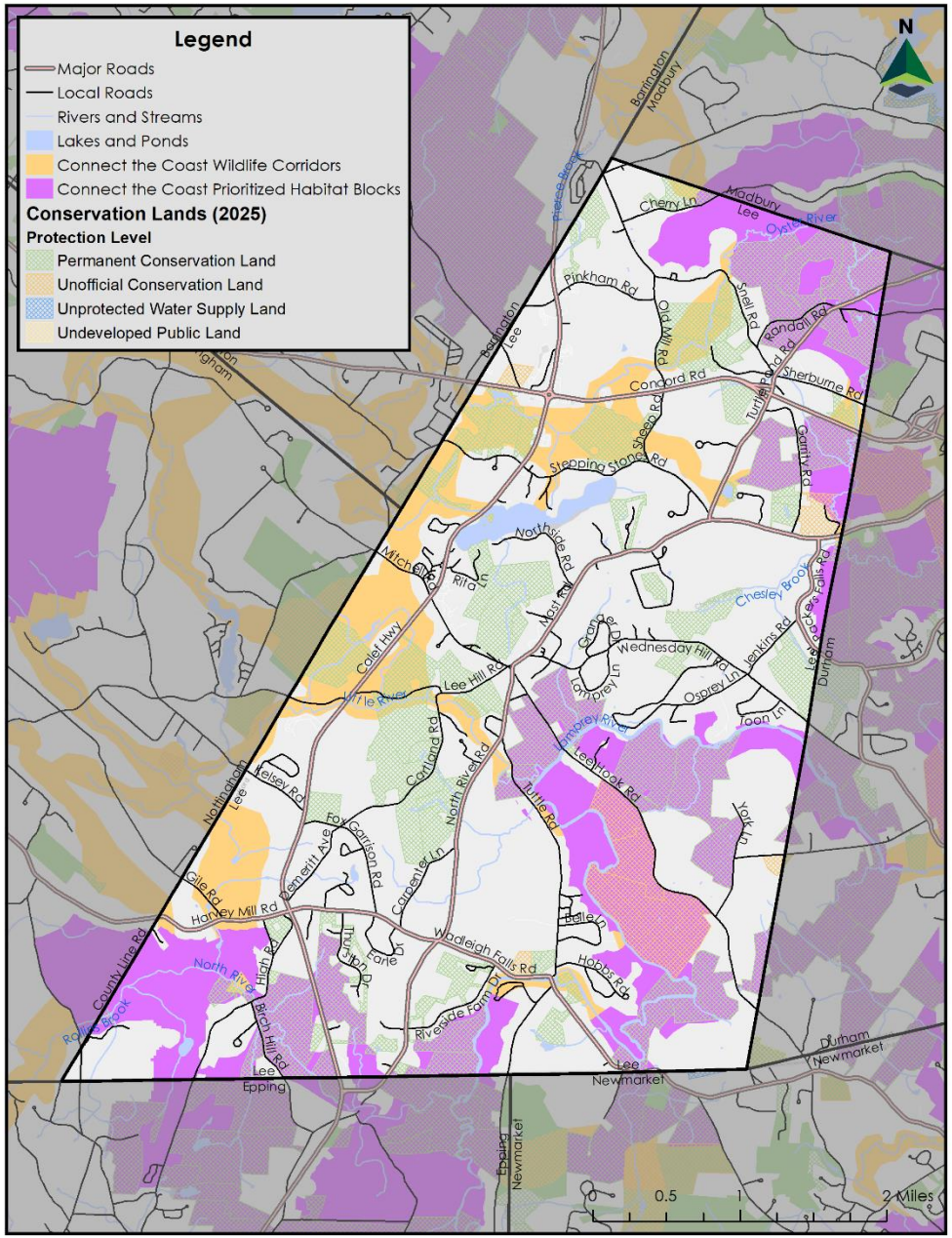
Connect the Coast

Connect the Coast is a tool that identifies prioritized blocks of habitat and wildlife movement corridors, including high priority road-crossing areas. It aims to create a landscape of unfragmented habitat for wildlife. Connectivity is critical in ensuring wildlife can move across the landscape to suitable areas that support all stages of species' life cycles. Many species exist in multiple types of habitats depending on their life stage or require a large range of landscape that can't be accommodated by smaller, fragmented habitat blocks. Population growth and development pressures emphasize the need to ensure thoughtful community planning where high priority areas are conserved to maintain and enhance habitat connectivity across Lee, the coastal watershed, and beyond.[iv]

There are large blocks of wildlife corridors identified along Lee's western border that connect to other large parcels in Nottingham and Barrington.

Likewise, there are large, prioritized habitat blocks located along the northern and eastern borders with Madbury and Durham and some along the southern border with Epping and Newmarket.

Figure 8: Connect the Coast Habitats and Corridors

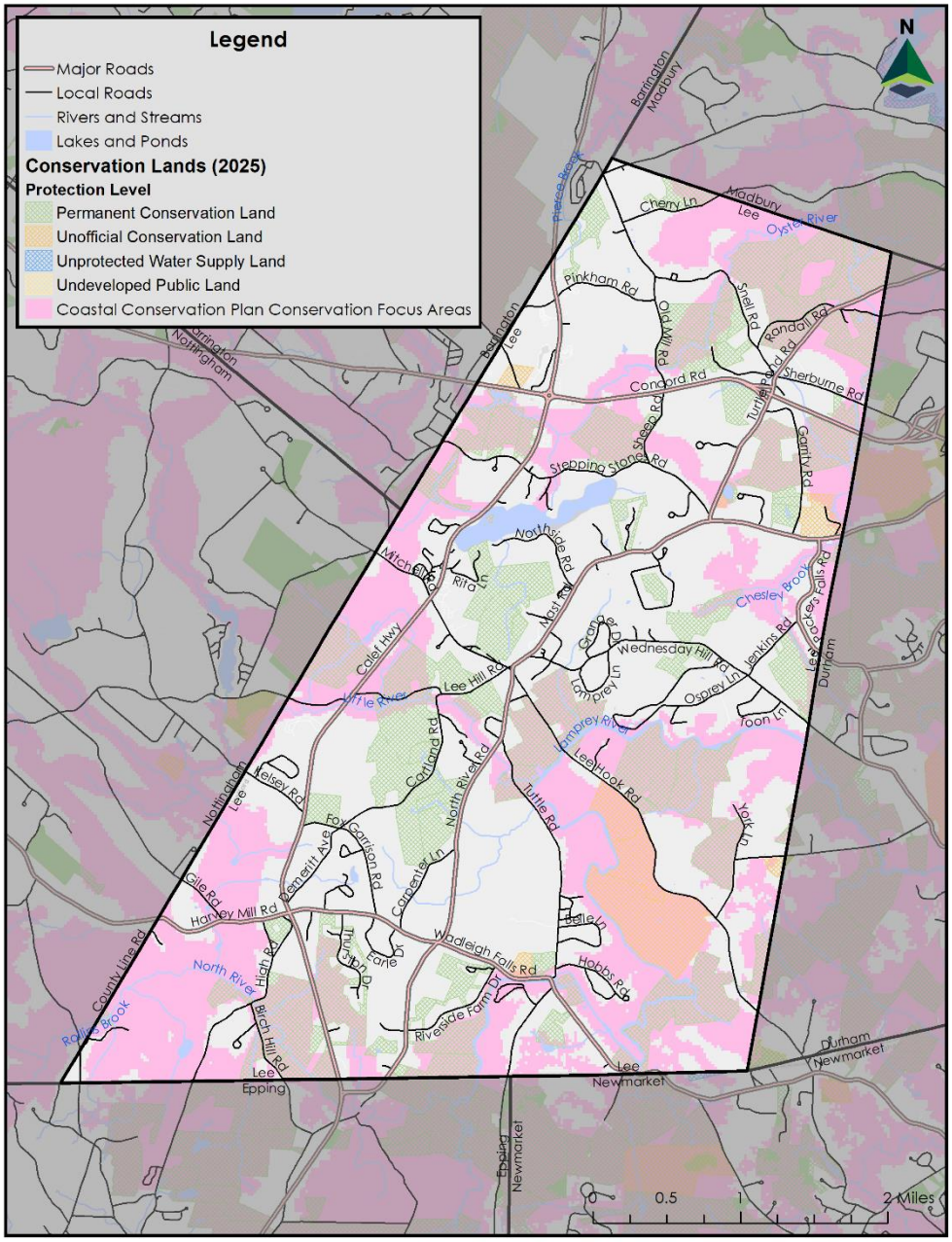


NH Coastal Watershed Conservation Plan (2021)

New Hampshire's 2021 update to the Coastal Watershed Conservation Plan was developed through an extensive community engagement and data synthesis process, using existing regional plans and geospatial datasets to identify conservation focus areas, with the goal of maintaining ecological function and integrity across a landscape that is under threat from habitat loss, habitat degradation, and the impacts of climate change. The analysis utilized many different input conservation plans shown in the table below. This plan builds off the 2006 plan titles, "The Land Conservation Plan For New Hampshire's Coastal Watersheds." Coastal Conservation Focus Areas identified in the 2021 update represent priorities such as wildlife and habitat, water resources, coastal resilience, and opportunities for climate adaptation using nature-based solutions.

Input Conservation Plan
2019 Connect the Coast – Prioritized Habitat Block
2019 Connect the Coast – Wildlife Corridors
2020 New Hampshire Wildlife Action Plan – Tier 1
Maine Beginning with Habitat Focus Areas
2016 Water Resources – Pollutant Attenuation
2016 Water Resources – Flood Storage and Risk Mitigation
2020 New Hampshire Wildlife Action Plan – Tier 2
Salt Marsh Resiliency Areas
2020 Resilient and Connected Network
2016 Water Resources – Public Water Supply

Figure 9: Conservation Lands



Section 4: Agriculture and Forestry

Agriculture and forestry in the Town of Lee, as in most of Southern New England, are inextricably connected through 200 plus years of history. The town was cleared of forest for the purpose of agriculture wherever tilling or grazing was possible by the time of the beginning of the industrial revolution. Some estimates indicated that only 20% of the land area was forested at the time of the Civil War. Most of those tilled and grazed lands returned to forest when fields were abandoned during the depression and after WWII as populations moved to urban/industrial areas and gave up subsistence agriculture.

While many surrounding towns were profoundly affected by the industrial revolution and still have the dams and mill buildings to remind them of their heritage, Lee's history is largely the farms and forests, farmhouses and barns. Today, lands are still in flux as old fields are let go to forest, or forests are cleared for agriculture, residential development, and other uses.

The vast majority of forest land in Lee is in private ownership with the management decisions dependent on the landowners. While UNH Cooperative Extension and several landowner organizations have a long history of encouraging good stewardship, most of the forest land is not intensively managed for specific outcomes, be it forest products, wildlife or recreation.

Farms used for the production of crops and livestock dot the landscape and contribute to Lee's "pastoral" beauty. Many farms are permanently protected from development by the landowners voluntarily entering into conservation easement in a desire to keep the land open and available for agricultural purposes. A key anchor to agriculture in Lee is the UNH Organic Dairy Research Farm and fields on Lee Hook Road. However, this state-owned land is currently not under any protection from future development and loss could threaten the viability of Lee's agricultural roots.

The working landscape of Lee's farms and forests contributes to local food production, clean water, and habitat for wildlife. Healthy and productive soils and a clean and abundant water supply are integral to keeping Lee's agriculture and forest lands sustainable.

Lee has an active Agricultural Commission that advocates for local agriculture. Lee's farms are diversified and look to engage with the local community via direct to consumer enterprises such as Lee's Farmers Market, farm stands, Community Supported Agriculture (CSA's), as well as Educational and Agritourism ventures. Many of Lee's farms are practicing regenerative agriculture, adapting practices and products to be climate resilient and able to meet changes in market conditions.

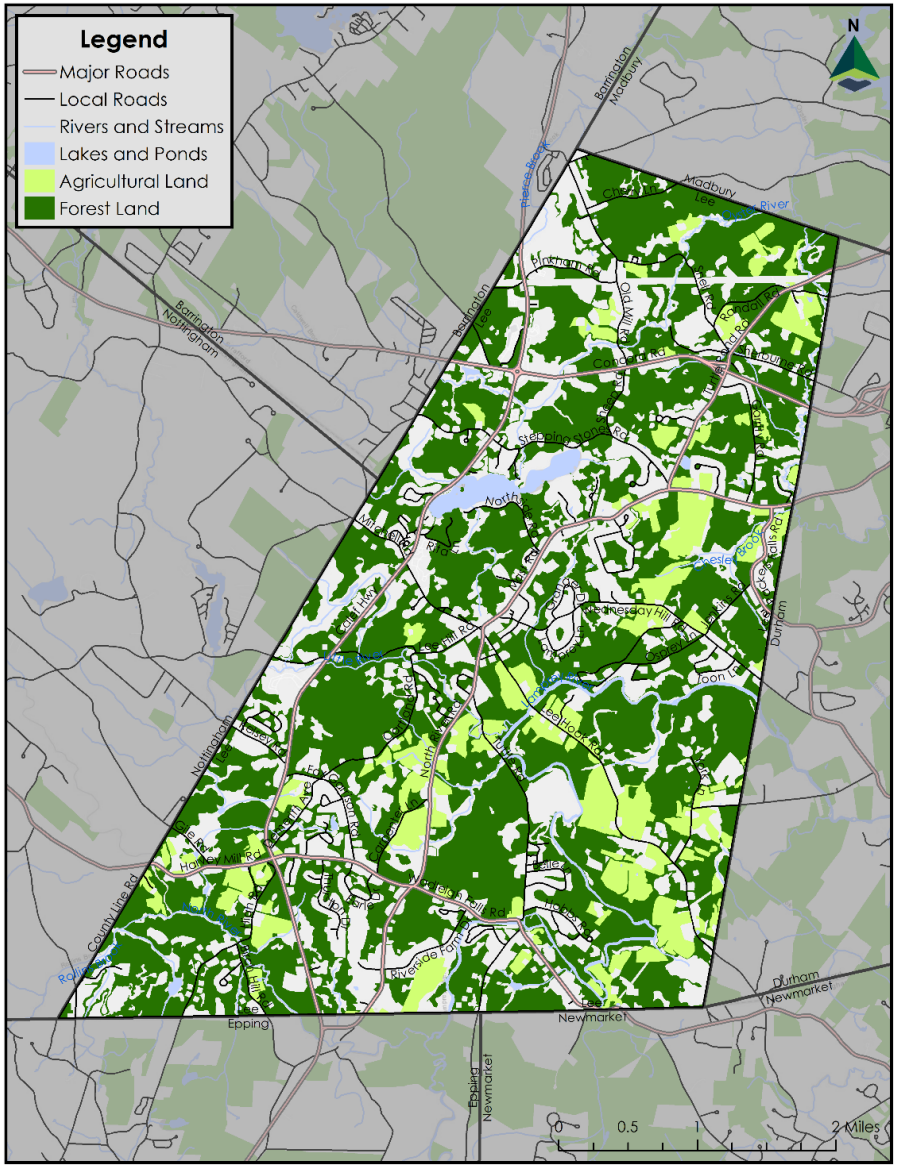
There are many small to mid-size agricultural enterprises in Lee including:

- Fruits-apples, peaches, pears, blueberries, cane fruits like raspberries and blackberries; grapes (winery)
- Vegetables-pumpkins, squash, greens, tomatoes, peppers, potatoes, sweet corn, root crops, herbs (both for seasoning and medical uses)
- Field crops-hay, field corn, silage, small grains, sunflowers for oil, etc.
- Livestock-beef cows, sheep, oxen, goats, dairy goats, organic cow dairy, chickens, turkeys, other poultry
- Equine-raising, boarding, training, hunting, polo, working draft horses
- Botanical Gardens and flowers for sale
- Honey, maple syrup
- And many family gardens

The map to the right demonstrates areas in Lee that are agricultural or forest land. Approximately 6,747 acres of land in Lee are forested, or 52.2% of the Town, and 1,314.11 acres of land are considered agricultural, or 10.2%. Not only do agricultural and forest lands provide important products such as food and timber, but these lands are also valued for their scenic qualities, wildlife habitat, and ability to mitigate the impacts of climate change. The following sections discuss the ideal conditions and areas for forest and agricultural land uses.

Resource	Acres	% of Town
Town of Lee	12,927.29	100.0%
Forest Land	6,747.02	52.2%
Agricultural Land	1,314.11	10.2%

Figure 10: Agricultural and Forest Land



Implications of Climate Change on Agriculture & Forestry Practices

Climate change has profound impacts on agricultural land, affecting various aspects of crop production, soil health, water availability, and the overall agro-ecosystem. Climate change alters temperature and precipitation patterns, leading to changes in growing seasons. Warmer temperatures can advance planting dates, while erratic weather patterns may disrupt crop growth cycles, affecting yields and harvest times. Warmer temperatures and altered precipitation patterns also create favorable conditions for the proliferation of pests, diseases, and the spread of invasive species.

Crop pests expand their ranges into new territories, while changing weather patterns may disrupt natural pest control mechanisms, leading to increased pesticide use and crop losses. Changes in temperature and precipitation regimes may disrupt pollination cycles, decrease genetic diversity in crop plants, and affect the availability of wild plant species that serve as sources of genetic material for crop improvement.

Droughts are predicted to become more frequent and severe; reducing crop yields, threatening livestock, and increasing competition for water resources among farmers, developed areas, and ecosystems. Intense rainfall events and prolonged droughts associated with climate change can degrade soil quality through erosion, compaction, and nutrient depletion. Loss of soil organic matter reduces its ability to retain water and nutrients, impairing crop growth and productivity.[v] Farm ponds and man-made ponds can offer drought relief to farm crops as well as providing wildlife and aesthetic values. If maintained, farm ponds can be a water source for fire protection.

Agricultural Soils and Active Farmlands

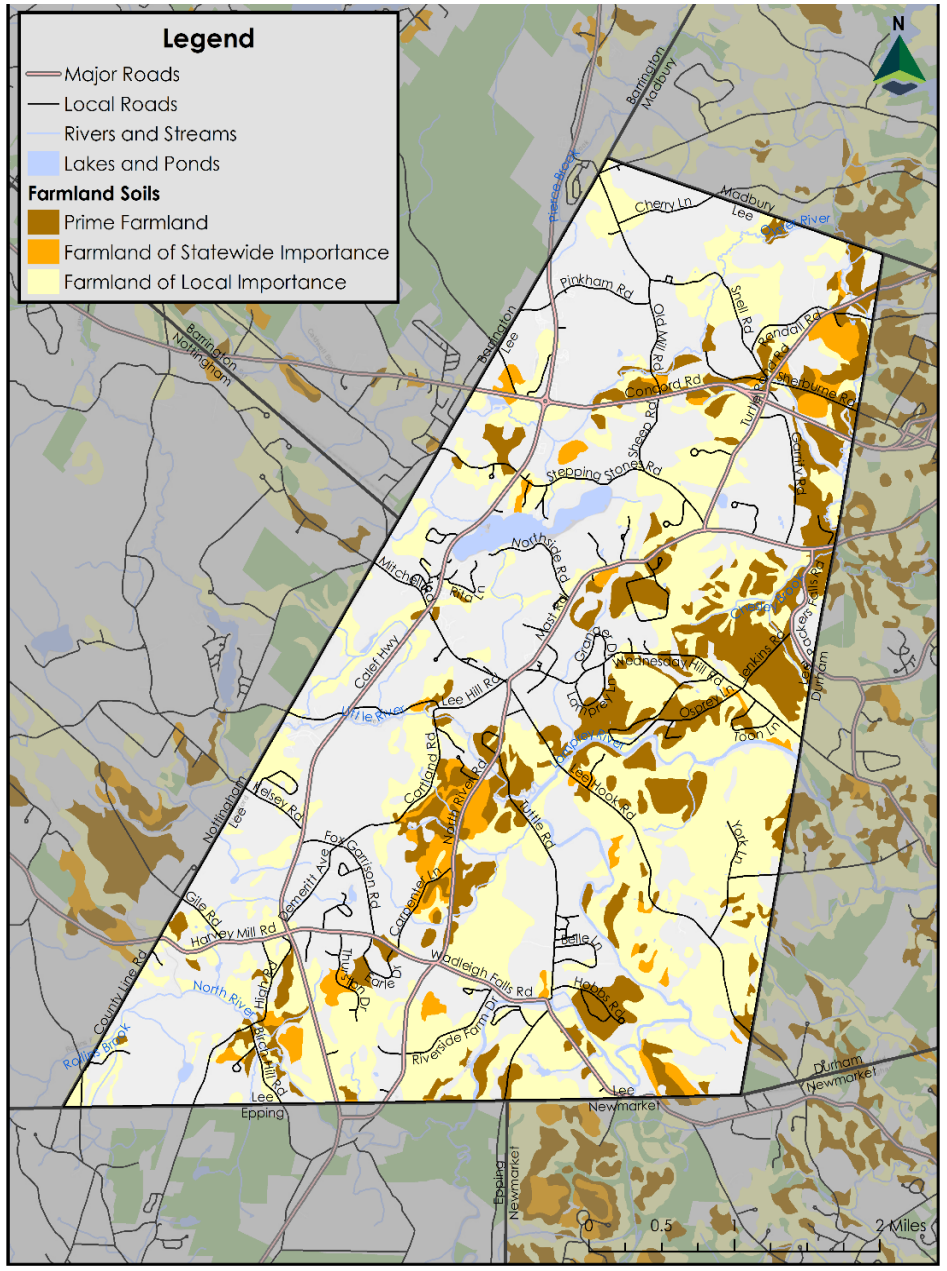
Lee is home to an abundance of both *Prime Farmland* and *Farmland of Statewide Importance*. Approximately 1,650.20 acres of land in Lee are classified as Prime Farmland. Another 415.43 acres of land are classified as Farmland of Statewide Importance. From a local perspective, the amount of farmland of local importance is 4,167.35 acres.

