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SECTION 1—INTRODUCTION

Natural resources contribute to Brookline's community character, quality of life, and recreation opportunities. They also play a role in determining the type and location of development. Natural resources in Brookline include forests, conservation land, wildlife, ponds, and streams, as well as natural systems that cannot be seen as easily. These natural systems provide valuable services to the Town free of charge, including flood storage, clean air, water purification, productive soils, wildlife habitat, waste recycling, and temperature moderation. In Brookline, they also provide all of the water for commercial, industrial, municipal, and residential needs through individual wells. Loss of these services impacts human health, safety, the economy, and quality of life.

This chapter divides Brookline's natural resources into two broad categories—water-based resources and services and land-based resources and services. Within each category there is a discussion of the specific resources present in Brookline; resulting land use implications; and findings, recommendations, and implementation steps.

SECTION 2—NATURAL RESOURCES VISION FOR BROOKLINE

Brookline's natural resources are essential to the small town atmosphere and quality of life that is so important to its residents. The 2010 Brookline Master Plan Survey asked residents what the most important features are that make Brookline a desirable place to live. 71% of respondents stated Brookline's rural character made it a desirable place to live and 63% specified its natural landscapes. Respondents also identified wildlife, Lake Potanipo, conservation lands, trails, and outdoor recreation opportunities as attractive features of the community. Preserving Brookline's natural resources is critical to maintaining the Town's rural character and fostering its overall vision for the future.

SECTION 3—NATURAL RESOURCES AND THE TOWN OF BROOKLINE

3.1 ~ Support for Natural Resource Protection in Brookline

Residents of Brookline demonstrated broad support for natural resource conservation at the 2010 Master Plan Forum as well as in their responses to the 2010 Master Plan Survey. In addition, residents showed support in this area at the 2008 Brookline Route 13 and Route 130 Visioning Forum and in associated surveys. Furthermore, natural resources are integral to the qualities and characteristics identified in the overall vision for Brookline.

3.2 ~ Role of the Town of Brookline

The Town of Brookline can play an important role in promoting and preserving the natural resources that are so critical to its quality of life and community character. Thoughtful planning can ensure that natural services remain intact and functional for the wellbeing of all citizens and that public access is maintained to natural resources used for recreation. To date, Brookline has adopted a number of ordinances designed to protect its natural resources.

Brookline Zoning & Land Use Ordinance 1100 *Wetlands Conservation District* ~ the purpose of this ordinance is to control and guide land use to prevent the destruction, pollution, or alteration of wetlands, which provide valuable natural services to the community. Prohibited uses include salt storage sheds, automobile junk yards, solid or hazardous waste facilities and/or bulk storage of hazardous materials, use of fertilizer (except lime and/or wood ash), sand and gravel excavation and processing, and dumping or disposal of snow collected from roadways or parking areas. Permitted uses are those that do not result in the erection of any structure or alter the surface configuration by the addition of fill.

Brookline Zoning & Land Use Ordinance 1200 *Floodplain Ordinance* ~ this ordinance applies to all land designated as special flood hazard areas by the Federal Emergency Management Agency in publications dated September 25, 2009 or as amended. Among its provisions, this ordinance requires that all proposed developments in any special flood hazard areas receive a permit. It also allows the Building Inspector to review all building permit applications for new construction or substantial improvements to determine whether the proposed building site will be reasonably safe from flooding. Building inspectors must also be provided assurance that new and replacement septic systems in flood prone areas will not be impaired or create contamination during periods of flooding.

Brookline Zoning & Land Use Ordinance 1300 *Aquifer Protection Ordinance* ~ this ordinance creates the Aquifer Protection District, which is a zoning overlay district that applies to all areas designated as stratified drift aquifers by the US Geological Survey. It regulates land use practices related to commercial-industrial land use in order to maintain and protect existing and potential ground water resources and surface water fed by groundwater from contamination.

Brookline Zoning & Land Use Ordinance 1500 *Open Space Development* ~ an Open Space Development plan is required for all developments 20 acres or greater, unless the Planning Board deems that topography, wetlands, soils, or other considerations prevent the proposal from accomplishing the purposes of the ordinance or when an Open Space Development is unnecessary to meet the purposes of the ordinance. A minimum of 35% of the gross tract area must be set aside as permanent open space through easement or deed for low-impact recreation, agriculture, or conservation uses.

SECTION 4—IDENTIFICATION OF WATER-BASED RESOURCES AND SERVICES

4.1 ~ Watersheds

A watershed is an area of land that drains downslope through a network of drainage pathways to the lowest point. These pathways can be underground or on the surface and they typically become progressively larger as the water moves downstream. Watersheds vary in size and every stream, tributary, and river has an associated watershed. Small watersheds join to become larger watersheds. Nearly all of Brookline lies within the Nissitissit River sub-watershed. The Nissitissit River sub-watershed flows southeasterly into the main stem of the Nashua River just north of the center of Pepperell, MA. The Nissitissit River sub-watershed is part of the Nashua River Watershed and the larger Merrimack River Watershed.

There is a great deal of interconnectivity in watersheds, between tributaries and the main river, surface water and ground water, and wetlands. In addition, because water flows downstream, an action that impacts water quality, quantity, or rate of movement in one location affects locations downstream as well. For this reason, all neighborhoods and communities within a watershed must work together to make sound land use decisions.

4.2 ~ Major Surface Water Bodies

Nissitissit River

The Nissitissit River is 9.2 miles long and is fed by a number of smaller streams, including North Stream, Scabbard Mill Brook, Village Brook, Stonehouse Brook, Talbot Brook, Wallace Brook, and Rocky Pond Brook. There are roughly 60.5 square miles or 38,764 acres of land area in the Nissitissit River sub-watershed. 1,583 acres or roughly 7% of this land area is permanently protected; another 1,259 acres has limited protection (Nashua River Watershed, 5 Year Action Plan, 2003-2007).

Lake Potanipo

Lake Potanipo is 169.9 acres with an average depth of 13.5 feet and a maximum depth of 25.1 feet (NH Dept. of Environmental Services). Lake Potanipo provides habitat to a variety of fish species, including largemouth bass, chain pickerel, yellow perch, pumpkinseed, hornpout (brown bullhead), and black crappie (NH Fish & Game Department). It also provides habitat for the endangered Brook floater and the threatened Fern-leaved false foxglove, both listed on the NH Natural Heritage Inventory. The Lake supports a number of recreational uses including boating, fishing, swimming, and water skiing. There is one public beach for Town residents and one private beach for Camp Tevya, as well as a few small beaches located at private properties around the lake. The 2003-2007 Nashua River Watershed 5 Year Action Plan lists Lake Potanipo as the most threatened water body in the Nissitissit River watershed. There are 27 houses and seasonal cottages around Lake Potanipo and a 500 acre back parcel with rights to the Lake (NH DES).

Melendy Pond

Melendy Pond is 16.7 acres with an average depth of 8.9 feet and a maximum depth of 22.4 feet (NH DES). Melendy Pond is a naturally occurring water body that provides habitat to a variety of fish species, including largemouth bass, chain pickerel, yellow perch, and hornpout (brown bullhead) (NH Fish & Game Department). The NH Natural Heritage Bureau does not list any Rare, Threatened, or Endangered Species in Melendy Pond. There are 23 houses around the Pond's shoreline; many are seasonal cottages though there are some year-round homes. Melendy Pond is used for a variety of recreation activities including boating, fishing, and swimming. There is one designated public access for boats, which is suitable for small motor boats, kayaks, and canoes. There are several small, private beaches located on private properties around the Pond, but no public beaches. Melendy Pond also serves as a water source for toilets and showers for several homes on the shoreline.

4.3 ~ Wetlands

Importance and Function of Wetlands

Wetlands are areas that have water at or near the surface, saturated soils for at least part of the year, and plants that are tolerant of wet conditions. Swamps are the most common type of wetland in New Hampshire and are simply forested wetlands. New Hampshire is approximately 6-10% wetlands and has the distinction of being one of only three states to have retained over 80% of its wetlands since 1780 (NH DES).