Prime Farmland is defined by the Natural Resources Conservation Service as land that has an optimal combination of physical and chemical attributes needed to produce agricultural products. The land's soil properties (acidity versus alkalinity, sodium content, and little to no rocks), growing season, and water supply (precipitation or irrigation) are ideal to maintain high yields of crops if managed under agricultural best practices.[vi]

While Farmland of Statewide Importance is not considered prime or unique, it is given this designation due to its importance in producing agricultural products. Attributes of land with this designation include slopes of less than 15%; not stoney or bouldery; not somewhat, poorly, or very poorly drained; soil complexes with less than 30% shallow soils and rock outcrops and slopes do not exceed 8% and are not excessively drained or generally have low water holding capacity.[vii]

Soils	Acres	% of Town
Town of Lee	12,927.29	100.0%
Prime Farmland	1,650.20	12.8%
Farmland of Statewide Importance	415.53	3.2%
Farmland of Local Importance	4,167.35	32.2%

Figure 11: Farmland Soils

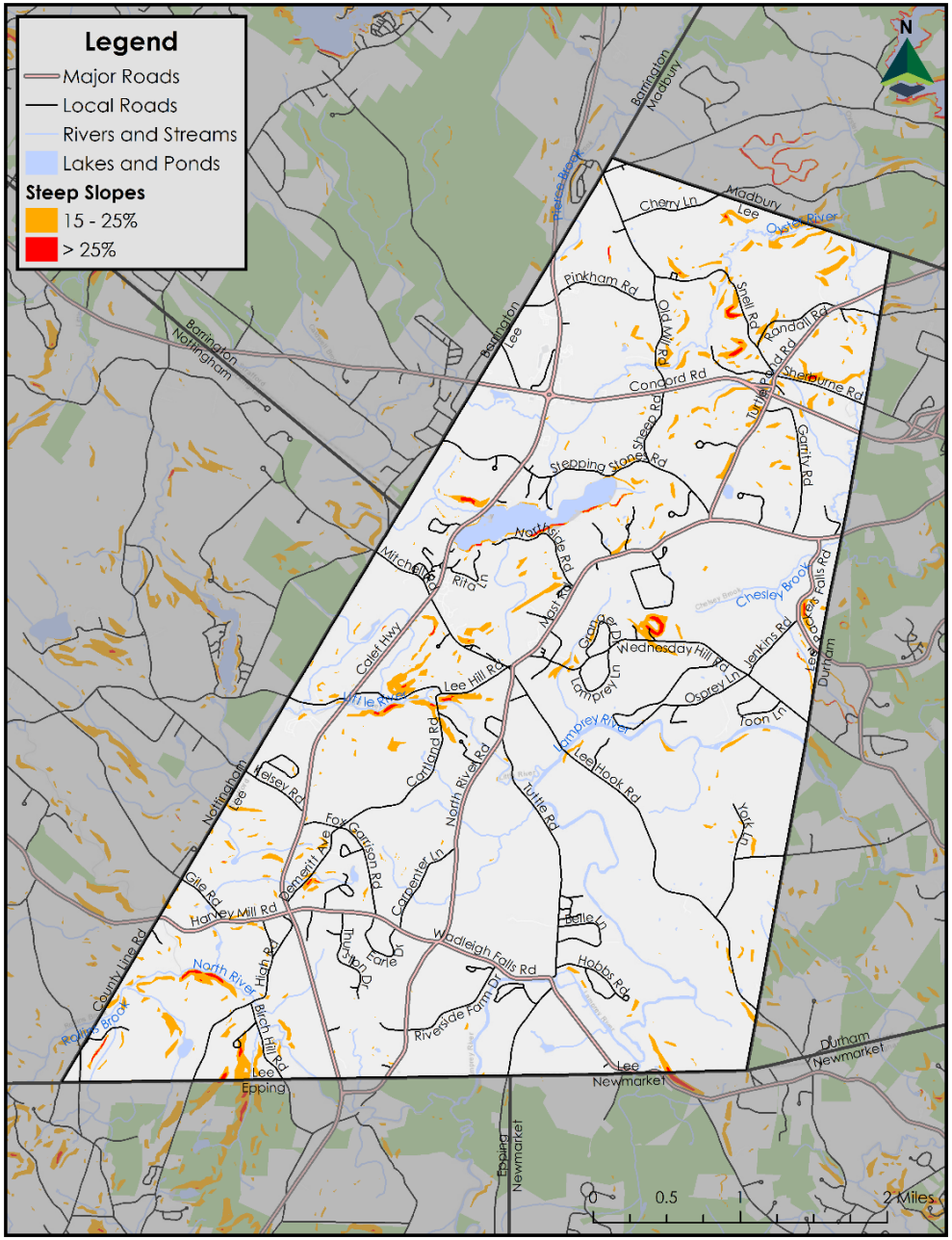


Section 5: Steep Slopes

Waterfalls and gorges along major rivers develop steep slope communities found mostly at lower elevations, as compared to cliff and talus communities which exist above 1,700 feet. Steep slope communities typically have richer calcareous soils. Prominent vegetation includes harebell, red columbine, fringed loosestrife, Canada anemone, virgins bower and spreading dogbane.[viii]

Resource	Acres	% of Town
Town of Lee	12,927	100.0%
Slopes 15% - 25%	441.6	3.4%
Slopes > 25%	29.4	0.2%

Figure 12: Steep Slopes



Section 6: Historical and Cultural Resources

Historic and cultural resources reflect some of the values that we place on our natural resources, such as scenic quality, historic significance, recreational opportunity, and general quality of life.

The Lee Heritage Commission has marked eight Town of Lee Historic Sites:

Locations of Historic Sites

1. At the Rt 152 bridge and Tuttle Road
2. At intersection of Rt 152 and Rt 125
3. Cartland Road between Fox Garrison and Lee Hill Rd
4. The “hook” on Lee Hook Road
5. Lee Town Center
6. Wheelwright Pond
7. At intersection of Mast Road and Garrity Road
8. Old Mill Road north of Rt 4

Figure 13: Cultural Resources

Heritage Site #1 - Wadley Falls Village
As much as 8000 years before European settlers came to this area, Native Americans visited here each summer to fish and camp. When the Europeans arrived, this location was coveted for its potential as a mill site and became the first permanently settled area within the bounds of the current Town of Lee. The mill owned by Robert Wadley began a period of 266 years of continuous commercial activity powered by the falls. This site grew the village of Wadley Falls that contained at various times a sawmill, grist mill, a planing mill, tannery, pail factory, herbal drug factory and leatherboard factory. In 1794 travelers made their way along what is now NH Route 152, passing over a bridge in this general vicinity. At its peak at the turn of the nineteenth century, Wadley Falls Village was the largest settlement in Lee. The mills here employed some 40 individuals, and there were two stores, a post office, and a hotel. A four-horse stagecoach ran daily between Nottingham and Newmarket with a stop here at Wadley Falls. The last surviving mill, the Norton Fiberboard Factory, burned in 1921, and ended the mill era in Lee.

Heritage Site #2 South Lee
South Lee Railroad Station was a stop on the Nashua and Rochester Railroad where Route 152 now crosses Route 125, which originally was the rail line. The South Lee Depot was the commercial center of Lee during that time. Major items of freight shipped from this location included lumber, milk, and a few masts. Mail was also routed via the railroad during that time. As many as 70 trains per day may have passed through this area during the heyday of the railroad.

Heritage Site #3 Cartland Road
Cartland Road exemplifies the earliest days of colonial New England. It begins on a sharp curve on Lee Hill Road and continues southerly for almost a mile to its terminus at Fox Garrison Road. This road was designated a Scenic Road at the 1972 Lee Town Meeting. Records are unclear as to when the road was laid out, but it certainly pre-dates the Cartland Farm, which was established in 1737. Some evidence suggests the road was first laid out in the late 1600's, shortly after the establishment of the mast way between Durham and this location. Robert Thompson built a sawmill on the Little River just above Cartland Road Bridge sometime before 1733. Remains of the mill on a 6.6 acre site is now owned by the Town of Lee. Current-day travelers might be impressed by the pastoral, unhurried feeling that one experiences relative to the traffic of other Town roads, but in the earlier days of our Town, this was the main north/south corridor through the area.

Heritage Site #4 Lee Hook
Lee Hook refers to the peculiar course of the Lamprey River, beginning below Wadley Falls, and continuing on a large horseshoe-shaped course through the southeastern portion of Lee for nearly five miles before exiting into Durham above Wiswall Falls. The original farms in this area were established in the first half of the 1700's and Lee Hook contained *"some of the finest farms in Strafford County"*. To this day, agriculture continues to be the principal industry in Lee and the quest for excellence continues on the farms of Lee Hook. Through its Master Plan process, the Town of Lee has determined that there is a strong desire among residents to maintain Lee's significant farming heritage.

Heritage Site #5 – Lee Town Center
Once a thriving commercial center, Lee's Town Center had several taverns, a blacksmith shop, stables, a stagecoach stop, a feed store, a general, store, and a doctor's office. The meeting house was moved here before 1804 from Mast Road and Garrity Road and was replaced when the present Town Hall was built as a school in 1846. The library began life as the Center School in 1897 and was moved to its current location in 1962. The Town Hall Annex began life as a firehouse in 1950. Mast Way School was completed in 1960. The current Public Safety Complex was added in 2003. The present Lee Church was built as a chapel in 1861 and became the home of an organized Congregational Church in 1867. The building has been added to several times over the years, and the Parsonage was added in the 1870's. A Baptist church flourished on Lee Hook Road for about twenty years, before being renovated into the Jeremiah Smith Grange in 1891.

Heritage Site #6 – Wheelwright Pond
American Indians frequently fought with English settlers in this area. In 1690, Pennacook American Indians were in the vicinity of Turtle Pond. Evidence suggests that there was a two-hour running battle through the forest along a path roughly approximating the course of Steppingstone Road, toward Wheelwright Pond, ending with the total exhaustion of both forces somewhere along the southeast shore of the pond. The two parties continued raids with regularity. By 1725, some of the Pennacook bands went west, to join with their former Mohawk enemies but a majority went to Saint Francis, Quebec.

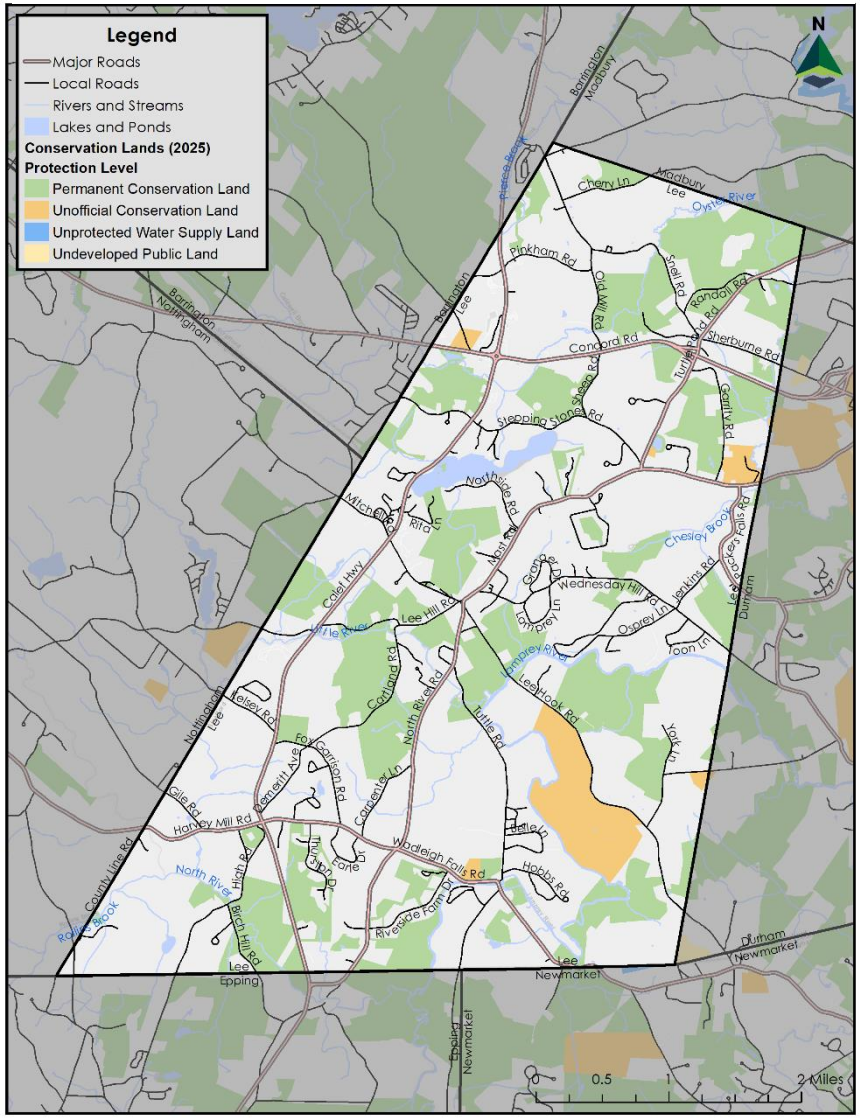
Heritage Site #7 – First Meeting House
in the early years of the eighteenth century, a meeting house was built here, on the northeastern corner of the Old Mast Way and Garrity Road. Not long after the establishment of the meeting house (which also served as a school), the land beside it was set aside as the first Town Cemetery. The school was disassembled in 1835 and moved to Stepping Stones Road, and later yet it was moved to Lee Town Center to become a Christian Endeavor Hall, the Community Church Vestry and presently serves the Lee Church Congregational as its Library.

Heritage Site #8 – New Town Plains
In this general area, early settlers found vast numbers of high-quality white pines, some taller than 100 ft, that were ideal for making ships' masts. The abundance of natural resources in this area was so significant that others soon followed the mast harvesters in search of lumber for building homes and barns, and a sawmill was established on the Oyster River, a few hundred feet below the Old Mill Road Bridge, to the south of here. By 1766, when Lee was incorporated as a separate town, this area was completely developed as farmland, and it remained so through the mid-twentieth century. Recognizing the need to preserve the remaining resources, the voters of the Town of Lee approved warrant articles in 2006 and 2007 to purchase a total of ninety acres between Old Mill Road and the Oyster River, and to work to reclaim the land for early successional wildlife habitat and enjoyment of future generations. The reclamation project included construction of vernal pools and erosion prevention, boulder perches, and replanting of aquatic and upland plants that attract many different types of wildlife, especially turtles and birds. The Oyster River is a source of drinking water for the Town of Durham, the University of NH, and also services development at the Lee traffic circle.

Section 7: Conserved and Recreational Lands

7.1 Conservation Lands

Figure 14: Conservation Lands



Conservation lands provide multiple environmental, social and fiscal benefits to the Town of Lee. Privately held conservation easements were voluntarily entered into by landowners wishing to maintain the property in its natural conditions for future generations. These properties provide the community with open space for aesthetic enjoyment, wildlife corridors and habitat, and by providing environmental buffers for rivers and streams. In addition, study after study shows that open space land provides more tax dollars to the town than are required back in services. The ratio is approximately two to one. Residential property, in comparison, required approximately $1.20 worth of services (police, fire, schools, etc.) for every $1.00 paid in taxes.

The map to the right identifies areas in Lee that are permanently protected through conservation. It should be noted that the UNH land on Lee Hook Road is state owned but is not permanently protected.

Lee has several properties owned by the town that are also open and available for recreational purposes in addition to their environmental benefits. Notable town owned conservation lands in Lee include:

- Ellis Oyster River Reserve 14 acres
- James Farm 15 acres
- Joe Ford Wildlife Sanctuary 71 acres
- Lee Five Corners 20 acres
- Lamprey River Canoe Launch ½ acre
- Little River Park (including Mills and Bricker Parcels) 36.5 acres
- Little River Reserve (Thompson Mill Road) 7 acres
- Maud Jones Memorial Forest 75 acres
- Old Mill Reserve 100 acres
- Rothwell 13 acres
- Town Forest (including Bales, Wulf, and Durgin parcels) approx..180 acres

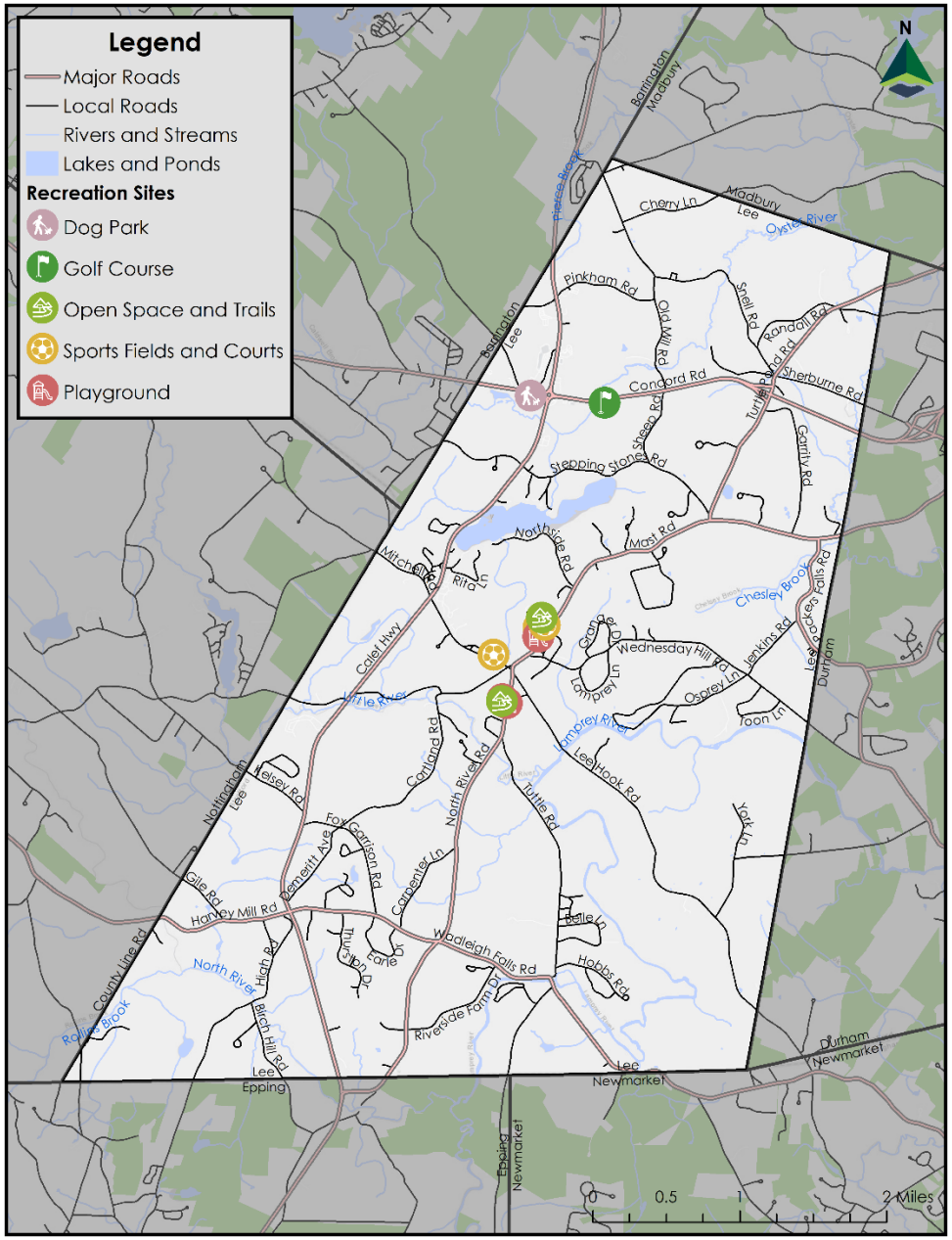
7.2 Recreational Lands

In the Lee NRI Community Survey, participants identified several favorite outdoor spaces including the Lee Town Forest, Lamprey River, Maud Jones Trails, Little River and Park, Wheelwright Pond, Carland Road, Bedrock Gardens, many trails, forests, and country roads. An interesting response that was written in by many participants was their own backyard and gardens.

Parks and recreation sites are important elements of the community that can build social ties and foster a sense of belonging and connection to a person's community. Additionally, recreation sites that add green space to the Town provide environmental benefits such as improved air quality, reduced temperatures, water infiltration wildlife corridors, and buffers.[ix]

Considering the multiple benefits of recreation sites, if planned thoughtfully these spaces can be used to improve habitat connectivity and provide community benefits. Recreation sites shown on the map to the right were identified through the Strafford Regional Planning Commission's Promoting Outdoor Play project, up to date as of 2023. All these locations are accessible to the public.

Figure 15: Recreational Lands



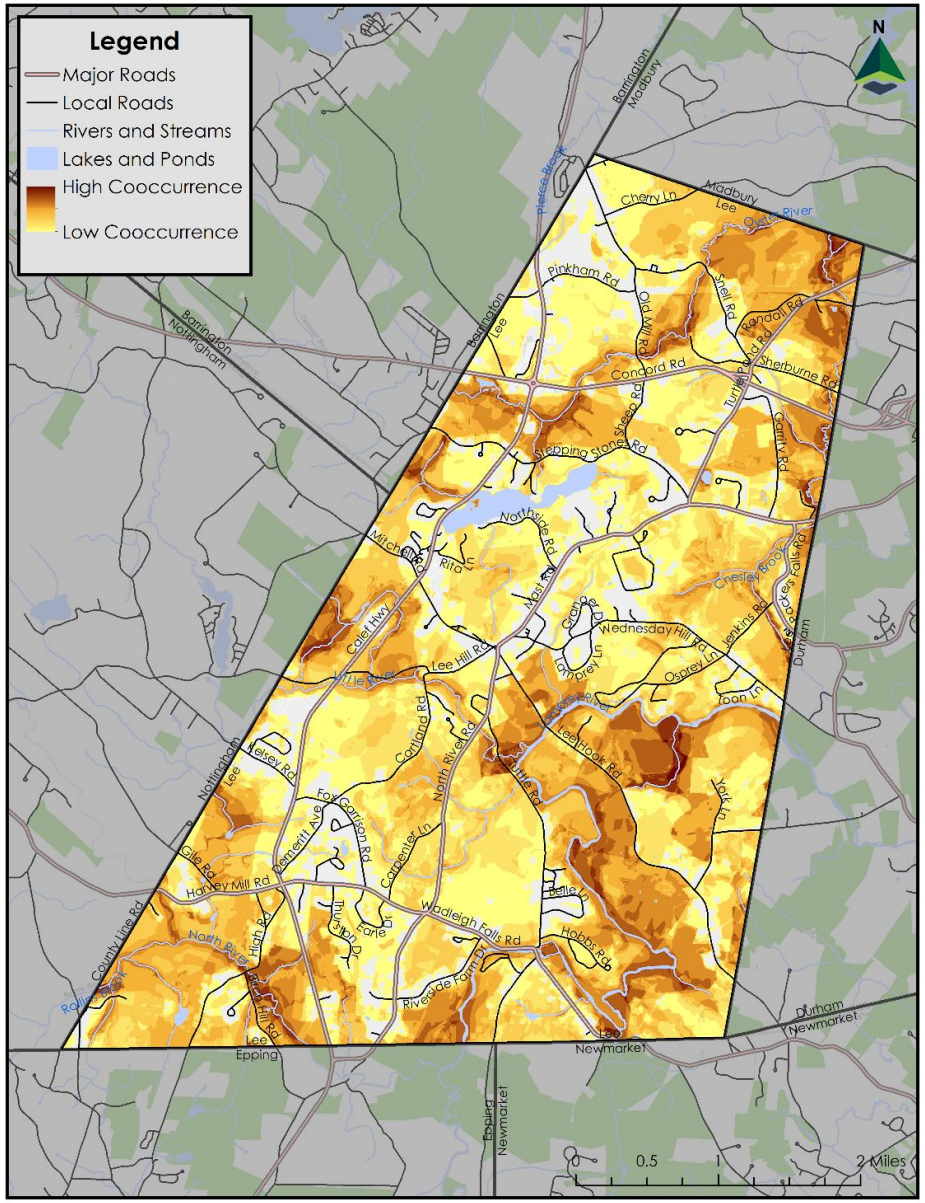
Section 8: Conservation Focus Areas

The co-occurrence map to the right and on the following page take multiple data layers and stack them on top of each other, such that the darkest areas on the map indicate the highest number of each layer's features occurring in that area.