Wetlands provide a number of critical services to communities. One of the most important is their protection of water quality and drinking water. Wetlands remove excess nitrogen and retain sediments that contain contaminants such as heavy metals and excess nutrients. This prevents these contaminants from entering waterways and polluting waters downstream. Wetlands also play an important role in flood prevention and maintenance of water flow. During periods of floods, wetlands decelerate runoff from upland areas and release it slowly, decreasing peak flood flows and mitigating flood damage. In dry periods, wetlands feed streams through groundwater discharge, which maintains in-stream flow and is important for water supply and wildlife habitat.

Wetlands provide a vital wildlife habitat, supporting almost two-thirds of the state's most threatened wildlife. Wetlands support wildlife of all sizes, from amphibian species that depend on vernal pools for breeding habitat to moose that utilize wetlands for their food source. Finally, wetlands support recreation and the State's economy, which is heavily based on natural resources and tourism. Quality of life in New Hampshire and in Brookline is very dependent on clean water, wildlife, and outdoor recreation, which wetlands greatly contribute to.

TABLE 1 - Wetlands Soils in Brookline

Soil Name	Drainage	Symbol
Borohemists	Very poor	BoA, BpA
Chocorua	Very poor	Cu
Greenwood	Very poor	Gw
Saco Variant	Very poor	Sm
Scarboro	Very poor	So, Sr
Ridgebury	Very poor	RbA, ReA, ReB
Saugatuck	Very poor	Sn
Binghamville	Poor	Bg
Leicester Variant	Poor	LeA, LsA
Leicester-Walpole Complex	Poor	LtA, LtB, LvA, LvB
Pipestone	Poor	PiA, PiB

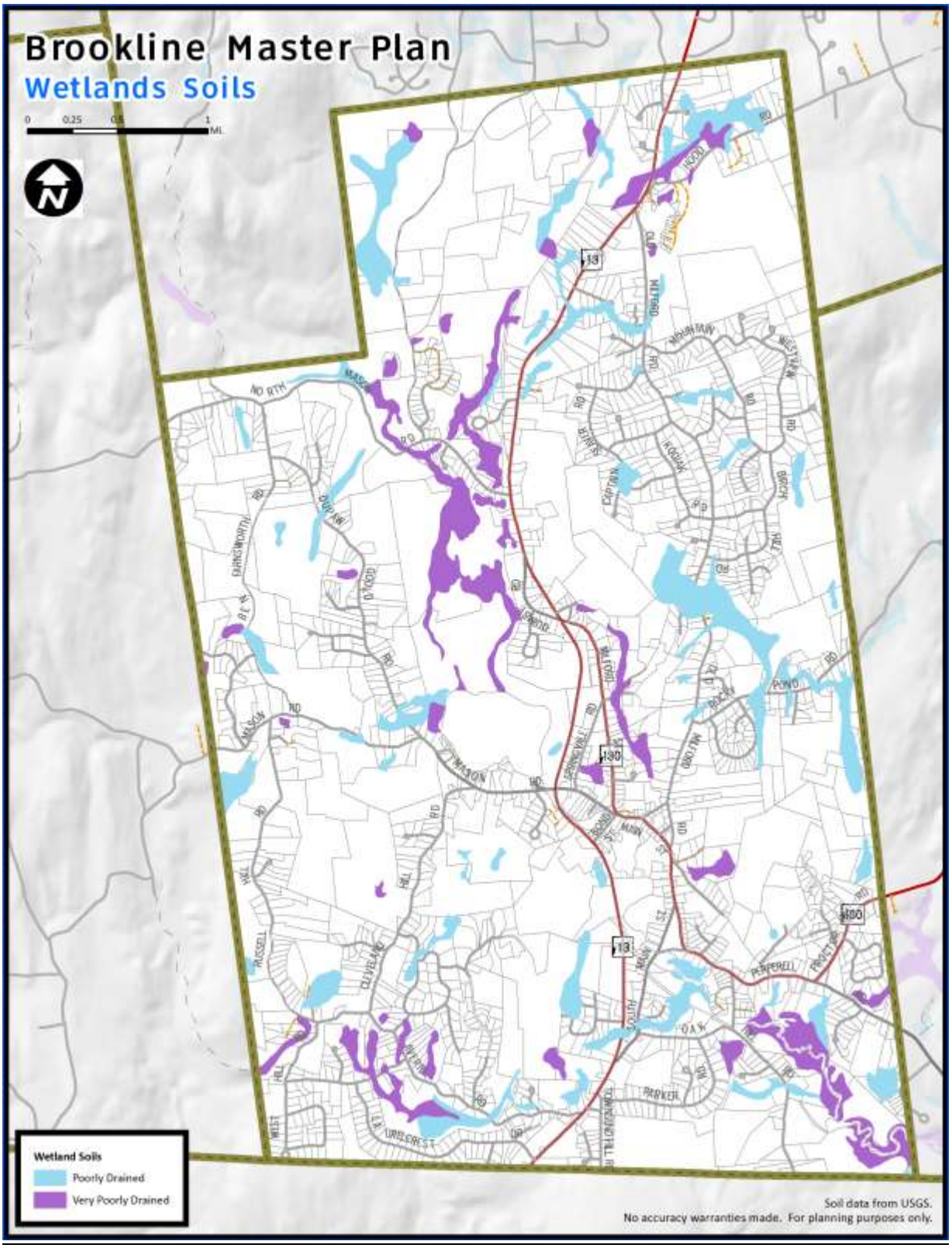
Description of Wetland Locations in Brookline