The map on the next page overlays existing conservation land in Lee to demonstrate the areas of high co-occurrence that are already protected. In a natural resources co-occurrence analysis, areas of high co-occurrence often appear near water bodies, as they and their surrounding habitats provide multifaceted benefits to humans and wildlife. Conversely, more developed areas of the Town show low co-occurrence, as there are fewer high-quality natural spaces in these areas. Layers in this analysis include:

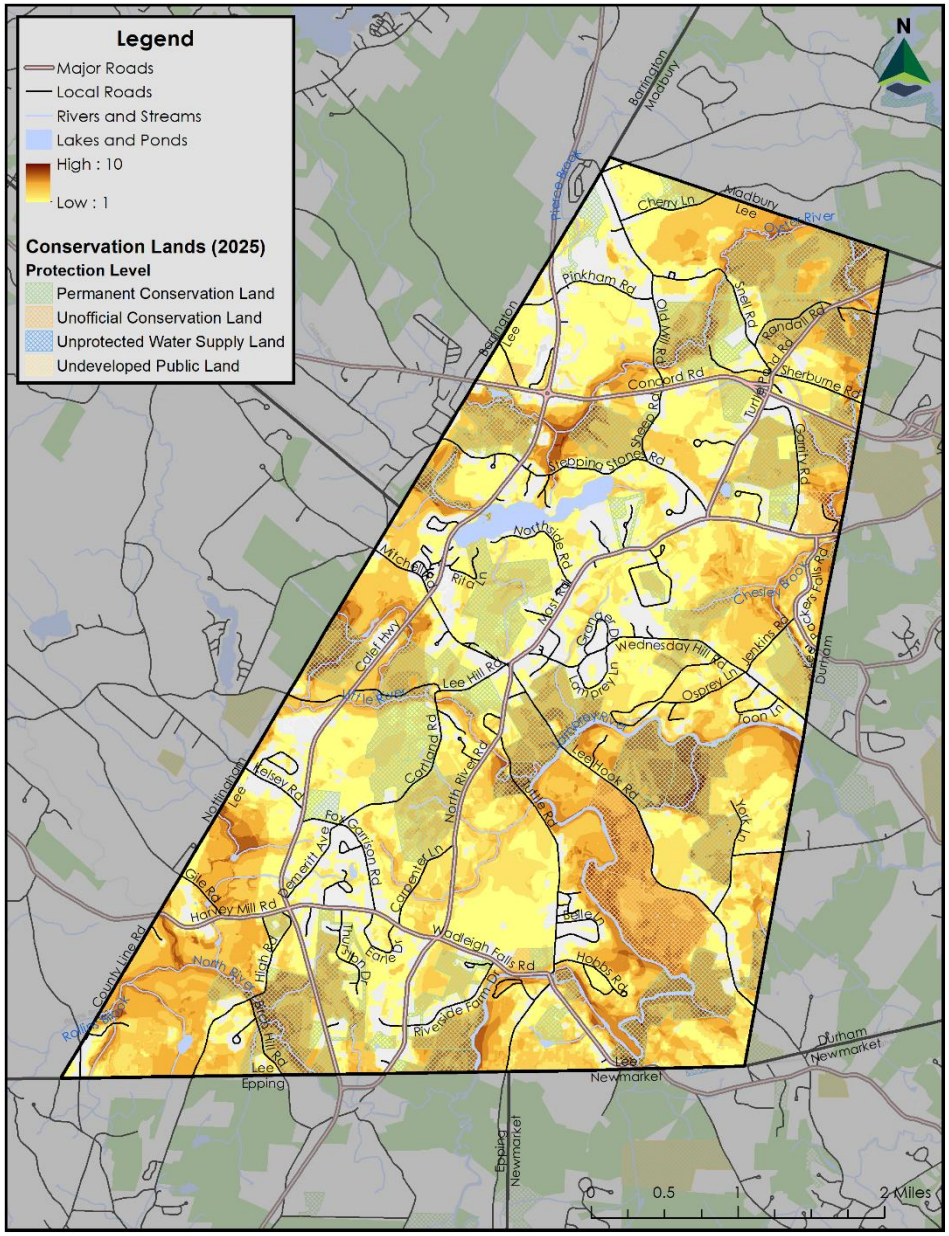
- Rivers and Streams
- Lakes and Ponds
- Wildlife Action Plan
  - Highest Ranked Habitats
  - Highest Ranked Habitat in Biological Region
- Habitats
  - Appalachian Oak Pine
  - Developed Impervious
  - Developed or Barren Land
  - Floodplain Forest
  - Grassland
  - Hemlock Hardwood Pine
  - Open Water
  - Peatland
  - Sand/Gravel
  - Temperate Swamp

Figure 16: Co-occurrence Map



    - Wet Meadow/Shrub Wetland
- Wildlife Action Plan Aquatic Habitats
    - Coldwater Rivers/Streams
    - Warm/Cool Rivers/Streams
    - Warm/Cool Lake
    - Warm/Cool Pond
- Watersheds
- Wetlands
- Flood Zones
- Steep Slopes
- Soil Drainage
- Forest Land
- Agricultural Land
- Farmland Soils
- Prime Farmland
- Farmland of Statewide Importance
- Stratified Drift Aquifers
- Wellhead Protection Areas
- Conservation Lands
- Conservation Focus Areas (Coastal Conservation Plan)
- Wildlife Corridors (Connect the Coast)
- Prioritized Habitat Blocks (Connect the Coast)

Figure 17: Co-occurrence Conservation Map



Section 9: Local Regulatory Protection for Natural Resources

Conservation and natural resource protection efforts by the Town have been in place for many years. While these have added to natural resource protection, additional regulations may be needed as development pressures continue. Ongoing efforts to conserve land and creation of larger unfragmented areas will provide a broader protection across borders with the surrounding communities and beyond. Maps and data in this Natural Resource Inventory will be helpful in identifying parcels of high value for resource protection.

Below is a list of resource protection already in place by the Lee Zoning Ordinances.

Open Space Residential Development: The purpose of this article is to provide permanently preserved open space residential development consistent with the rural character of the Town of Lee. This will encourage and permit a "neighborhood" subdivision layout, and a variety of residential dwellings. (See Zoning Ordinance, Article VIII)

Aquifer Conservation District: The purpose of this article is to protect the public health, safety and general welfare by providing for the protection and preservation of existing and potential groundwater resources, known as aquifers, in the Town of Lee, New Hampshire. (See Zoning Ordinance, Article XIII)

Shoreland Conservation District: The intent of this district is to protect the water quality, visual character and the wildlife habitat of the Shoreland areas. When applications regarding this article are made to the Lee Zoning Board of Adjustment, all applications shall also be referred to the Lee Conservation Commission and the Health Officer for review and comment prior to the Zoning Board hearing. (See Zoning Ordinance, Article XIV)

Wet Soils Conservation Zone: The purpose of this article is to protect the public health, safety and general welfare by controlling and guiding the use of land areas which have been found to be subjected to high water tables for extended periods of time. (See Article XV)

Floodplain Development Ordinance: The purpose of this ordinance is to regulate development within the special flood hazard areas as designated by the Federal Emergency Management Agency. (See Zoning Ordinance, Article XIX)

Section 10: Goals and Actions

This section provides goals and actions to consider for natural resource protection. These were derived from comments received during the public outreach conducted for this natural resource inventory. This can serve as tool to use when seeking support and/or funding for projects. It should be reviewed and updated on an annual basis or sooner if needed.

Lee NRI Desired Outcomes

Protect the quality and quantity of the Town's groundwater and surface water resources

- Consider additional regulatory changes that will protect our drinking water resources.
- Use the Lee, NRI Supplemental Study Water Resource Analysis from FB Environmental to create priority zones for water quality protection.
- Expand the Aquifer Conservation District to include all groundwater and aquifer areas and strengthen the regulation.
- Consider Green Snow Pro solutions instead of salt for treating slippery roads in sensitive areas.
- Provide outreach for homeowners to manage stormwater to reduce the amount of unfiltered run-off into surface water

Identify areas of local and ecological value and habitat corridors that support connectivity

- Identify potential conservation areas that will connect to other conservation areas.
- Provide outreach and education for individuals to consider the value of conserving portions of their land.
- Coordinate with neighboring towns to identify areas to make connections between conserved areas.

Protect the natural ability of the landscape to withstand flooding and other climate related changes

- Upgrade stormwater management standards and practices to protect sensitive areas and increase capacity to handle heavy storm events.
- Develop resilient storm water infrastructure and policy that integrates with the natural landscape.
- Identify and provide education to the public about invasive species that are threatening native habitats.
- Use best management practices for eradicating or controlling invasive species.

Coordinate resource protection with land use planning.

- Conduct a regulatory audit of Lee's land use regulations to identify regulations and policies that are outdated.
- Encourage town-wide coordination and planning of infrastructure, housing, and transportation planning to minimize impacts on natural resources.
- Consider adopting a conservation subdivision regulation.
- Provide the Board of Selectmen and the Planning Board with guidance on areas of natural resource importance using the co-occurrence maps.
- Encourage UNH or the State to permanently protect the UNH farms on Lee Hook Rd.
- Use Low Impact Development (LID) strategies for stormwater management to replace traditional approaches with innovative approaches such as bioretention, vegetated swales, permeable paving, and replacing impervious areas with porous materials.

Additional References, Resources, and Endnotes

Town of Lee Zoning Ordinance (2023)
https://www.leenh.org/sites/g/files/vyhlif776/f/uploads/2023_zoning_ordinance.pdf

New Hampshire Wildlife Action Plan: Appendix B – Habitats
https://www.wildlife.nh.gov/sites/g/files/ehbemt746/files/inline-documents/sonh/appendixb-habitats.pdf

Vernal Pool Documentation Manual
https://www.wildlife.nh.gov/wildlife-and-habitat/nongame-and-endangered-species/vernal-pool-documentation-manual

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Why watersheds are Important
[i] https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/wmb-19.pdf

Ground Water and Aquifers
[ii] https://extension.unh.edu/nhnriguide/nri-components/water-resources/ground-water-aquifers

New Hampshire Natural Heritage Bureau Report – July 2020
[iii] https://www.nh.gov/nhdfl/documents/town-lists.pdf

Connect the Coast – October 31, 2019
[iv] https://www.nature.org/content/dam/tnc/nature/en/documents/nh-connect-the-coast-report.pdf

Fifth National Climate Assessment, Northeast
[v] https://nca2023.globalchange.gov/chapter/21/

Prime Farmland Definition
[vi] https://efotg.sc.egov.usda.gov/references/public/CO/5a_Prime_Farmland_Definition.pdf

New Hampshire Soil Data Dictionary
[vii] https://www.nrcs.usda.gov/sites/default/files/2022-11/NH%20Soil%20Data%20Dictionary-2013.pdf

Steep Slope Ecosystems in the Northern Appalachian/Acadian Ecoregion
[viii]https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Documents/EcoregionalPlans/NAP/Steep.pdf

APPENDIX A

Water Resource Analysis, FB Environmental, July 10, 2024

LEE, NH NRI SUPPLIMENTAL STUDY | WATER RESOURCES ANALYSIS

TO: Lisa Murphy, Strafford Regional Planning Commission
FROM: Sarah Large and Christine Bunyon, FB Environmental Associates (FBE)
SUBJECT: **Priority Zones for Enhanced Water Resource & Water Quality Protection**
DATE: July 10, 2024
CC: Forrest Bell, FB Environmental Associates (FBE)

As part of the Natural Resource Inventory, developed by the Strafford Regional Planning Commission, for the Town of Lee, FB Environmental (FBE) conducted a GIS analysis of water resources and water quality protection within the Town of Lee. The purpose of this analysis was to identify where in the Town these resources are most concentrated to guide further conservation efforts focused on protecting drinking water resources. These resources include streams, rivers, waterbodies, wetlands, groundwater aquifers, and flood zones, as well as designated water resource protection areas such as shoreland conservation and shoreland protection zones, wellhead protection areas, wild and scenic river designations, impaired surface waters, groundwater reclassification areas, among others (Table 1).

METHODS

To identify the density of water resources in Lee, FBE conducted a co-occurrence analysis. A co-occurrence analysis identifies areas with the highest density of resources within a given area utilizing GIS. These high-density areas contain multiple and overlapping resources and resource protection areas. Ultimately, the final compilation can serve as an aid in identifying zones to expand conservation efforts while protecting water resources and water quality for the community to use and enjoy into the future.

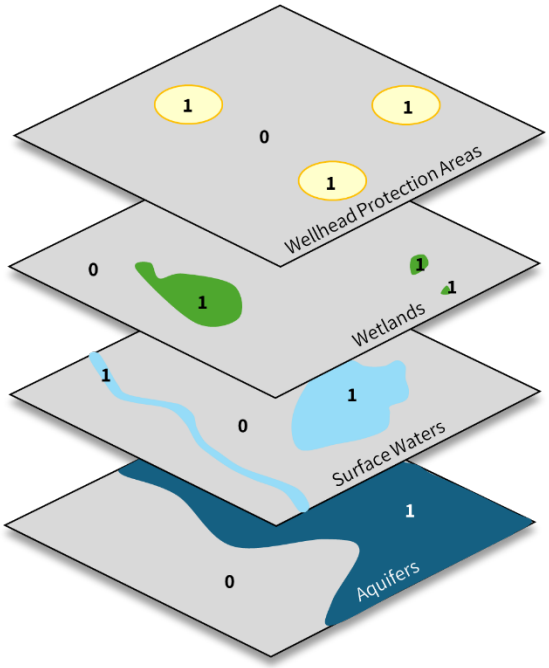

Figure 1. Graphical visualization of spatial data layers used in the GIS co-occurrence analysis with their reclassification of either 0 (absent) or 1 (present).

Spatial data (i.e., GIS data layers for surface waters, wetlands, streams, etc.) used in the GIS analysis were kept in polygon form to maintain feature shapes and accuracy. Next, to visually display the density gradation, each data layer was categorized into one of two categories. If the feature of interest (i.e., a surface water), was present, those polygons were given a value of 1. Where if a feature was absent (i.e., no surface water), those polygons were given a value of 0 (Figure 1). The data layers were then stacked, and a "union" analysis tool transposed the layers into a single data layer where each numeric value was added together for every polygon. Through the graphical representation shown in Figure 1 as an example, areas with aquifers, surface waters, and a wellhead protection area would get a score of 3. The higher the score, the more resources are present.

FBE gathered 19 spatial data layers related to water resources and water quality protection from the NH Geographically Referenced Analysis and Information Transfer System (NH GRANIT), U.S. Geological Survey (USGS), U.S. Department of Agriculture (USDA), U.S. Federal Emergency Management Agency (FEMA), New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFG), Strafford Regional Planning Commission (SRPC), and The Nature Conservancy (TNC) (Table 1).

Table 1. Spatial data gathered for the water resources co-occurrence analysis for the Town of Lee, NH.

Category	Data Layer	Data Source
Wetlands	Wetlands	National Wetlands Inventory + (NWI+)
Waters	Waterbodies, Rivers, and Streams	National Hydrological Database (NHD) and NHFG
Designations	Wild and Scenic Rivers	NHD
	Designated Rivers with a Quarter Mile Buffer	SRPC
	Surface Waters with Impairments in 2020 and a Quarter Mile Buffer	NHDES
Shoreland, Waterbody, and Wetland Protection	Shoreland Protection Act: 250 ft buffer around waterbodies >10acres and rivers of a 4th order or larger	FBE from NHDES Regulation
	Shoreland Conservation District: 100-foot buffer from Lamprey, Little, North, and Oyster Rivers, Dube and Chelsey Brooks, and Wheelwright Pond	FBE from Lee Ordinance; NHFG rivers
	FBE's recommended enhanced shoreland protection areas: 100-foot buffer around all other streams and waterbodies	FBE from NHFG rivers
	Wet Soils Conservation Zone: 75-foot buffer around "Wet Soils" (poorly or very poorly drained as defined by the Soil Drainage Class)	USGS Web Soil Survey
Flooding	FEMA 100-year Flood Hazard Areas	FEMA
Groundwater	Stratified Drift Aquifers	NH GRANIT
	Groundwater Reclassification Areas GA1: Groundwater of high value for present or future drinking water. No land use prohibitions. Authorizes active management of potential contamination sources on local level.	NHDES
	Groundwater Reclassification Areas GA2: Potentially valuable stratified drift aquifers. No active management.	NHDES
	Wellhead Protection Areas	NHDES
	FBE's recommendation for additional soils to conserve: shallow depth to groundwater AND somewhat and excessively drained soils	FBE from NRCS/USGS Web Soil Survey
	Aquifer Conservation District	SRPC
General	High Priority Water Supply Lands	TNC
	Source Water Protection Areas for Surface Water Sources	NHDES
Utilities	Areas not served by water utility lines	NHDES

RESULTS

With a possible range of co-occurrence scores from 0 to 19, scores of 2 through 13 were found within the Town of Lee (Figures 2 and 3). Having the lowest score of 2 indicates that at least two of the water resources listed in Table 1 are present throughout the entire town. 90% of the town has between 3 and 7 of these water resources. Only 0.89% of Lee has 10 or more of these resources. (For context, the Town of Lee covers approximately 12,927 acres in Strafford County, NH.)

The highest concentration of water resources – the highest co-occurrence scores – can be found along the Oyster River southwest and northeast of the Lee Traffic Circle, and along Dube Brook south and northeast of the Lee Traffic Circle (Figure 3). Water resources found here include a combination of the following 13 resources: wetlands, wet soil conservation zone, Shoreland Conservation District, FEMA Flood Hazard Areas, Wellhead Protection Areas, a surface water with an impairment and buffer, a Designated River and its buffer, Groundwater Reclassification Areas GA2, stratified drift aquifers, the Aquifer Conservation District, high priority water supply lands, source water protection areas for surface water sources, and areas not serviced by the municipal drinking water utility. **Other high co-occurrence areas include the areas surrounding the North River, Lamprey River, Little River, South Chelsey Brook, and the Oyster River on the northeastern side of town.**

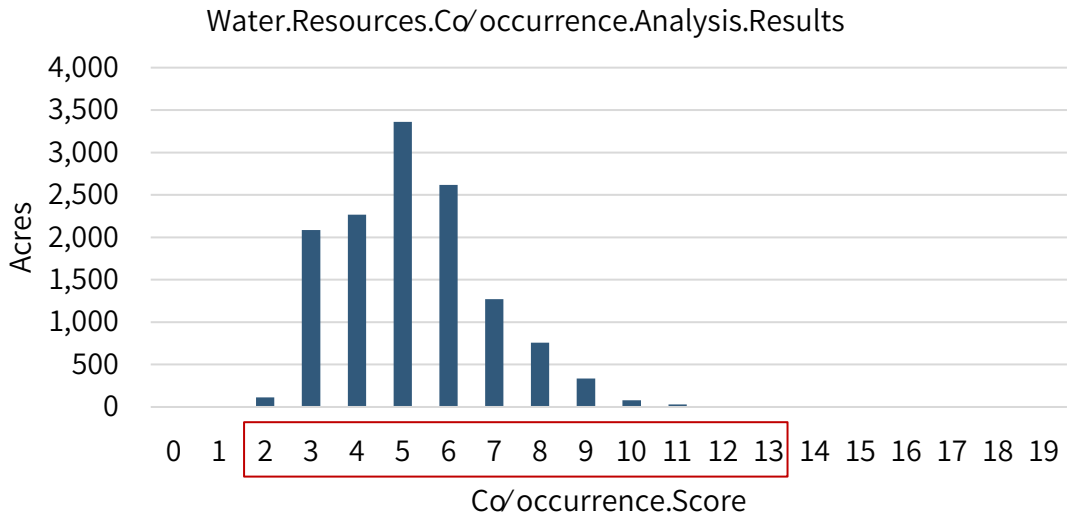

Figure 2. Number of acres per co-occurrence analysis score for the Town of Lee, NH. Scores found within Lee ranged from 2 to 13.

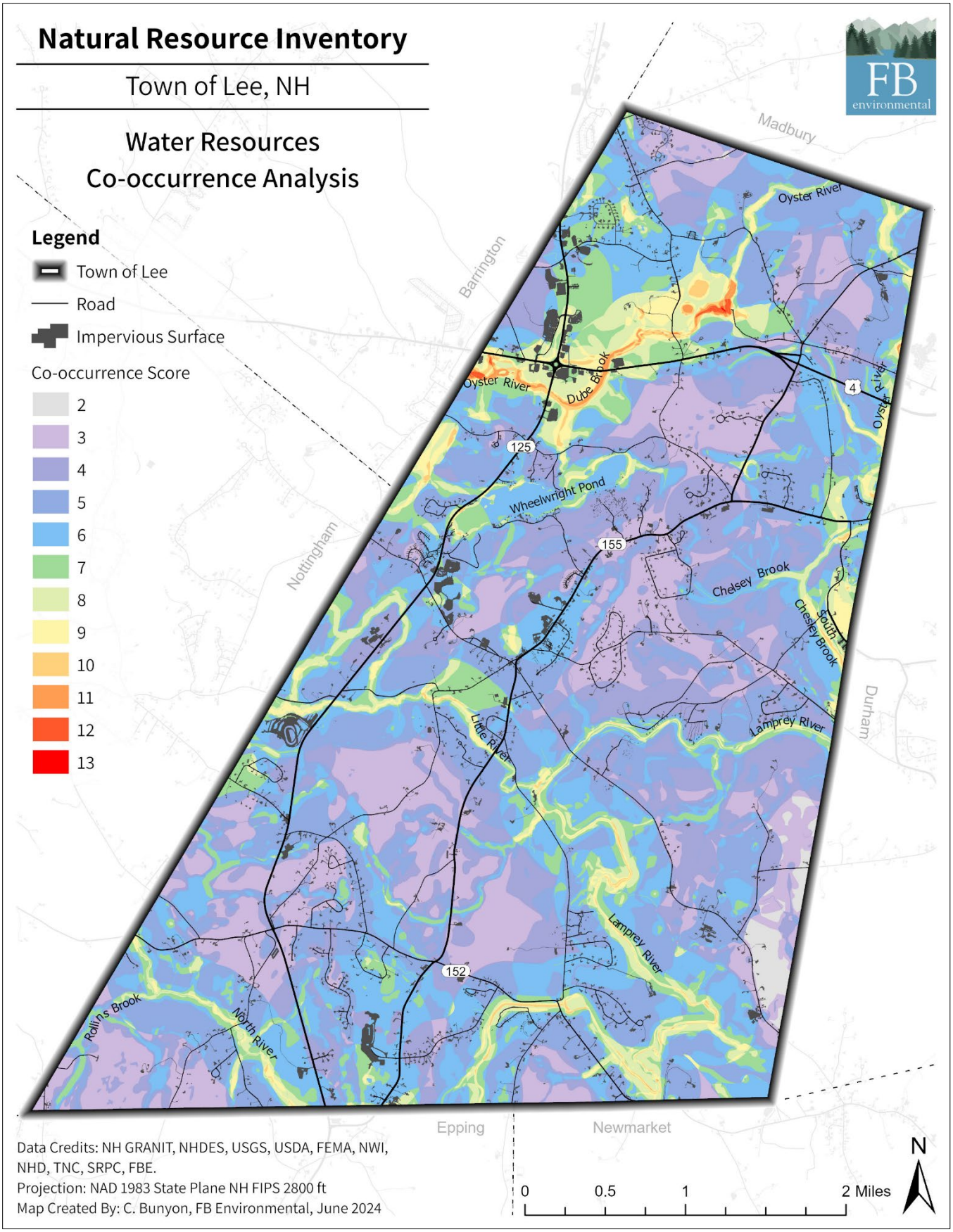

Figure 3. Co-occurrence analysis of water resources within Lee, NH.

RECOMMENDATIONS

Water Resources and Water Quality Protection Through Conservation

Land conservation is essential to the health of a region or town, particularly for the protection of water resources, enhancement of recreation opportunities, vitality of local economies, and preservation of wildlife habitat. Land conservation is one of the best methods in preserving water quality and water resources for future generations (Kreye, Adams, & Escobedo, 2014), though it is only one of the methods for doing so. The forests and wetlands provide vast ecological benefits to water quality including nutrient retention and uptake, and stormwater diversion and infiltration. The Town of Lee has many areas of conserved land which overlay areas with a high density/concentration of water resources (i.e., high co-occurrence scores) (Figure 4).

Aquifers for drinking water sources were identified by residents as the most important natural resource to protect within the town (Lee Sustainability Committee, 2017). With a total of 1,529 wells in the town, nearly all residents in Lee receive drinking water from private wells that are drilled bedrock wells. Even under severe drought conditions, there are no records of diminishing water in Lee wells, let alone wells having failed or run dry. The only area on public water supply in Lee is Thurston Woods, which is owned by Pennichuck Water Works (Lee Sustainability Committee, 2017).

The two municipal wells in Lee are a part of the Town of Durham's water system and include the Lee Well (also known as Five Corners Well) and Spruce Hole Municipal Well and Artificial Recharge Project which was authorized in 2014 (Lee Sustainability Committee, 2017). The Lee Well is surrounded by protected land in the Five Corners Reserve, purchased by the Town of Lee in 2005. Knowing the importance of protecting land surrounding a drinking water well, Lee voters approved the $290,000 purchase of the 20.7-acre lot to ensure the future of an important drinking water supply. The second municipal well in Lee, is the Spruce Hole Municipal well which is located next to the Lee/Durham town line. This well pulls from a classified GA1 sand and gravel aquifer that stretches across the two towns (Oyster River Local Advisory Committee, 2014). In 1989, the town of Durham established the Spruce Hole Conservation area, which is a 35.6-acre parcel of land that permanently protects the area above the aquifer (Oyster River Local Advisory Committee, 2014). Included in this conserved land is the Spruce Hole Bog, recognized for its geological features, biological importance, and other natural services that are attributed to the region's strong conservation efforts.

Many resources are available through the University of New Hampshire, NH Land Trust Coalition, NHDES, and U.S. EPA providing guidance on land conservation including but not limited to those listed to the right. To enhance and further protect the drinking water resource in town we recommend the town add new conservation areas to its existing conserved lands, particularly in areas with a high co-occurrence of water resources that are not currently conserved. These high-density water resource areas are of the highest value to protect surface water and groundwater quality and therefore safeguard the Town's potential drinking water sources. In addition to these hot-spot areas, the town could consider conserving large undeveloped blocks of land.

Resources and Links

- Advancing Watershed Protection Through Land Conservation – A Guide for Land Trusts
- Common Grant and Load Sources for Land Conservation in New Hampshire
- What Conservation Commissions can do to Protect Natural Resources in a Changing Climate
- Conserving Your Land – Options for New Hampshire Landowners

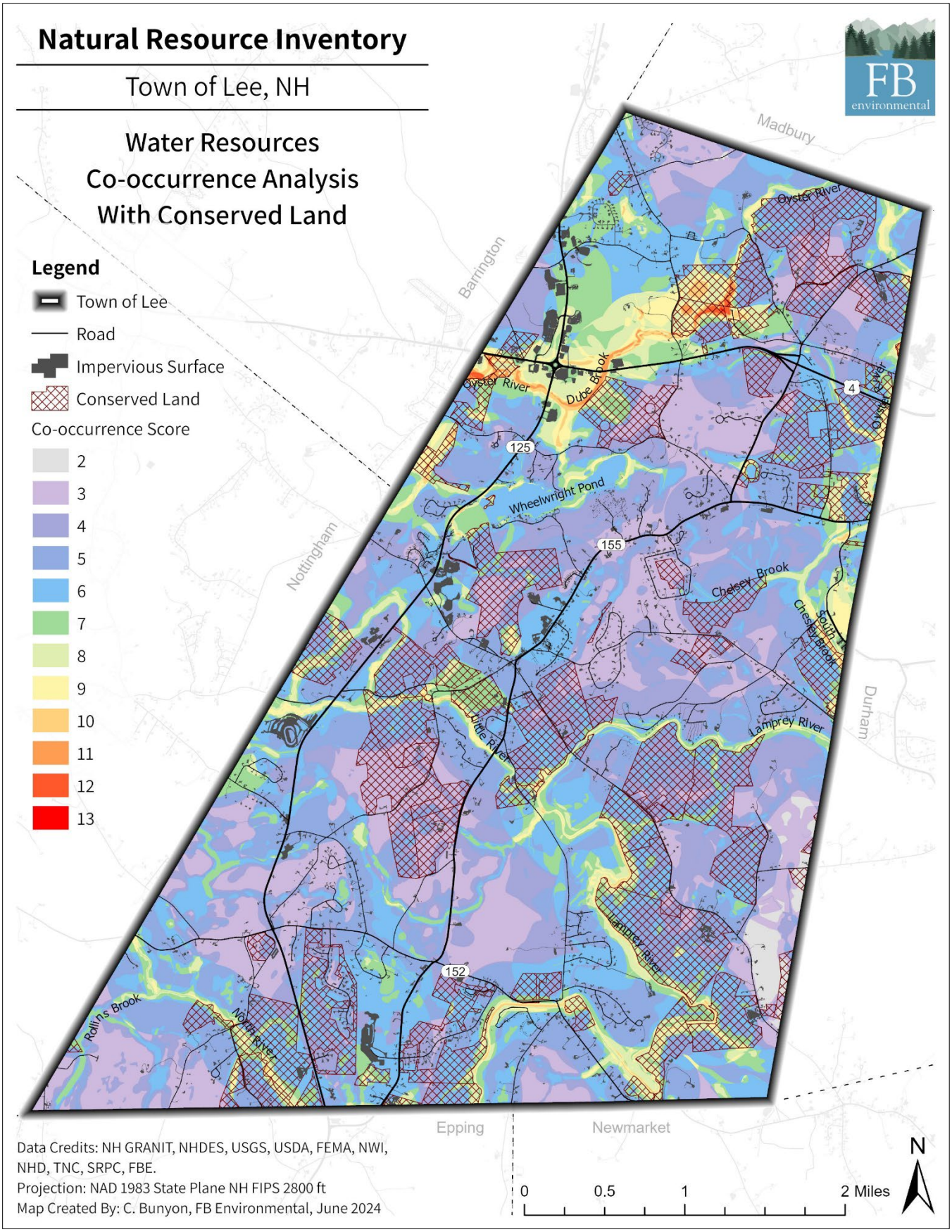

Figure 4. Co-occurrence analysis of water resources within Lee, NH with conserved land overlayed onto the map. Conservation land data acquired from the NH GRANIT.

Water Resources and Water Quality Protection Through Regulation Updates

Currently, the Town of Lee has an Aquifer Conservation District which encompasses areas "having the potential to yield groundwater" to "protect [their] known aquifers by preventing adverse land use practices…" (Town of Lee, NH, 2023). Certain activities are prohibited within this conservation district including the subsurface storage of petroleum, outdoor storage of road salts, dumping of snow containing road salts, septage disposal, solid waste disposal, storage, discharge, or disposal of hazardous or toxic materials, automotive services, and earth removal (Town of Lee, NH, 2023).

The NHDES and NH Office of Energy and Planning developed a Model Groundwater Protection Ordinance to assist NH communities in developing town-specific regulations for the protection of stratified-drift aquifers. The model ordinance also includes language on allowable/permittable, conditional, and prohibited land uses, as well as exceptions within the groundwater protection areas, and provides guidelines for maintenance and inspections. The model also explains how wellhead protection areas may be reclassified for eligibility of higher protections. The wellhead protection areas within Lee currently do not overlap with existing groundwater classifications (i.e., GAA, GA1, GA2).

SRPC, in collaboration with Rollinsford, NH, provided recommendations for updating regulations to enhance flood resilience, address flood hazard areas, and protect drinking water through an aquifer conservation update. The aquifer conservation update included a review of NHDES-approved wellhead protection areas and a review of the NHDES Groundwater Protection Model Ordinance. Proposed amendments include (1) revisions that more clearly outline authority, purpose, and district boundaries, (2) establishing performance criteria for development within the overlay, (3) simplifying permitted land uses, (4) strengthening the list of prohibited uses, (5) defining a process for the uses that are allowed with a conditional use permit, (6) maintaining existing non-conforming uses, (7) identifying a list of exemptions, (8) requiring maintenance and inspections, and (9) determining enforcement procedures and penalties for non-compliance (CAW, 2024). We provide this information as a resource for the Town's use and reference.

We recommend the Town of Lee first expand their Aquifer Conservation District to include all groundwater and aquifer areas, and then strengthen the regulation. The expanded district should encompass the area where the stratified drift aquifer expands around the Lee Traffic Circle and Dube Brook, as well as the area where the Groundwater Reclassification Area GA1 extends around Chelsea Brook and Jenkins Road (Figure 5). Updates to the Town's regulation(s) can be modeled after the Model Groundwater Protection Ordinance publication and guidance, and Rollinsford's Flood Hazard and Aquifer Conservation Overlay District (once published).

Resources and Links

- Town of Lee Aquifer Conservation District – see pages 35-37
- Model Groundwater Protection Ordinance
- The NH Groundwater Protection Act: RSA 485-C – An Overview
- Local Reclassification of Groundwater to Implement Protection Programs: A Six-Step Process
- Best Management Practices for Groundwater Protection
- SRPC and Rollinsford Flood Hazard and Aquifer Conservation Overlay District updates

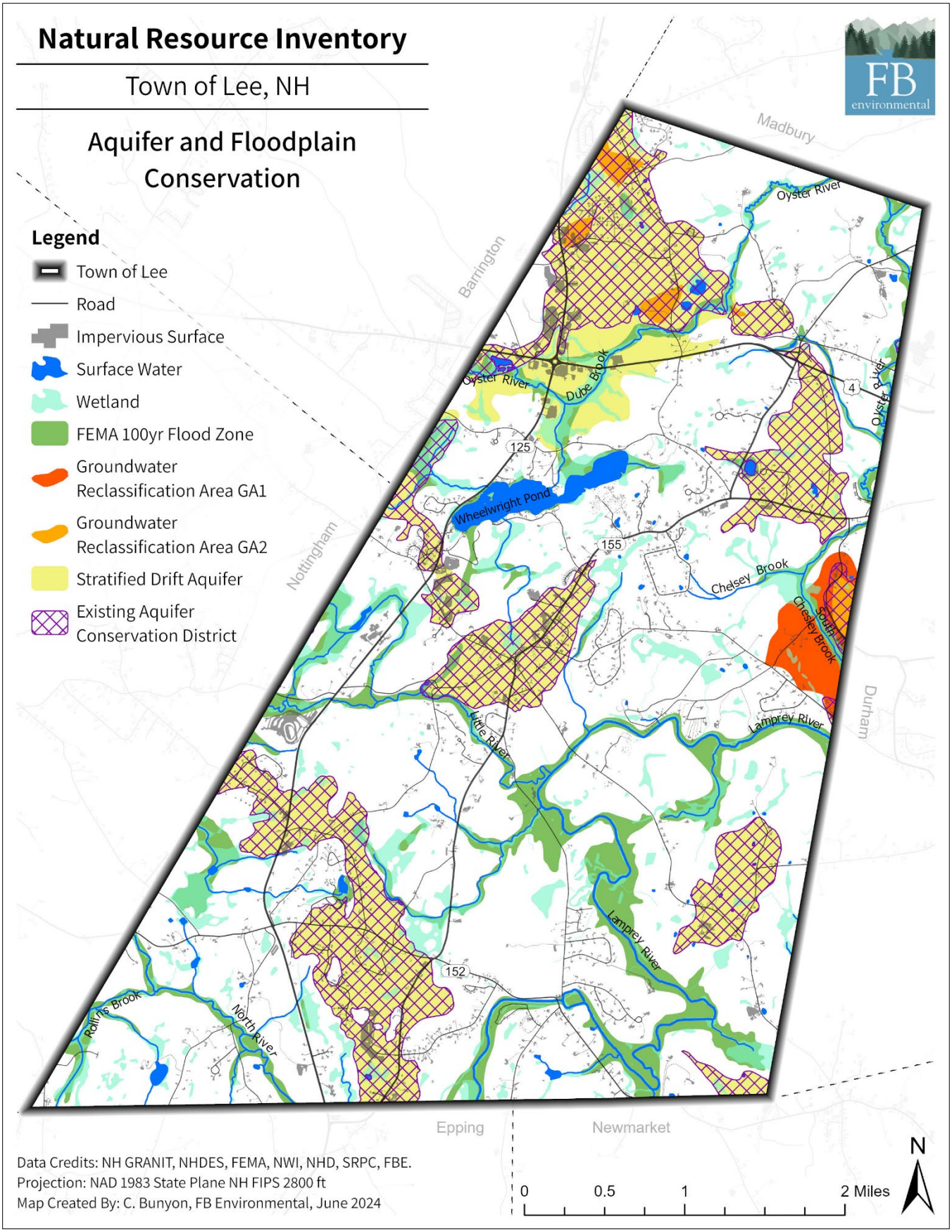

Figure 5. Existing surface water, wetland, and aquifer resources within the Town of Lee, NH in relation to the existing Aquifer Conservation District.

General Regulation Recommendations

Regulations through municipal zoning and ordinances such as low impact design (LID) strategies that prevent polluted runoff from new and re-development projects are equally important as land conservation. In fact, local land use planning and zoning ordinances can be the most critical components of water resource protection. Local land use planning and zoning ordinances should consider incorporating climate change resiliency strategies for protecting water quality and improving infrastructure based on temperature, precipitation, water levels, wind loads, storm surges, wave heights, soil moisture, and groundwater levels (Ballestero, Houle, Plus, & Barbu, 2017). There are nine strategies that can aid in minimizing the adverse effects associated with climate change and include the following (McCormick & Dorworth, 2019).

- Installing Green Infrastructure and Nature-Based Solutions: Planning for greener infrastructure requires that we think about creating a network of interconnected natural areas and open spaces needed for groundwater recharge, pollution mitigation, reduced runoff and erosion, and improved air quality. Examples of green infrastructure include (but is not limited to) in-tact forest, wetlands, riparian (banks of a watercourse) buffers, floodplains, green roofs, permeable pavement, etc.; all of which already exist to various extents in the watershed and have minimized the damage created by intense storms. As future development occurs, these natural barriers must be maintained or even increased to reduce runoff of pollutants into freshwater resources.
- Using LID Strategies: Use of LID strategies requires replacing traditional approaches to stormwater management such as using curbs, pipes, storm drains, gutters, and retention ponds with innovative approaches such as bioretention, vegetated swales, and permeable paving and replacing impervious areas with porous materials.
- Minimizing Impervious Surfaces: Impervious surfaces such as roads, buildings, driveways, and parking lots should be minimized which a town can regulate by updating ordinances and building construction design requirements that reduce and minimize the amount of new imperviousness of new development and encourage the conversion of impervious surfaces to permeable in re-development projects. Property owners can increase the permeability for their lots by incorporating permeable driveways and walkways. For reference, there are approximately 639 acres of combined impervious surfaces throughout the Town of Lee or about 4.9% of the total town area.
- Encouraging Riparian Buffers and Maintaining Floodplains: Municipal ordinances should forbid construction in floodplains, and in some instances, floodplains should be expanded to increase the land area to accommodate larger rainfall events. Riparian (vegetated) buffers and filter strips along waterways should be preserved and/or created to slow runoff and filter pollutants.
- Protecting and Re-establishing Wetlands: Wetlands are increasingly important for preservation because wetlands retain water, recharge groundwater, and mitigate water pollution.
- Encouraging Tree Planting: Trees help manage stormwater by reducing runoff and mitigating erosion along surface waters. Trees also provide critical shading and cooling to streams and land surfaces.
- Promoting the Use of Native Vegetation in Landscaping: The Town and landowners should promote and encourage the use of native vegetation in landscaping. Landscapers should use native plants and become familiar with techniques which minimize runoff and the discharge of nutrients into waterbodies (Chase-Rowell, Davis, Hartnett, & Wyzga, 2012).
- Slowing Down the Flow of Stormwater: To slow and infiltrate stormwater runoff, roadside ditches can be armored or vegetated and equipped with turnouts, settling basins, check dams, or infiltration catch basins. Rain gardens can retain stormwater, while waterbars can divert water into vegetated areas for infiltration. Water running off roofs can be directed towards infiltration fields and drainage trenches.
- Coordinating Infrastructure, Housing, and Transportation Planning: Town-wide coordination and planning of infrastructure, housing, and transportation improvements to minimize impacts on natural

resources. It's essential to conserve critical resources, such as groundwater, and to keep natural resources free of pollutants, especially as future droughts may deplete groundwater supplies.

CONCLUSION

The Town of Lee has numerous freshwater resources including stratified drift aquifers, reclassified groundwater areas, wetlands, rivers, streams, and ponds. These resources are delicate and valuable and can be easily impacted by overuse or misuse. The co-occurrence analysis of water resources revealed that the town has at least two hot-spots/high-density zones of water resources occurring near the Oyster River southwest and northeast of the Lee Traffic Circle, and along Dube Brook south and northeast of the Lee Traffic Circle. The major riverways (the North River, Lamprey River, Little River, South Chelsey Brook, and the Oyster River) in town were also identified as high co-occurrence areas.

The protection of water resources comes from a variety of approaches including land conservation, education, and ordinance/zoning/regulation updates. Though this analysis focuses on only the Town of Lee, it is imperative to acknowledge that many of the water resources in Lee are aquifers, rivers, and streams that begin and flow or extend into adjacent communities. In addition to in-Town improvements to regulations, practices, and expansion of land conservation, collaborations between Lee and the neighboring towns of Nottingham, Barrington, Madbury, Durham, Newmarket, and Epping, will be essential to the protection of Lee's shared water resources.

CITATIONS

Ballestero, T., Houle, J., Plus, T., & Barbu, I. (2017). Stormwater Management in a Changing Climate. *Presented at NH Lake Association Annual Meeting*. Meredith, NH.