Major concentrations of wetland soils are found throughout Brookline. In the southern portion of Town, wetland soils are located in the areas of Wallace Brook, Stickney Brook, Rocky Pond Brook, and the Nissitissit River. Wetlands soils can be found in the central portion of Brookline near Lancy Brook, Lake Potanipo, North Stream, Village Brook, and Stonehouse Brook. In the northern portion of Brookline, wetland soils are located in the areas of Scabbard Mill Brook and Melendy Pond.

Brookline's Wetlands Conservation District Ordinance

The Wetlands Conservation District was passed as part of Brookline's Zoning Ordinance in 1987. The purpose of this ordinance is to control and guide land use to prevent the destruction, pollution, or alteration of wetlands, which provide valuable natural services to the community. Additional details about the ordinance are described in Section 3.2 of this chapter.

MAP 1—Wetlands Soils in Brookline



4.4 ~ Flood Storage Lands

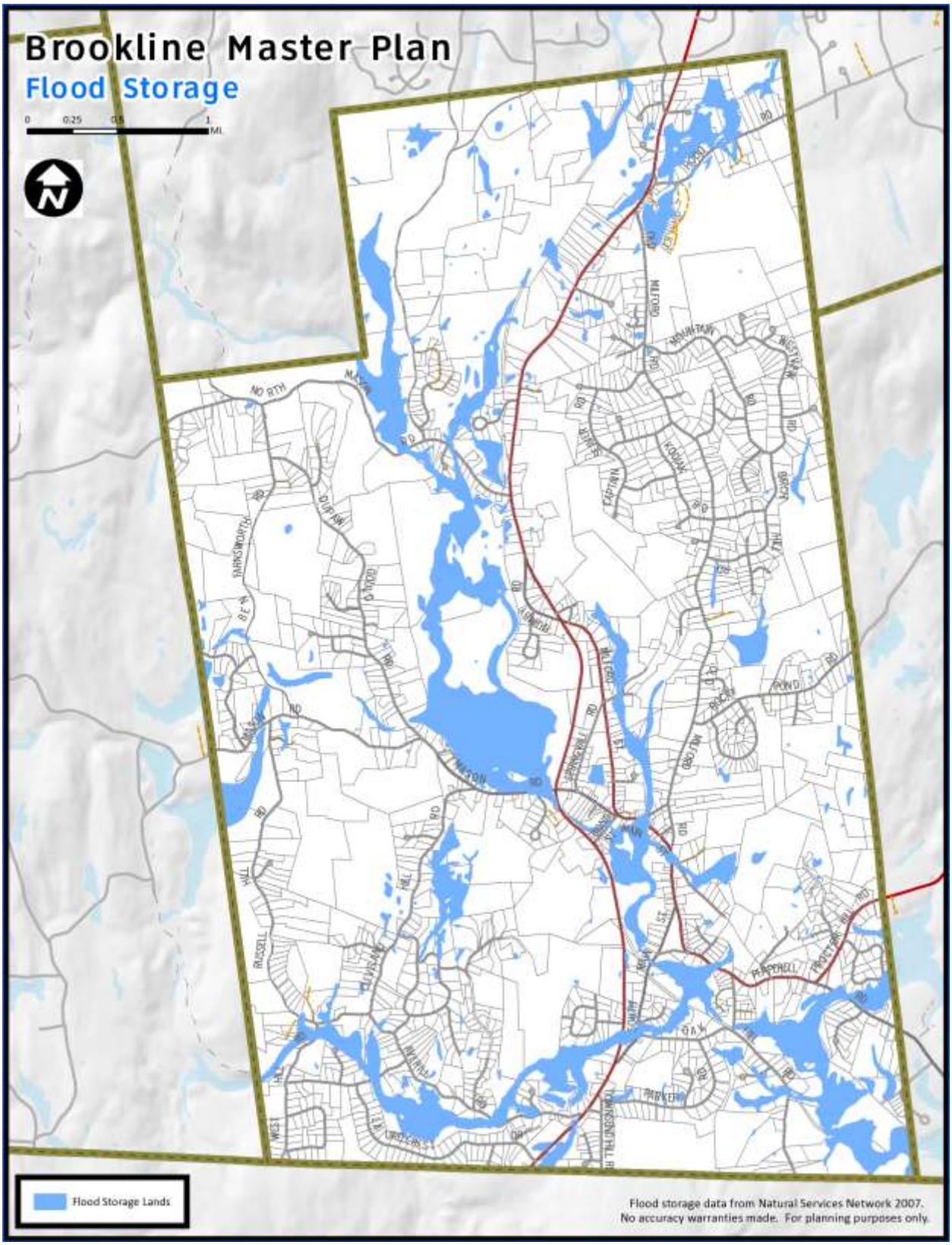
Importance of Flood Storage Lands

According to the Federal Emergency Management Agency, flooding is the second most common and widespread natural disaster behind fires. As noted above, wetlands provide natural flood storage to a community. One acre of wetlands can typically store one million gallons of water (US Environmental Protection Agency). In addition, trees and other wetlands vegetation slow the speed of flood water, which combined with flood storage, can lower flood heights and decrease destruction.

Brookline's Floodplain Ordinance

Brookline's Floodplain Ordinance applies to all land designated as special flood hazard areas by the Federal Emergency Management Agency in publications dated September 25, 2009 or as amended. Among its provisions, this ordinance requires that all proposed development in any special flood hazard area receive a permit. Additional details about the ordinance are described in Section 3.2 of this chapter.

MAP 2—Flood Storage Land in Brookline



4.5 ~ Water Supply Lands

Importance of Aquifers to Brookline's Water Supply

Aquifers play a very significant role in Brookline, as all water for commercial, industrial, municipal, and residential needs comes from private wells. Recognizing this importance, Brookline adopted an Aquifer Protection Ordinance. This ordinance creates the Aquifer Protection District, which is a zoning overlay district that applies to all areas designated as stratified drift aquifers by the US Geological Survey (USGS). It regulates land use practices related to commercial-industrial land use in order to maintain and protect existing and potential ground water resources and surface water fed by groundwater from contamination.