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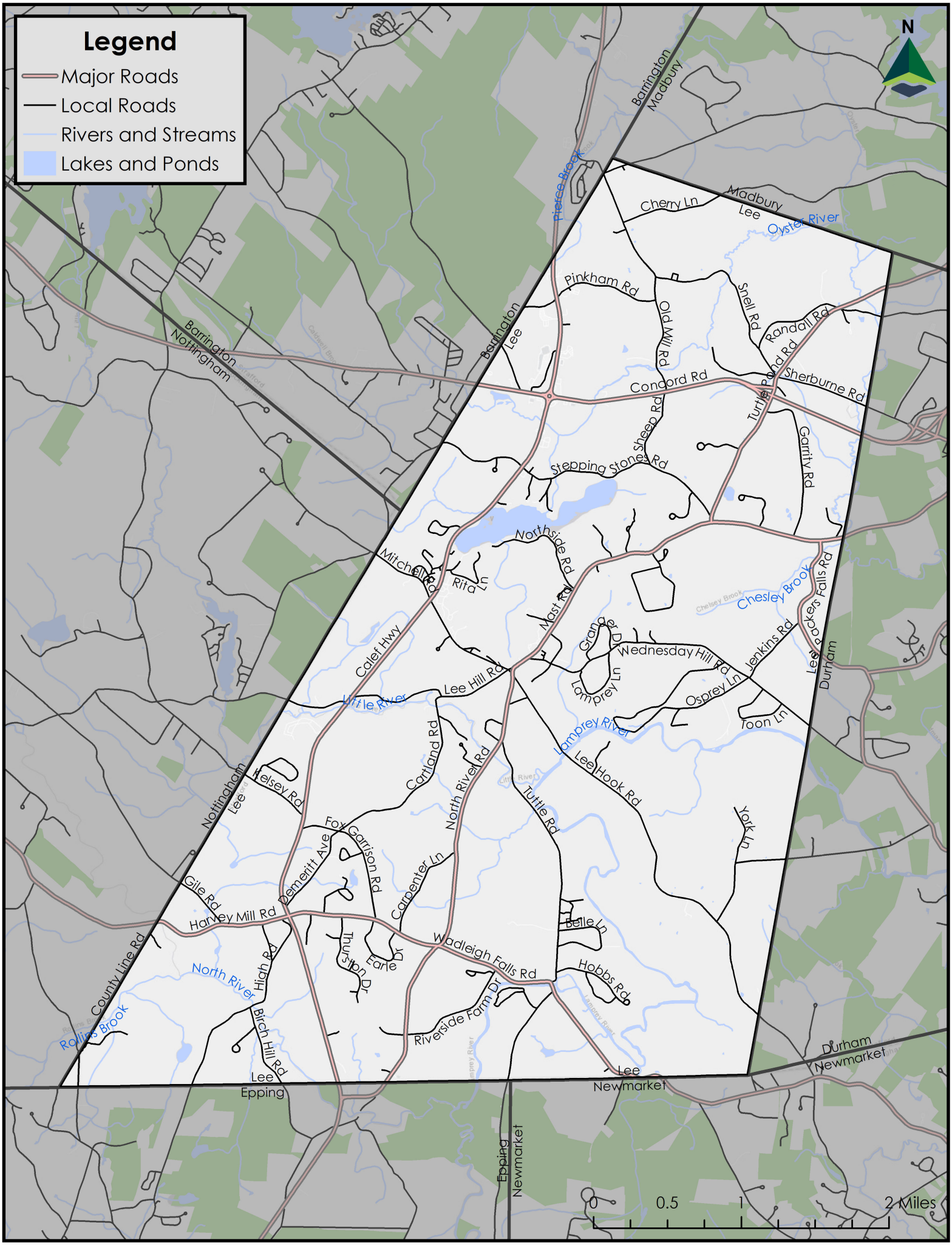
APPENDIX B

Maps

1. Locus Map
2. Watersheds
3. Water Resources
4. Drinking Water
5. Soil Drainage
6. Wildlife Action Plan Habitat Landcover
7. Wildlife Action Plan Tiers
8. Connect the Coast Habitat & Corridors
9. Conservation Focus Areas
10. Agricultural & Forest Lands
11. Steep Slopes
12. Conservation Lands
13. Recreation Lands
14. Co-occurrence Map
15. Co-occurrence Conservation Map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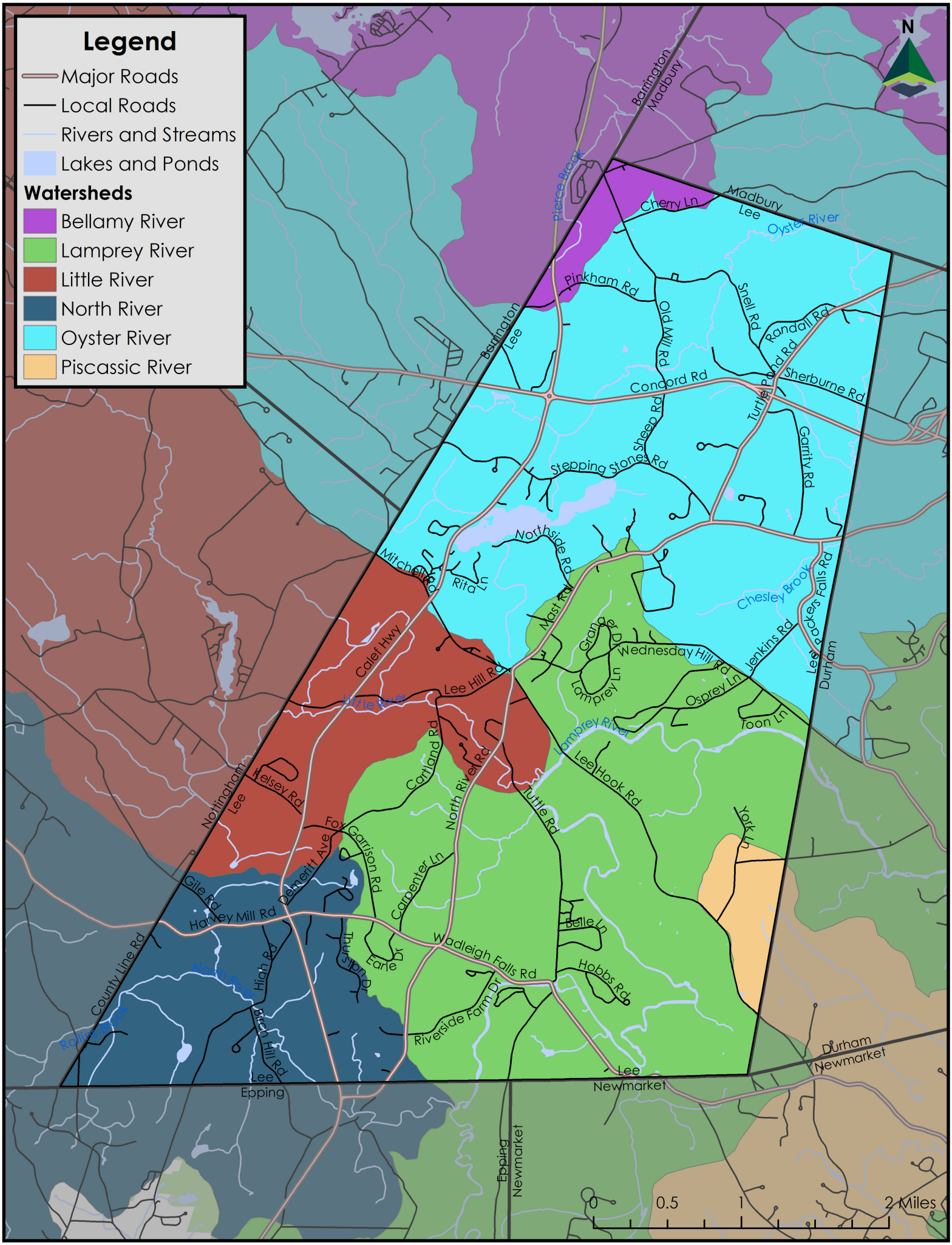
Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
Barrington
Nottingham
Concord Rd
Turtle Pond Rd
Sherburne Rd
Sheep Rd
Stepping Stones Rd
Garrity Rd
Northside Rd
Mitchell Rd
Rita Ln
Mast Rd
Chesley Brook
Lee Packers Falls Rd
Durham
Grange Dr
Wednesday Hill Rd
Jenkins Rd
Calef Hwy
Lee Hill Rd
Lamprey Ln
Osprey Ln
Toon Ln
Little River
Lamprey River
Cartland Rd
North River Rd
Lee Hook Rd
Nottingham
Lee
Kelsey Rd
Tuttle Rd
York Ln
Fox
Demeritt Ave
Garrison Rd
Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
Hobbs Rd
County Line Rd
North River
High Rd
Thurston Dr
Earle Dr
Rollins Brook
Birch Hill Rd
Riverside Farm Dr
Lee
Epping
Lee
Newmarket
Durham
Newmarket
Epping
Newmarket
0
0.5
1
2 Miles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Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Watersheds
Bellamy River
Lamprey River
Little River
North River
Oyster River
Piscassic River
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
Concord Rd
Turtle Pond Rd
Sherburne Rd
Sheep Rd
Garrity Rd
Stepping Stones Rd
Northside Rd
Mitchell Rd
Rita Ln
Mast Rd
Chesley Brook
Jackers Falls Rd
Lee
Durham
Grange Dr
Wednesday Hill Rd
Jenkins Rd
Calef Hwy
Lee Hill Rd
Lamprey Ln
Osprey Ln
Toon Ln
Little River
Lamprey River
Cartland Rd
North River Rd
Lee Hook Rd
Nottingham
Lee
Kelsey Rd
Tuttle Rd
York Ln
Fox
Garrison Rd
Cemetery Ave
Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
Hobbs Rd
Earle Dr
Thurston Dr
County Line Rd
North River
High Rd
Rollins Brook
Birch Hill Rd
Riverside Farm Dr
Lee
Epping
Lee
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Durham
Newmarket
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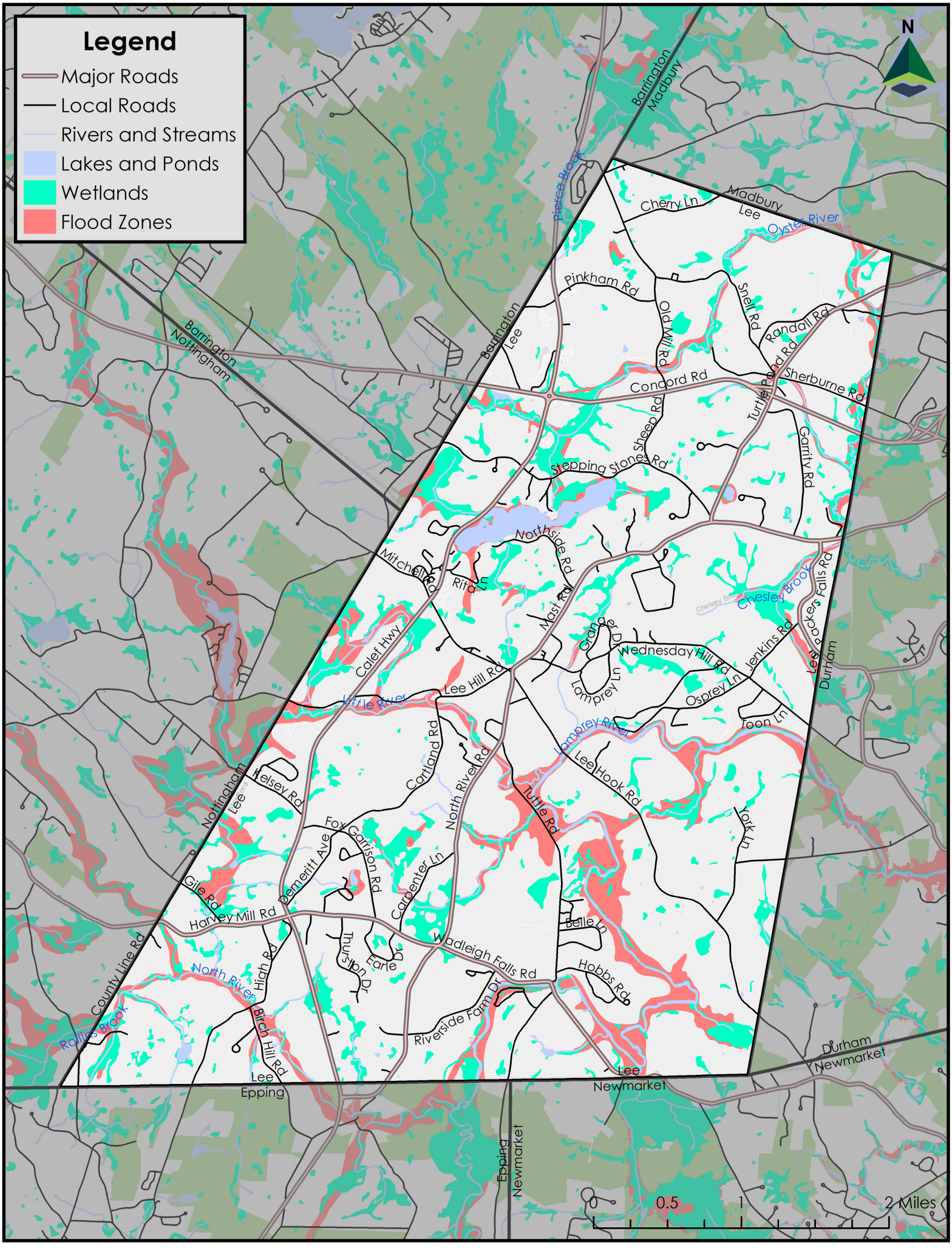
Legend
Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Wetlands
Flood Zones
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
Barrington
Nottingham
Concord Rd
Turtle Pond Rd
Sherburne Rd
Stepping Stones Rd
Garrity Rd
Northside Rd
Mitchell Rd
Rita Ln
Chesley Brook
Mast Rd
Grange Dr
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Jenkins Rd
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Lee Hill Rd
Little River
Lamprey Ln
Osprey Ln
Toon Ln
Lamprey River
Cartland Rd
North River Rd
Lee Hook Rd
Nottingham
Lee
Kelsey Rd
Turtle Rd
York Ln
Fox
Demeritt Ave
Garrison Rd
Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Thurston Dr
Earle Dr
Wadleigh Falls Rd
County Line Rd
High Rd
Hobbs Rd
North River
Riverside Farm Dr
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Birch Hill Rd
Lee
Epping
Durham
Newmarket
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0.5
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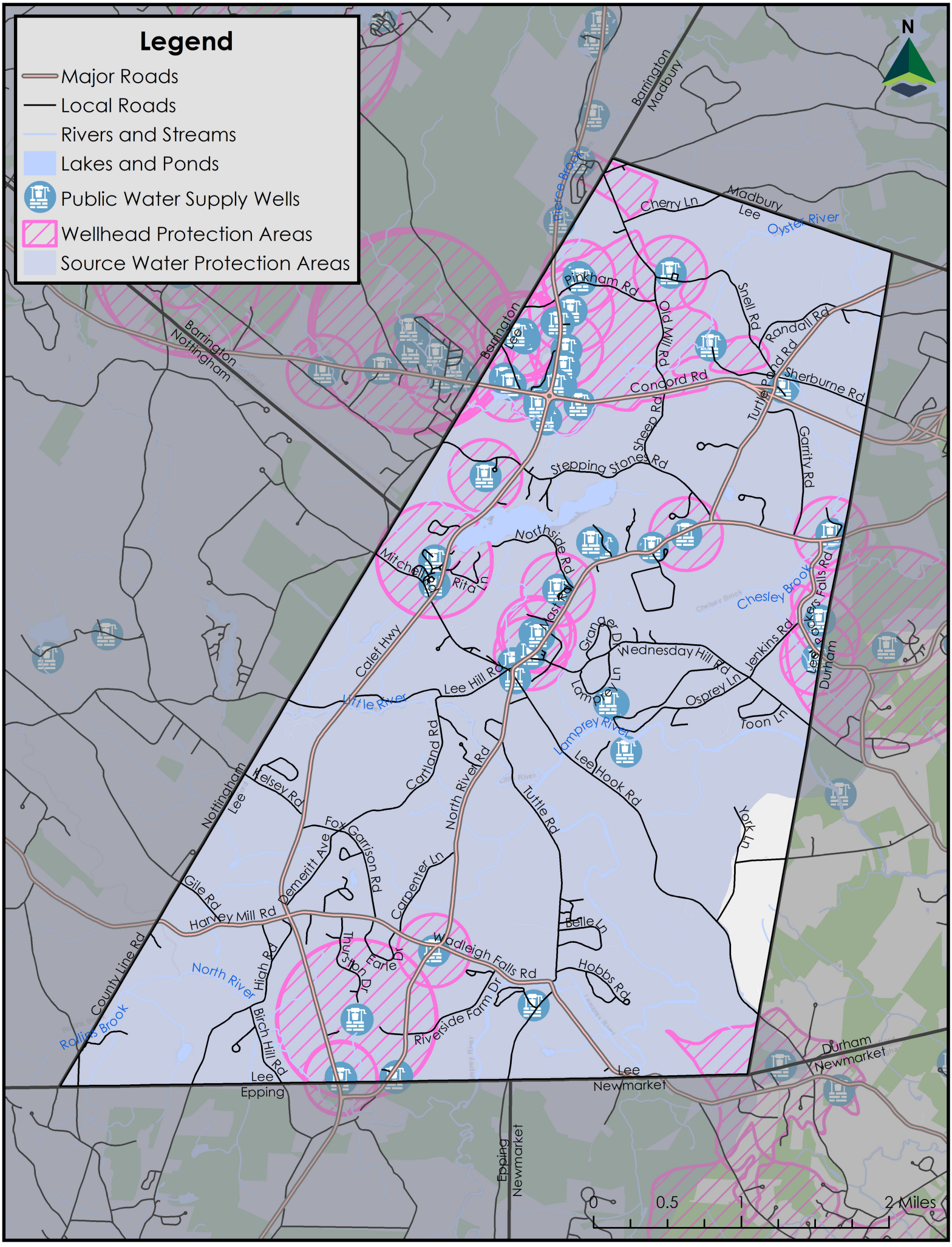
2 Miles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Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Public Water Supply Wells
Wellhead Protection Areas
Source Water Protection Areas
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Barrington
Madbury
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Nottingham
Barrington
Lee
Concord Rd
Turtle Pond Rd
Sherburne Rd
Sheep Rd
Garrity Rd
Stepping Stones Rd
Northside Rd
Mitchell Rd
Rita Ln
West Rd
Chesley Brook
Lee Corners Falls Rd
Durham
Calef Hwy
Grange Dr
Wednesday Hill Rd
Jenkins Rd
Lee Hill Rd
Little River
Lamprey Ln
Osprey Ln
Toon Ln
Lamprey River
Cartland Rd
North River Rd
Lee Hook Rd
Nottingham
Lee
Kelsey Rd
Tuttle Rd
York Ln
Fox Garrison Rd
Demeritt Ave
Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
Hobbs Rd
County Line Rd
North River
High Rd
Thurston Dr
Farley
Rollins Brook
Birch Hill Rd
Riverside Farm Dr
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Epping
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Newmarket
Durham
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Epping
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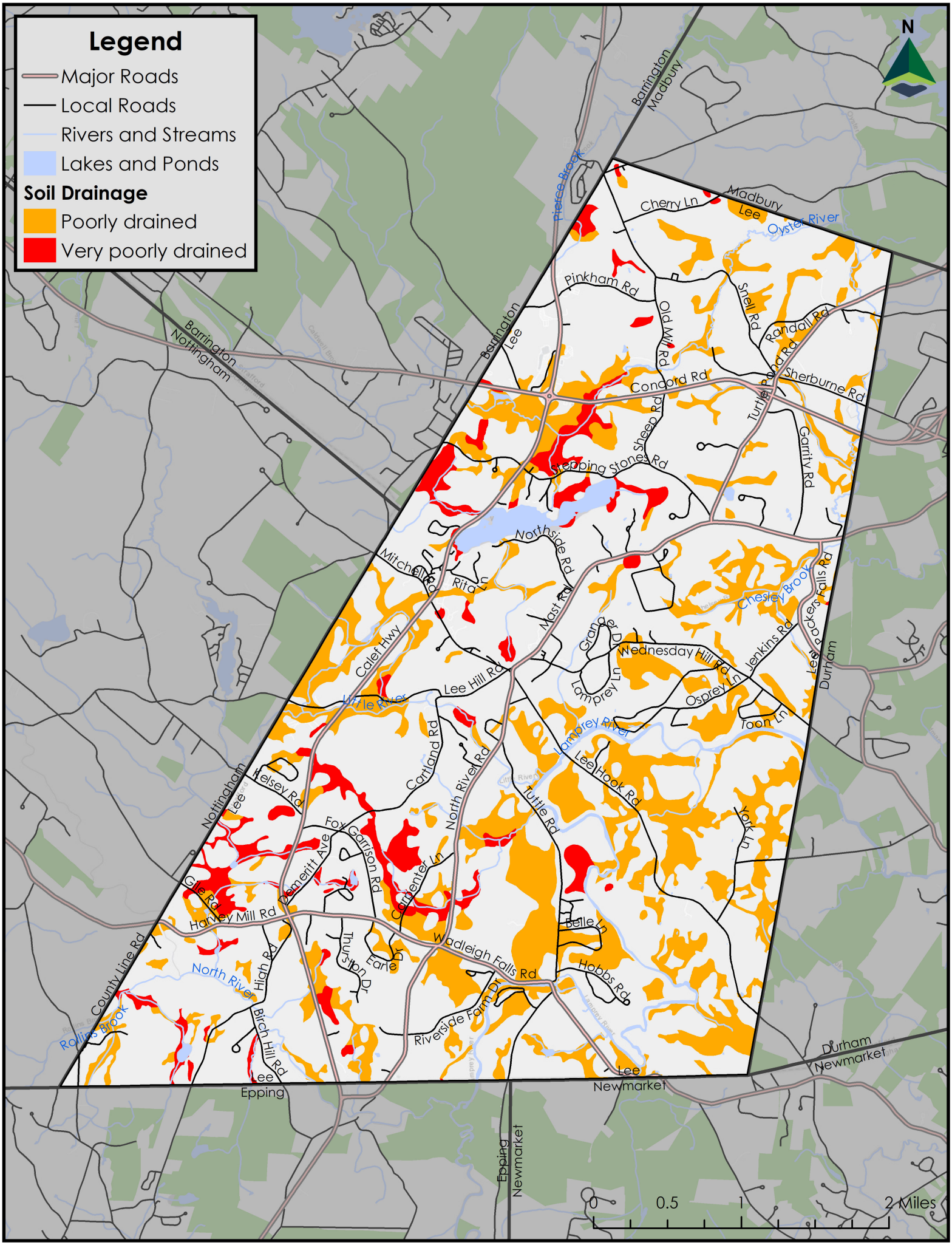
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Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Soil Drainage
Poorly drained
Very poorly drained
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
Barrington
Nottingham
Concord Rd
Turtle Pond Rd
Sherburne Rd
Stepping Stones Rd
Garrity Rd
Northside Rd
Mitchell Rd
Rita Ln
Mast Rd
Chesley Brook
Calef Hwy
Grange Dr
Wednesday Hill Rd
Jenkins Rd
Lee Packers Falls Rd
Durham
Lee Hill Rd
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Little River
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Cartland Rd
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Kelsey Rd
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Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
Hobbs Rd
County Line Rd
High Rd
Thurston Dr
Earle Dr
North River
Rollins Brook
Birch Hill Rd
Riverside Farm Dr
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Epping
Lee
Newmarket
Durham
Newmarket
Epping
Newmarket
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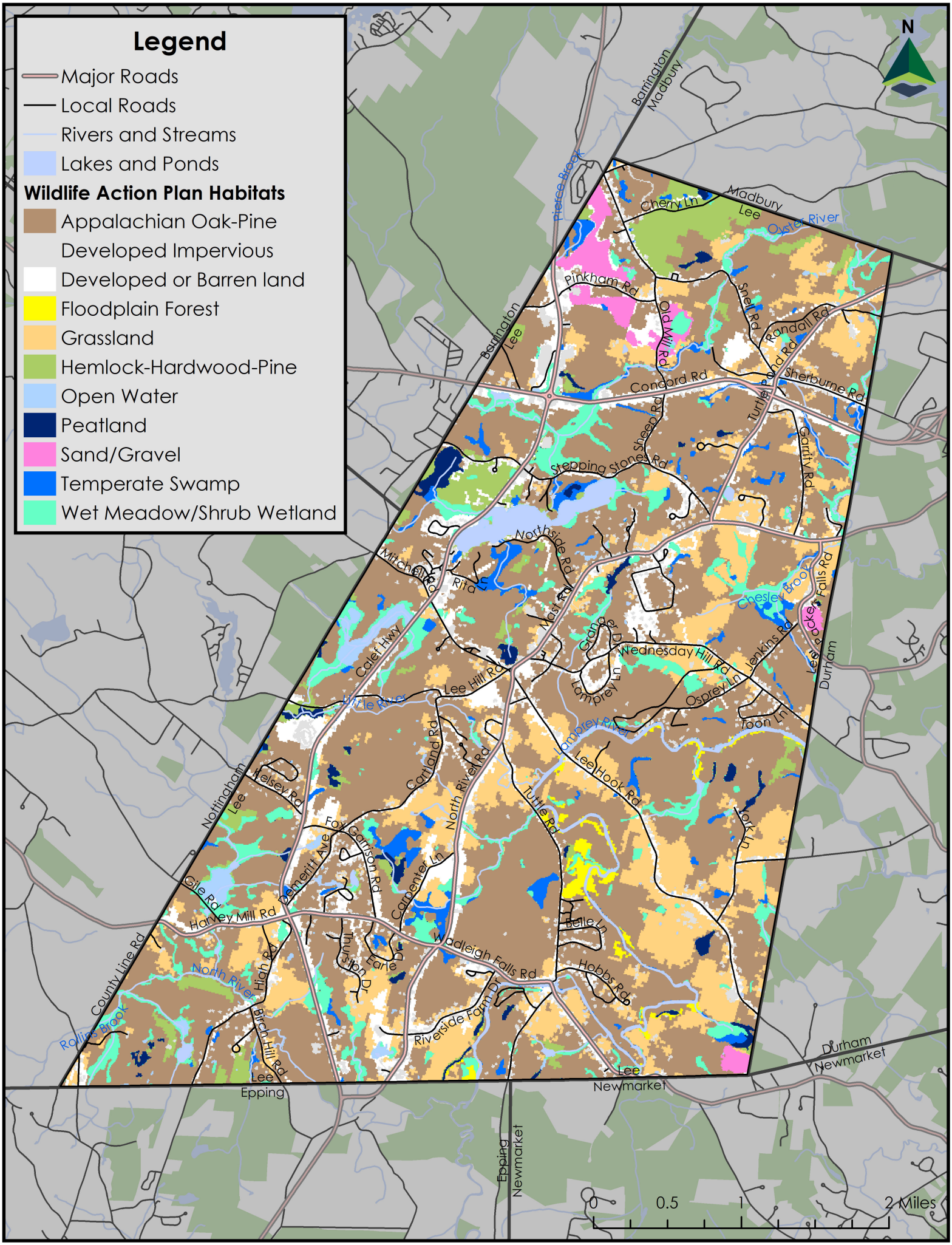
2 Miles


Legend
Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Wildlife Action Plan Habitats
Appalachian Oak-Pine
Developed Impervious
Developed or Barren land
Floodplain Forest
Grassland
Hemlock-Hardwood-Pine
Open Water
Peatland
Sand/Gravel
Temperate Swamp
Wet Meadow/Shrub Wetland
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
Concord Rd
Turtle Pond Rd
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Grange Dr
Wednesday Hill Rd
Jenkins Rd
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Lee Hill Rd
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Osprey Ln
Toon Ln
Lamprey River
Cartland Rd
North River Rd
Tuttle Rd
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York Ln
Nottingham
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Kelsey Rd
Fox Garrison Rd
Deneritt Ave
Carpenter Ln
Gile Rd
Harvey Mill Rd
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Belle Ln
Hobbs Rd
County Line Rd
High Rd
Thurston Dr
Farle Dr
North River
Rollins Brook
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Durham
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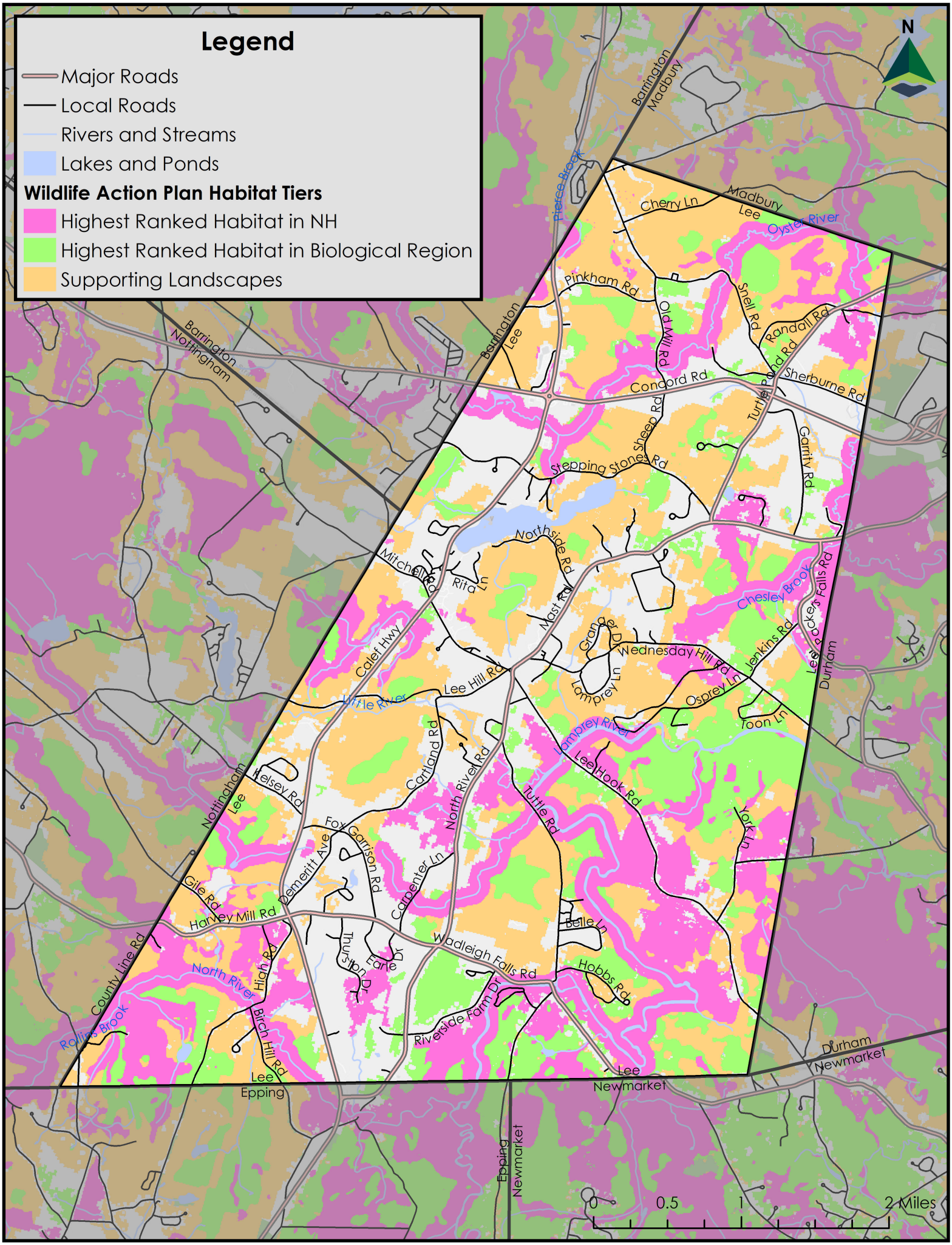
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Local Roads
Rivers and Streams
Lakes and Ponds
Wildlife Action Plan Habitat Tiers
Highest Ranked Habitat in NH
Highest Ranked Habitat in Biological Region
Supporting Landscapes
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
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Nottingham
Concord Rd
Turtle Pond Rd
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Garrity Rd
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Leavitt Falls Rd
Durham
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Grange Dr
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Lamprey Ln
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Toon Ln
Little River
Lamprey River
Cartland Rd
North River Rd
Lee Hook Rd
Nottingham
Lee
Kelsey Rd
Tuttle Rd
York Ln
Fox Garrison Rd
Demeritt Ave
Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Thurston Dr
Earle Dr
Wadleigh Falls Rd
Hobbs Rd
County Line Rd
High Rd
North River
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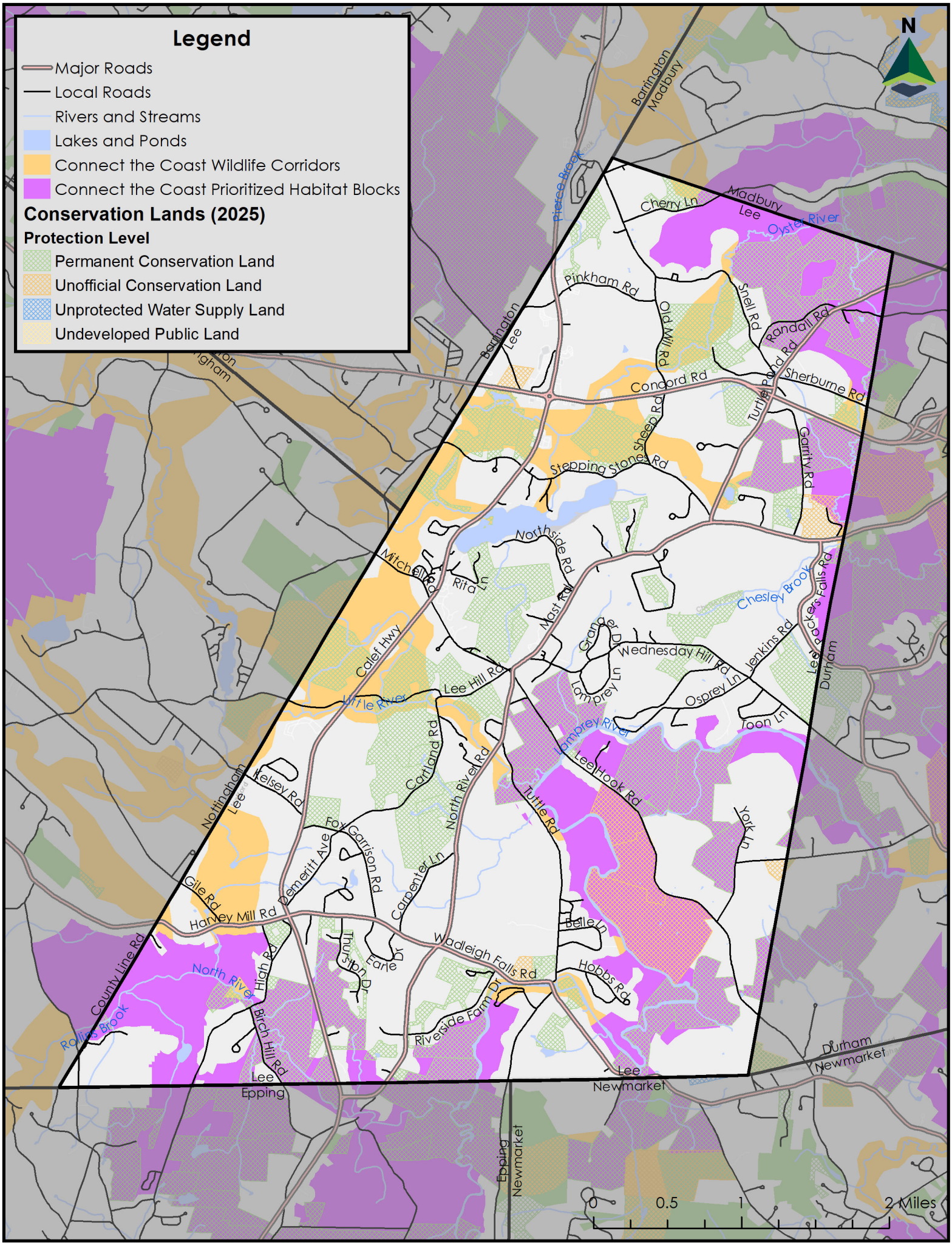
Legend
Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Connect the Coast Wildlife Corridors
Connect the Coast Prioritized Habitat Blocks
Conservation Lands (2025)
Protection Level
Permanent Conservation Land
Unofficial Conservation Land
Unprotected Water Supply Land
Undeveloped Public Land
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Turtle Pond Rd
Sherburne Rd
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Calef Hwy
Grange Dr
Wednesday Hill Rd
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Lamprey River
Cartland Rd
North River Rd
Lee Hook Rd
Tuttle Rd
York Ln
Nottingham
Lee
Kelsey Rd
Fox Garrison Rd
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Carpenter Ln
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Wadleigh Falls Rd
Hobbs Rd
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High Rd
Thurston Dr
Earle Dr
North River
Rollins Brook
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Newmarket
Durham
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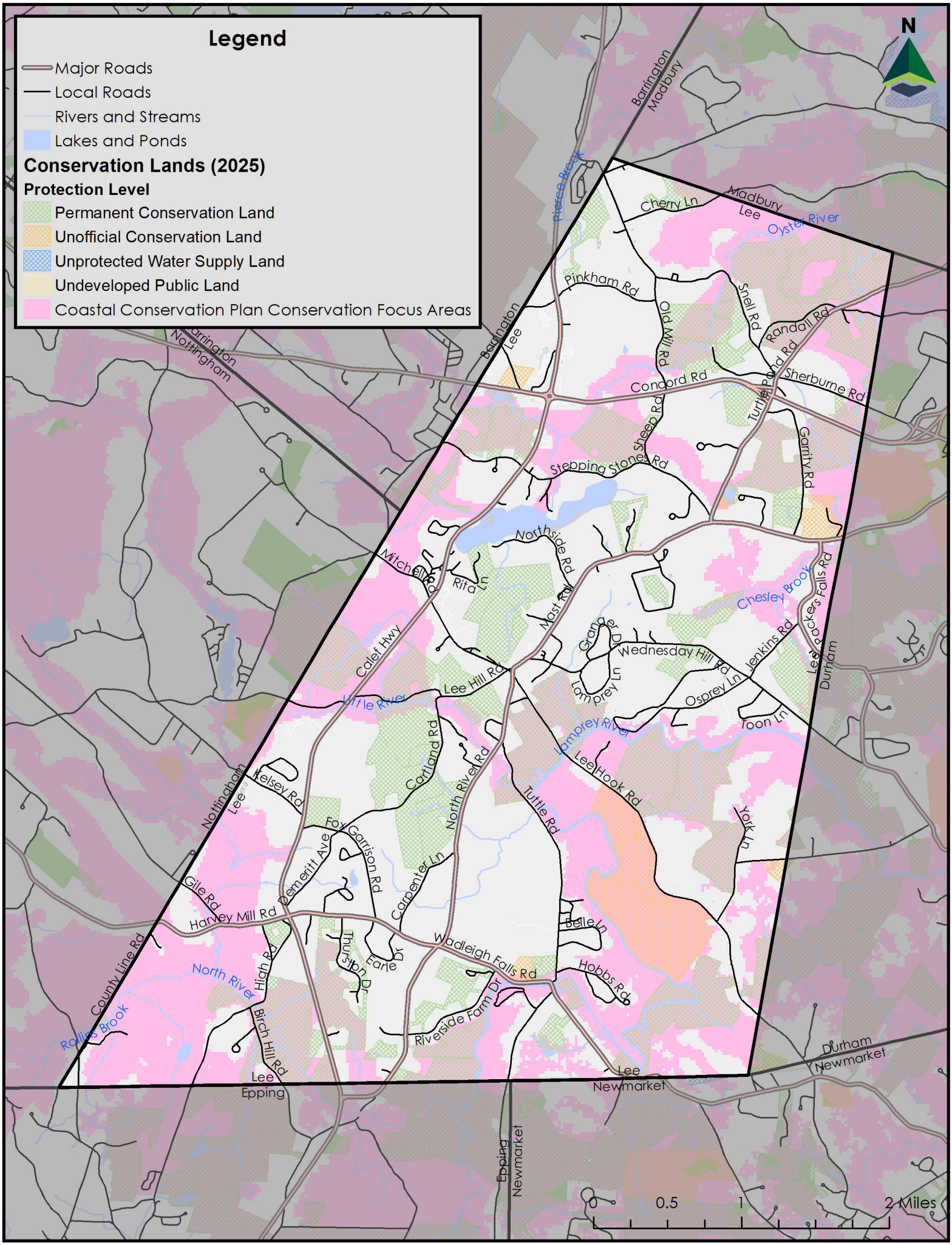
Legend
Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Conservation Lands (2025)
Protection Level
Permanent Conservation Land
Unofficial Conservation Land
Unprotected Water Supply Land
Undeveloped Public Land
Coastal Conservation Plan Conservation Focus Areas
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Turtle Pond Rd
Sherburne Rd
Barrington
Lee
Concord Rd
Barrington
Nottingham
Sheep Rd
Stepping Stones Rd
Garrity Rd
Northside Rd
Mitchell Rd
Rita Ln
Mast Rd
Chesley Brook
Packers Falls Rd
Durham
Lee
Calef Hwy
Granger Dr
Wednesday Hill Rd
Jenkins Rd
Lee Hill Rd
Little River
Lamprey Ln
Osprey Ln
Toon Ln
Lamprey River
Cartland Rd
North River Rd
Lee Hook Rd
Tuttle Rd
York Ln
Nottingham
Lee
Kelsey Rd
Fox
Demeritt Ave
Garrison Rd
Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
Hobbs Rd
County Line Rd
High Rd
Thurston Dr
Earle Dr
North River
Riverside Farm Dr
Rollins Brook
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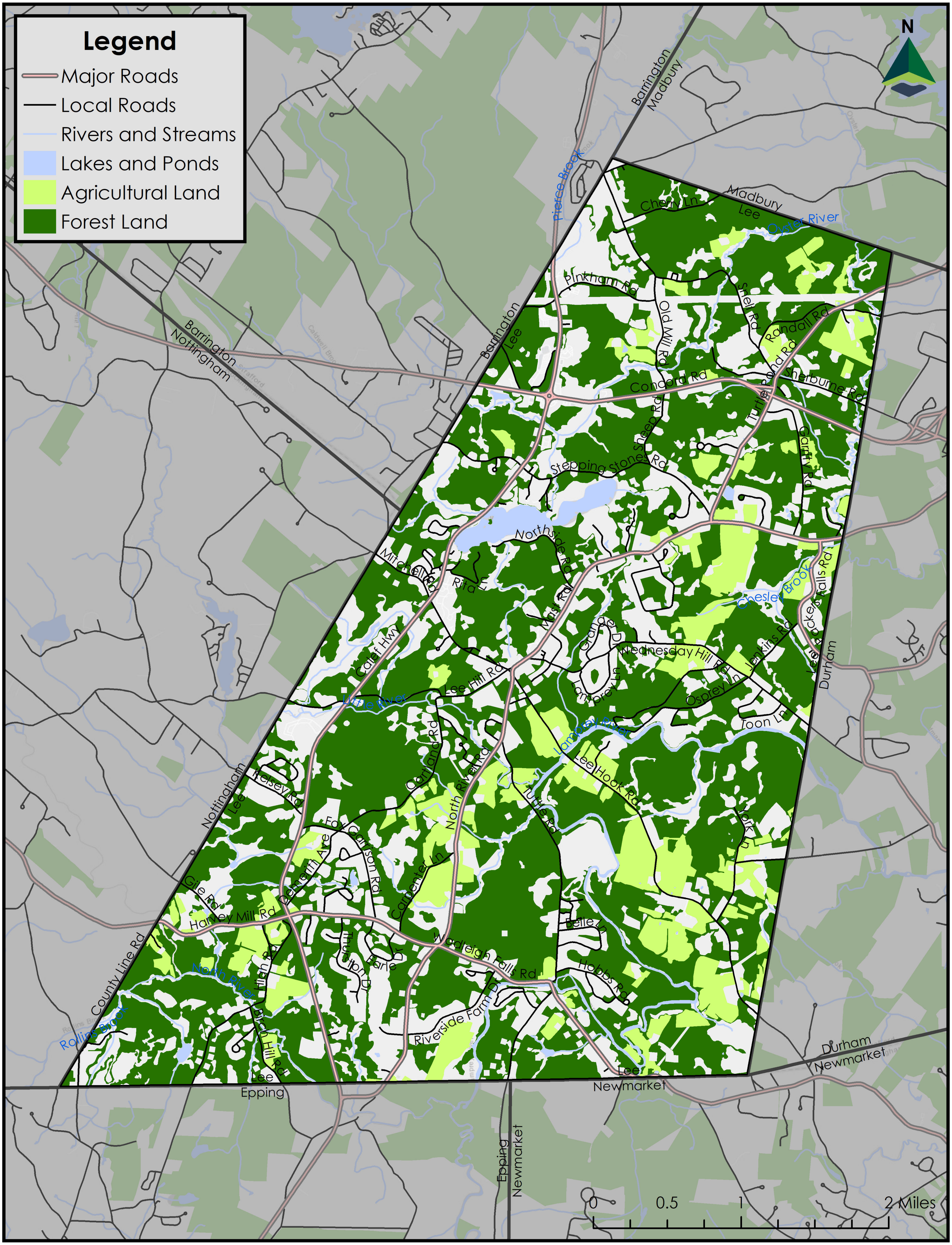
Legend
Major Roads
Local Roads
Rivers and Streams
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Forest Land
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Madbury
Pierce Brook
Madbury
Lee
Oyster River
Cherry Ln
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Nottingham
Barrington
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Turtle Pond Rd
Sheep Rd
Garrity Rd
Stepping Stones Rd
Northside Rd
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Mast Rd
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Wednesday Hill Rd
Grange Dr
Lamprey Ln
Jenkins Rd
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Demeritt Ave
Carpenter Ln
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Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
Hobbs Rd
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North River
High Rd
Birch Hill Rd
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Rollins Brook
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Lee
Newmarket
Durham
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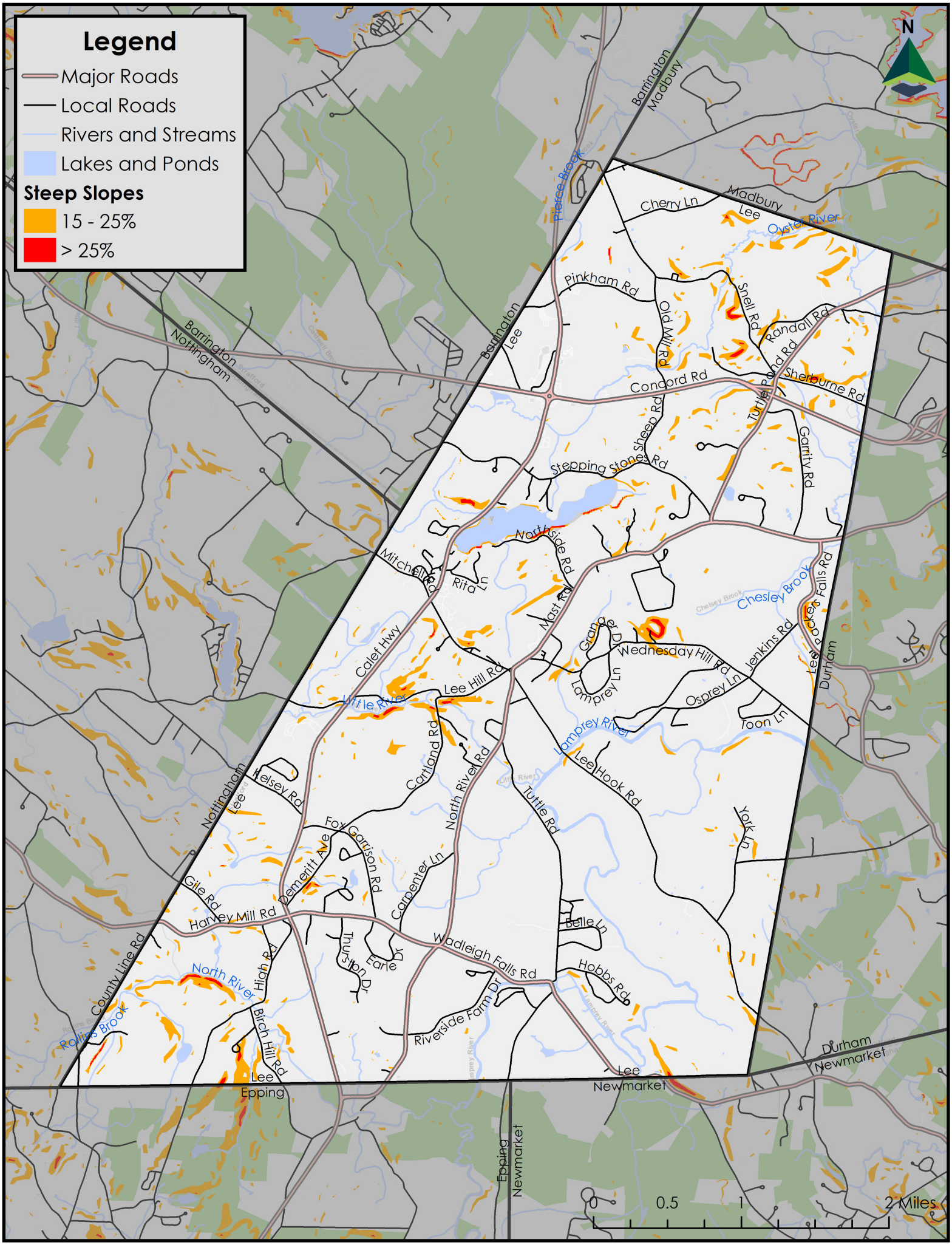
Legend
Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Steep Slopes
15 - 25%
> 25%
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
Barrington
Nottingham
Concord Rd
Turtle Pond Rd
Sherburne Rd
Stepping Stones Rd
Garrity Rd
Northside Rd
Mitchell Rd
Rita Ln
Mast Rd
Chesley Brook
Falls Rd
Grange Dr
Wednesday Hill Rd
Jenkins Rd
Calef Hwy
Lee Hill Rd
Little River
Lamprey Ln
Osprey Ln
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Durham
Toon Ln
Lamprey River
Cartland Rd
North River Rd
Lee Hook Rd
Nottingham
Lee
Kelsey Rd
Tuttle Rd
York Ln
Fox
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Garrison Rd
Carpenter Ln
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Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
Thurston Dr
Earle Dr
Hobbs Rd
County Line Rd
High Rd
North River
Riverside Farm Dr
Rollins Brook
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Newmarket
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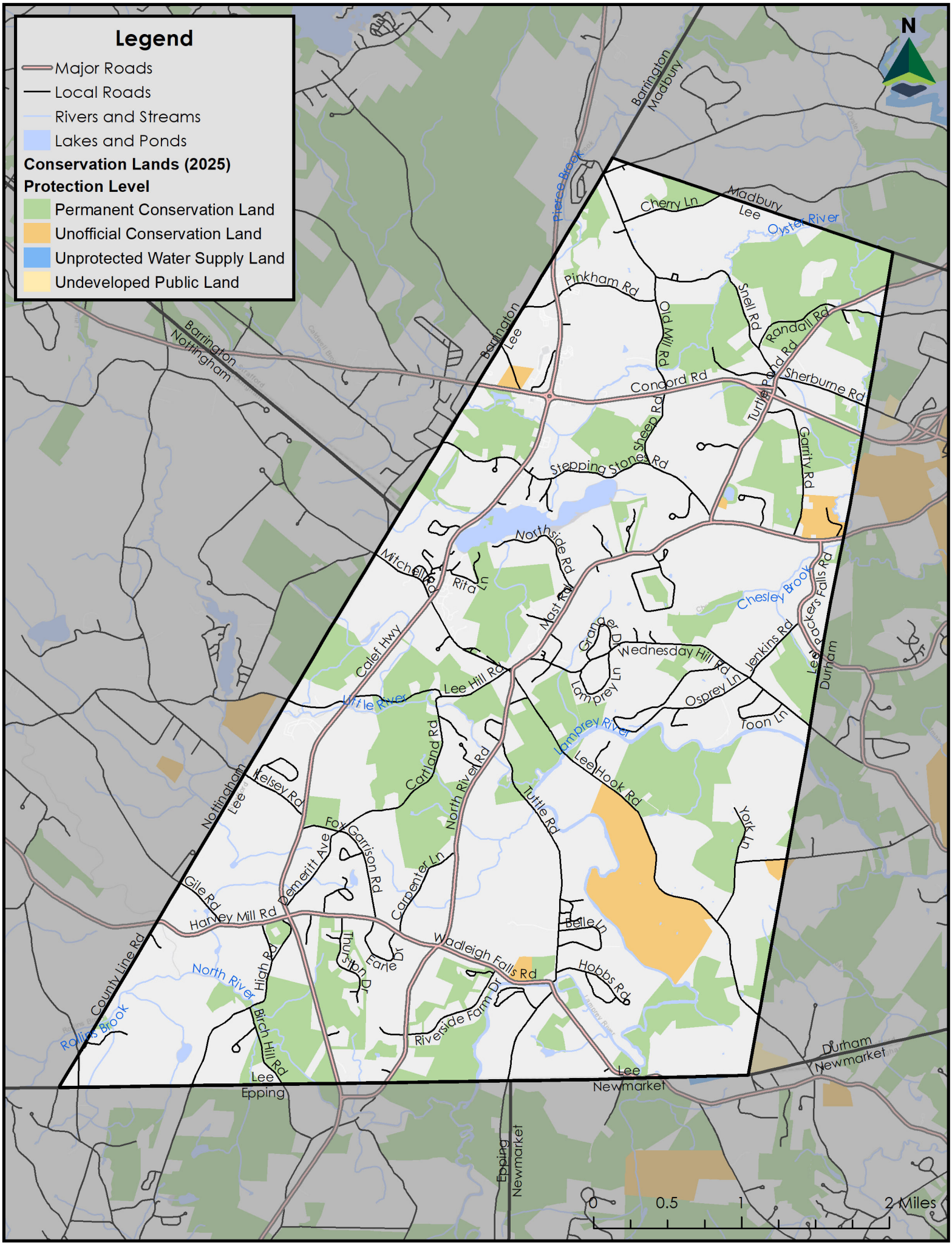
2 Miles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Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Conservation Lands (2025)
Protection Level
Permanent Conservation Land
Unofficial Conservation Land
Unprotected Water Supply Land
Undeveloped Public Land
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
Concord Rd
Turtle Pond Rd
Sherburne Rd
Barrington
Nottingham
Sheep Rd
Stepping Stones Rd
Garrity Rd
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Rita Ln
Mast Rd
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Jenkins Rd
Packers Falls Rd
Lee
Durham
Lee Hill Rd
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Lamprey Ln
Osprey Ln
Toon Ln
Lamprey River
Cartland Rd
North River Rd
Lee Hook Rd
Nottingham
Lee
Kelsey Rd
Tuttle Rd
York Ln
Fox
Demeritt Ave
Garrison Rd
Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
County Line Rd
North River
High Rd
Thurston Dr
Earle Dr
Hobbs Rd
Rollins Brook
Birch Hill Rd
Riverside Farm Dr
Lee
Epping
Lee
Newmarket
Durham
Newmarket
Epping
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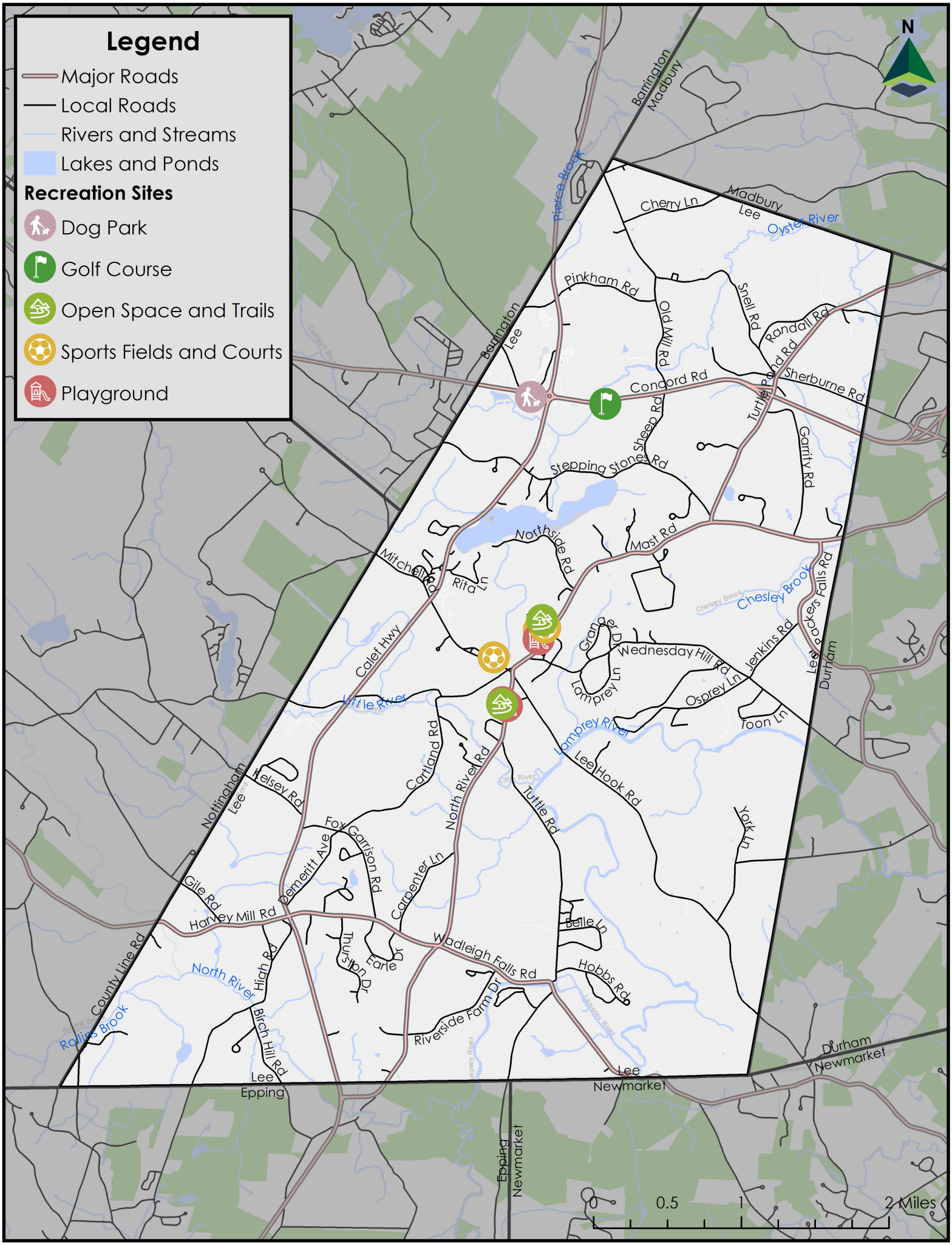
Legend
Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
Recreation Sites
Dog Park
Golf Course
Open Space and Trails
Sports Fields and Courts
Playground
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
Concord Rd
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Sheep Rd
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Stepping Stones Rd
Northside Rd
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Durham
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Grange Dr
Wednesday Hill Rd
Jenkins Rd
Lamprey Ln
Osprey Ln
Toon Ln
Little River
Lamprey River
Cartland Rd
North River Rd
Lee
Hook Rd
Tuttle Rd
York Ln
Nottingham
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Kelsey Rd
Fox
Garrison Rd
Demeritt Ave
Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
Hobbs Rd
County Line Rd
North River
High Rd
Thurston Dr
Earle Dr
Rollins Brook
Birch Hill Rd
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Newmarket
Durham
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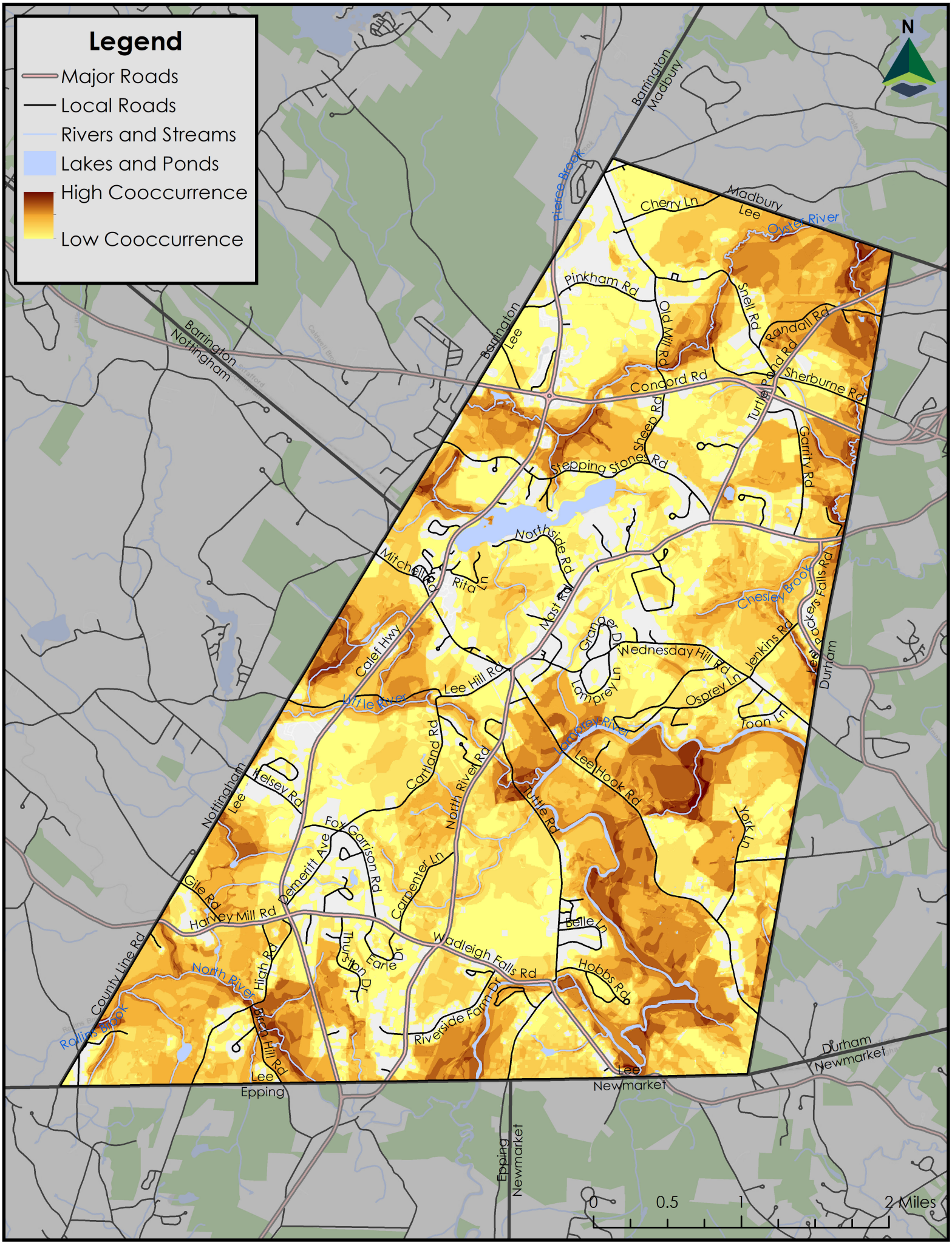
Legend
Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
High Cooccurrence
Low Cooccurrence
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
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Barrington
Nottingham
Concord Rd
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Cartland Rd
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Lee Hook Rd
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Kelsey Rd
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Garrison Rd
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Carpenter Ln
Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
County Line Rd
Thurston Dr
Earle Dr
High Rd
Hobbs Rd
North River
Rollins Brook
Birch Hill Rd
Riverside Farm Dr
Lee
Epping
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Newmarket
Durham
Newmarket
Epping
Newmarket
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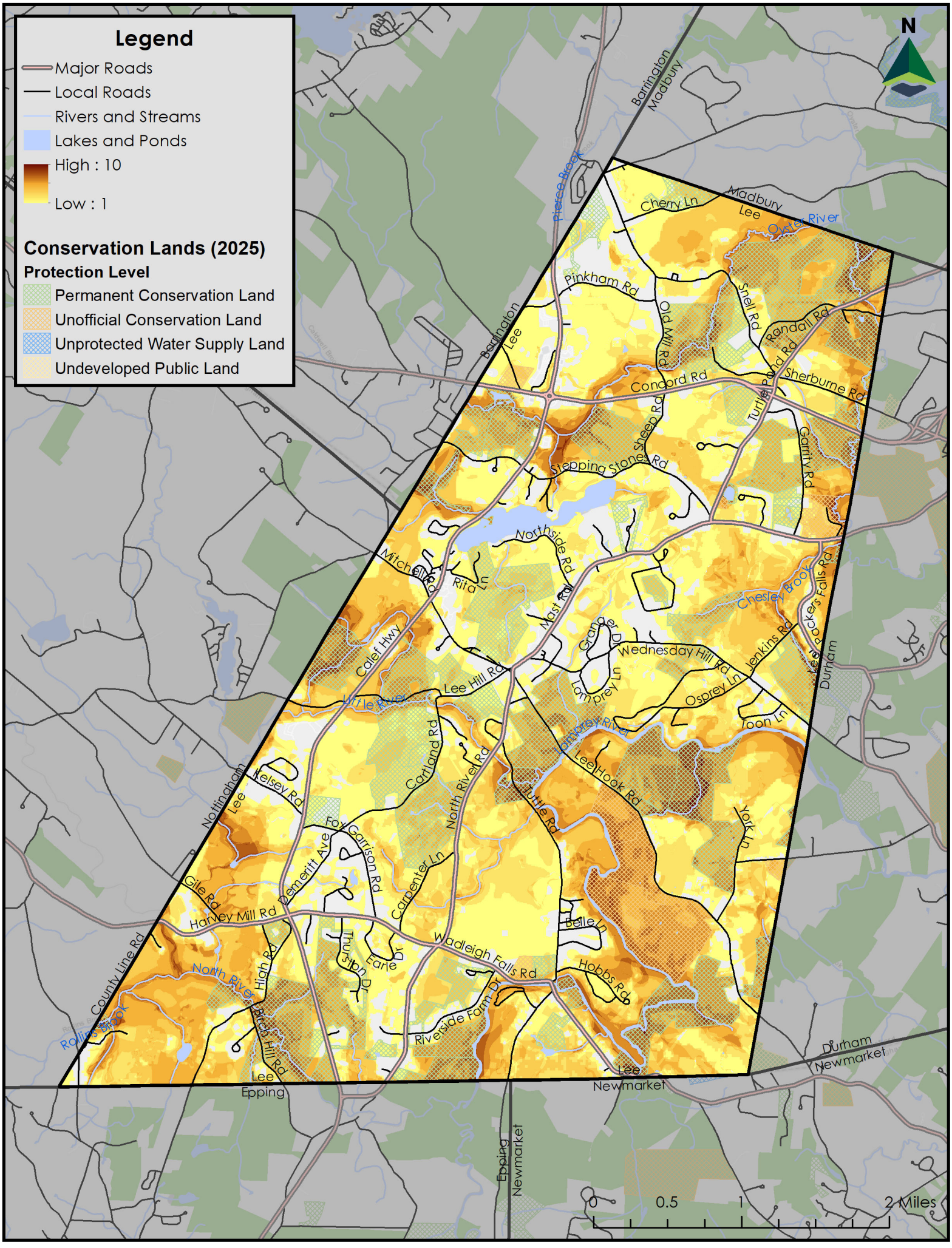
1
2 Miles


Legend
Major Roads
Local Roads
Rivers and Streams
Lakes and Ponds
High : 10
Low : 1
Conservation Lands (2025)
Protection Level
Permanent Conservation Land
Unofficial Conservation Land
Unprotected Water Supply Land
Undeveloped Public Land
N
Barrington
Madbury
Pierce Brook
Cherry Ln
Madbury
Lee
Oyster River
Pinkham Rd
Old Mill Rd
Snell Rd
Randall Rd
Barrington
Lee
Concord Rd
Turtle Pond Rd
Sherburne Rd
Stepping Stones Rd
Sheep Rd
Garrity Rd
Northside Rd
Mitchell Rd
Rita Ln
Mast Rd
Chesley Brook
Jackers Falls Rd
Durham
Calef Hwy
Granger Dr
Wednesday Hill Rd
Jenkins Rd
Lee Hill Rd
Lamprey Ln
Osprey Ln
Little River
Toon Ln
Pinkerton River
Lee
Hook Rd
Cartland Rd
North River Rd
Little Rd
York Ln
Nottingham
Kelsey Rd
Fox
Garrison Rd
Demeritt Ave
Carpenter Ln
Gile Rd
Harvey Mill Rd
Belle Ln
Wadleigh Falls Rd
Thurston Dr
Earle Dr
Hobbs Rd
County Line Rd
High Rd
North River
Birch Hill Rd
Riverside Farm Dr
Rollins Brook
Lee
Epping
Lee
Newmarket
Durham
Newmarket
Epping
Newmarket
0
0.5
1
2 Miles

APPENDIX C

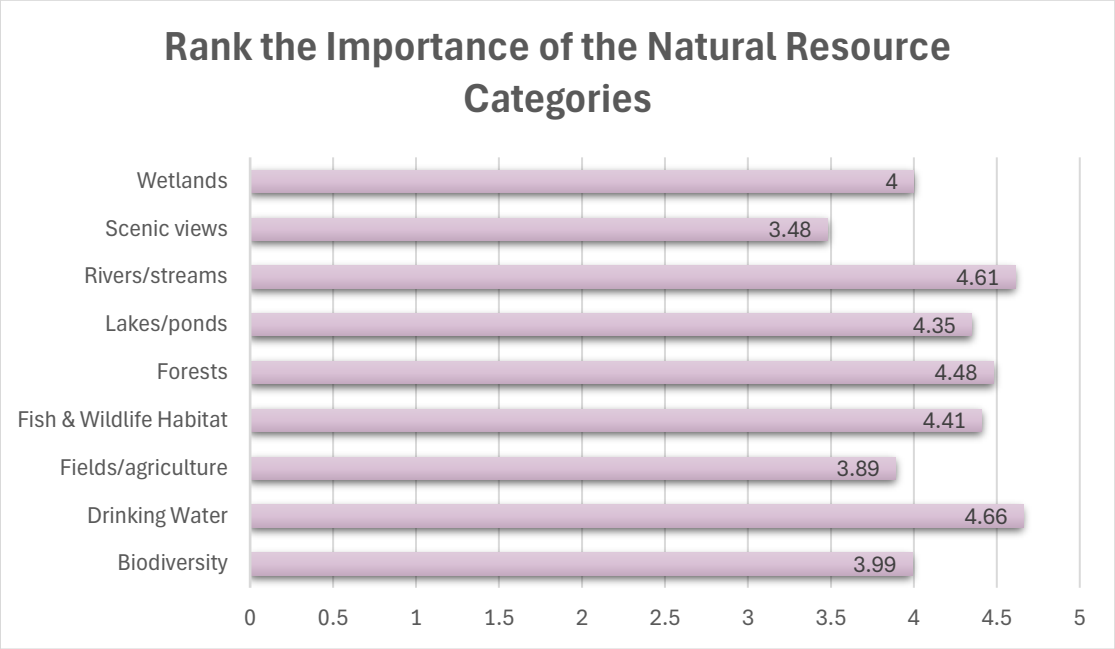
Community Survey Results

Community Workshop Findings – April 2024

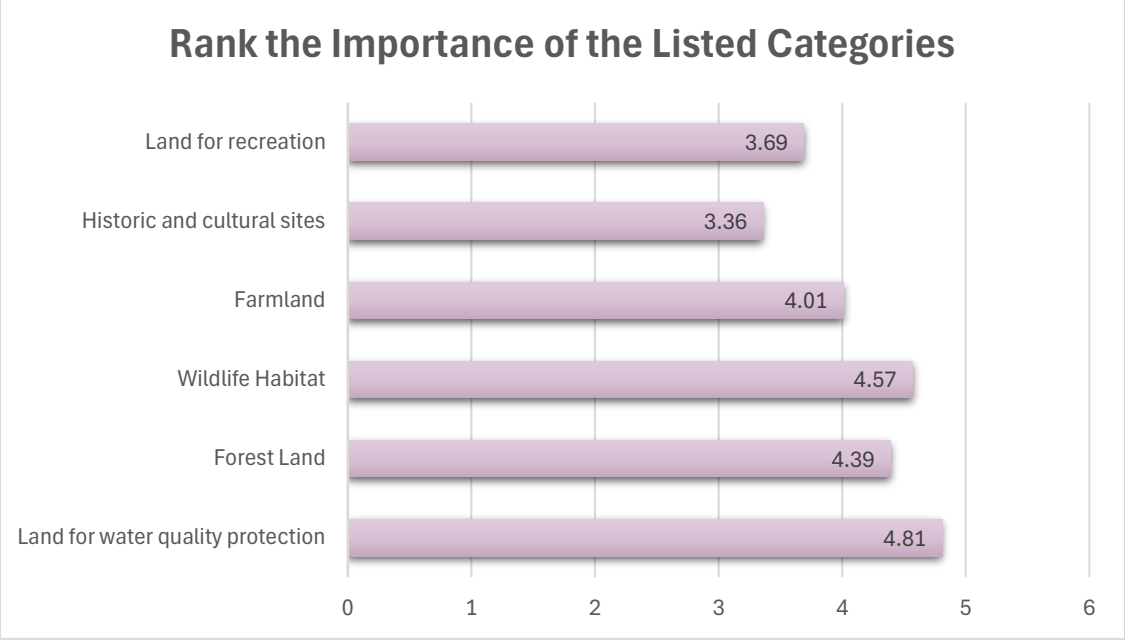
Community Survey Results

The following charts display the results of the Community Survey that was conducted during March and April. There were 103 responses collected.

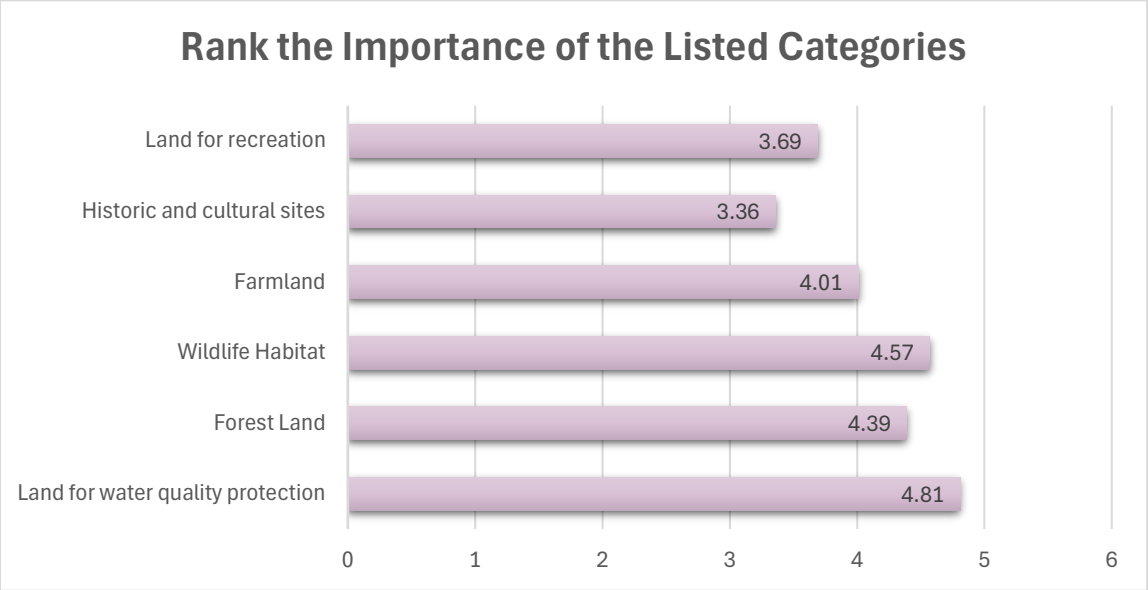
Question 1: Please rank the importance of the following natural resources to you using a 1 - 5 scale with 5 being the most important.



Question 2: Please rank the importance of the following categories to you using a 1 - 5 scale with 5 being the most important.



Question 3: Please rank the importance of the following short term (5 years) priorities using a 1 - 5 scale with 5 being the most important.



Question 4: What is your favorite outdoor space?

The results are listed from the most responses to least responses.

Town Forest- lllllllllllllllllllllllll

My backyard/gardens- lllllllll

Lamprey River- lllllllllll

Maud Jones Trails- llllllll

Little River and Park- llllllll

Trails- lllllll

Forests- llllll

Wheelwright Pond- lllll

Carland Road- lllll

Bedrock Gardens- lllll

Country Roads- llll

Open Fields- lll

Farms- lll

Lakes & Ponds- lll

Mast Way Trails- lll

Lee Hook Road- lll

Wednesday Hill Roads- ll

Tuttle Road- ll

Forests near the end of High Road- ll

James Farm Road- l

Spruce Hole/Oyster River Forest- l

North River- l

Durgin Preserve- l

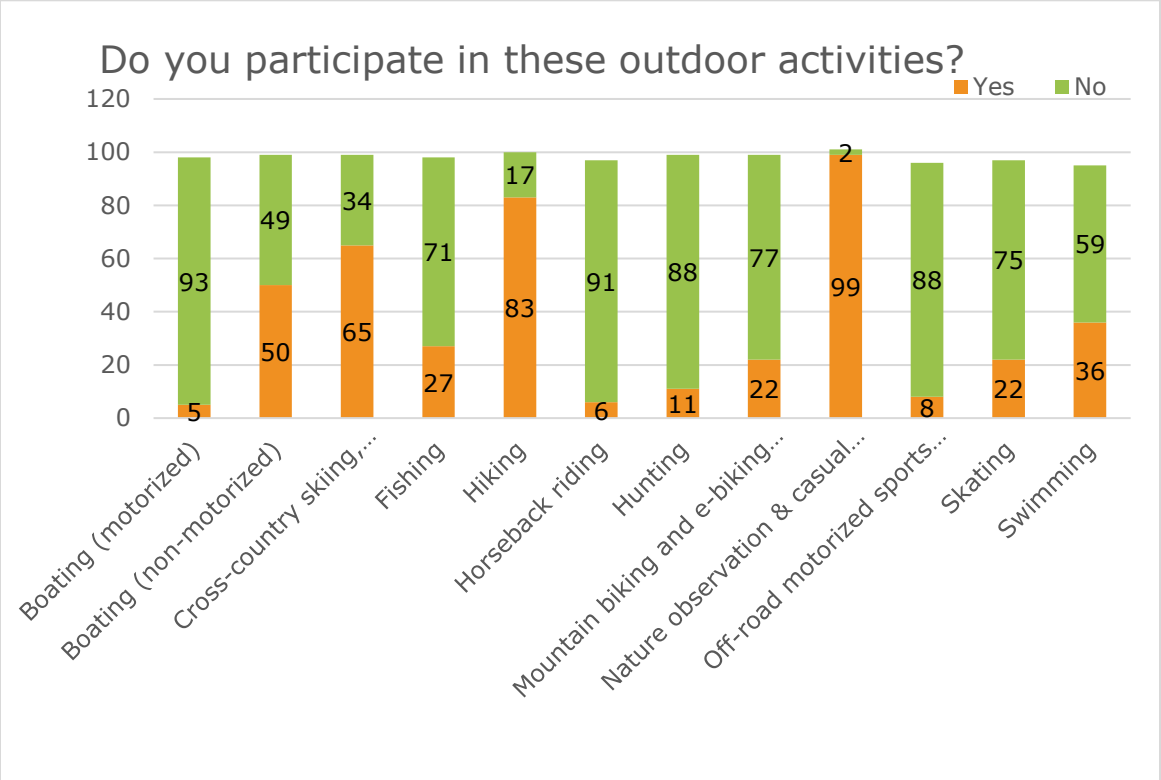
Canoe Launch off of Rita Lane- l

SELT Trails- l

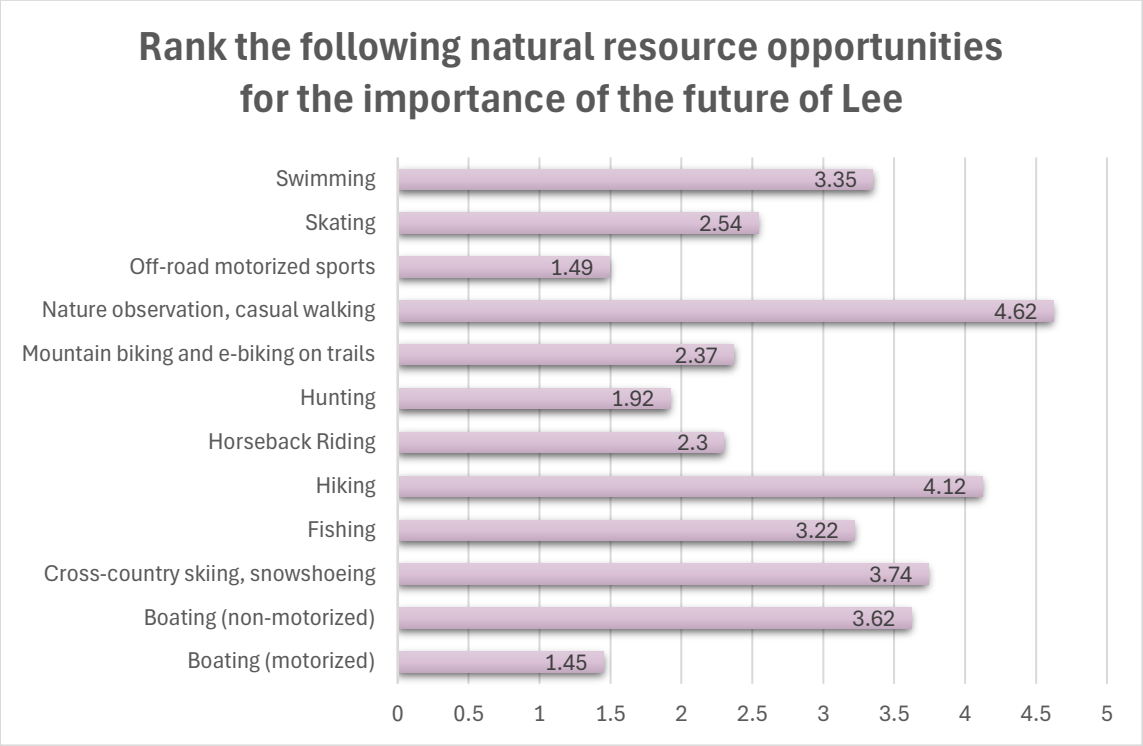
Lee Park- l

Lee Public Canoe Access- l

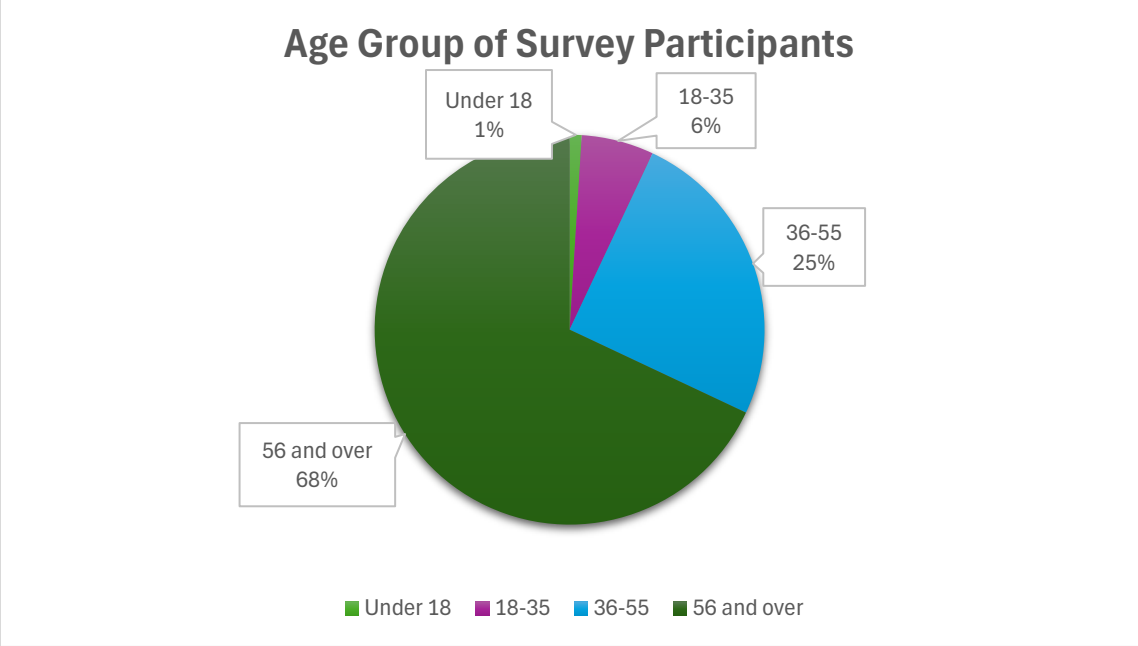
Question 5: In what ways do you enjoy Lee's natural resource opportunities? Please answer yes or no to each activity.



Question 6: Please rank the following natural resource opportunities for the importance of the future of this community using a 1 - 5 scale with 5 being the most important.



Question 7: Please tell us your age group.



Community Workshop Results - April 2024

Favorite Uses

River access & fishing

Trails & parks

Natural areas as a gathering place

Wildlife observation

Agritourism

Bedrock garden

Lamprey River (wild & scenic)

Apple orchards

Agriculture- local food

Maintain a working landscape

Areas that should be protected

Protect the farmland and grasslands. Keep Lee a working landscape.

- Hay and pasture lands are just as important for wildlife and scenic vistas and this habitat is diminishing
- Continued capability to produce food.
- Agriculture and forest lands need to be of size to be managed
- Get UNH or the State to permanently protect the UNH farms on Lee Hook Rd.

Special roads in town: Lee Hook Road, Tuttle Road, High Road, Cartland Road

Special areas of town: Wadleigh Falls, Town Forest

Town owned land providing recreation needs to be protected

Protect historical sites

- Keep the Grange Hall

Protect water resources

Wellhead areas

The wetlands area in the Mast Road, Granger, James Farm neighborhood

Lands at the end of York Lane near the Lamprey River

Lands along the Oyster River north of Route 4

Protect Little River Park

Consider expanding the park

Current Threats to Lee Natural Resources

Pollutants/Invasive Species

Pesticides/chemicals/fertilizers

Forever chemicals- PFAS, PFOA

Round up, lawn spray, mosquito spray, tick control

Disposal of hazardous waste

Invasive species

Development

Housing lot sizes are too large and encourage sprawl

Lack of affordable housing/building regulations

Impervious surface- impact to water quality

Wetland encroachment

Proper drainage

Existing regulations, ordinances, and codes- updates needed

Impact of NH Bill -> ADU's (mandatory)/ additional pressure on septic systems

Balance between conserve/preservation/recreation

Awareness of what is happening on our borders

Wetlands, vernal pools– difficult to protect vs building pressures

Declining wildlife habitat

Climate Change

Invasive species – wooly, hemlock

Ticks- impact on wildlife

Effects of climate on water supply- too much/too little water

Protecting wetlands to help mitigate the impact of flooding/erosion

Flood mitigation

Impact of flooding on plants and animals

Transportation

Lack of transportation options- result is more personal vehicle trips

Pollutants– increased air pollution, noise pollution, light pollution

Lack of connectivity-not walkable or bikeable

Pavement – salt on roads, water quality, impervious surfaces

Traffic circle- history of water at the traffic circle

Overturned tanker/chemicals/waste

Wildlife/fish passage- improper culvert types

Limited access for visitors (potential for overuse)

Rt 125 runoff to pond camps right on water (septic)

Other Concerns Mentioned

Who is watching over water resources/current and future stewardship for both public and private water resources

Wells/drinking water is dependent on neighbors making smart choices such as use of fertilizers, pesticides, detergents/cleaners, and septic maintenance

Power loss during storm events to keep water on

Old houses often have old oil tanks and septic systems

Racetrack proximity to Little River can cause water pollution

Wetlands protection

Lack of education- How do you reach people

Riparian habitats along rivers/ponds- Protect space along river

AG Comm – water

Clean, safe drinking water: Is there enough? Is it clean? Legacy septic are not up to code/leaking camps

Brownfields- contaminants from certain types of uses

Impact of UNH/Durham- Lamprey being drawn down by UNH

River assessment program

Opportunities & Suggestions

Expand land conservation

Expand access to conservation land

Joint natural resource planning with other towns (Durham, agriculture)

Access to conserved land = potential tax benefits

State legislature impacting access to private land

Additional access to water resources

Update ordinances, regulations and codes:

- Reduce minimum lot size
- Cluster development-should be encouraged and open space should be better planned
- Require large developments to show potential environmental impact