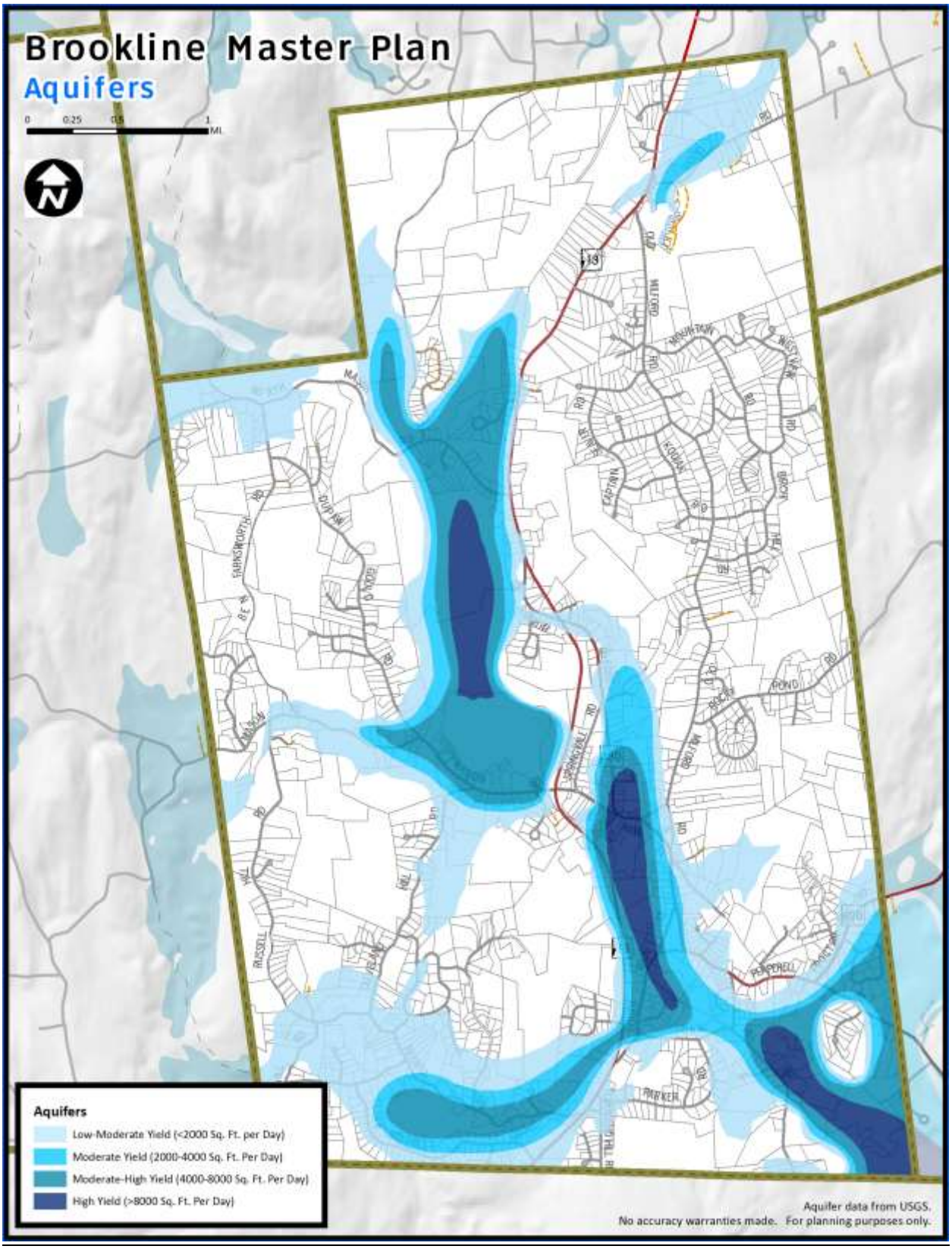
Aquifer Types

In 1987, the USGS conducted a mapping exercise and survey titled "Hydrogeology of Stratified Drift Aquifers and Water Quality in the Nashua Regional Planning Commission Area." This study found that aquifers currently in use or that have the potential for future use in Brookline are typically stratified drift or glacial till.

Stratified drift aquifers provide the best potential for yielding adequate water supplies in Brookline; according to the USGS study, 31% of Brookline is underlain by stratified drift. Stratified drift aquifers are typically comprised of sorted sand and gravel, which has a high porosity and therefore contains larger quantities of water.

Glacial till aquifers are typically much shallower than stratified drift, contain less water, and tend to be localized in extent. Therefore, they are better suited for domestic use only. A concern with glacial till aquifers is that their shallow nature leaves them more susceptible to contamination from land use practices such as septic system failures, agricultural runoff, industrial pollution, and surface runoff containing road salt.

MAP 3—Aquifers in Brookline

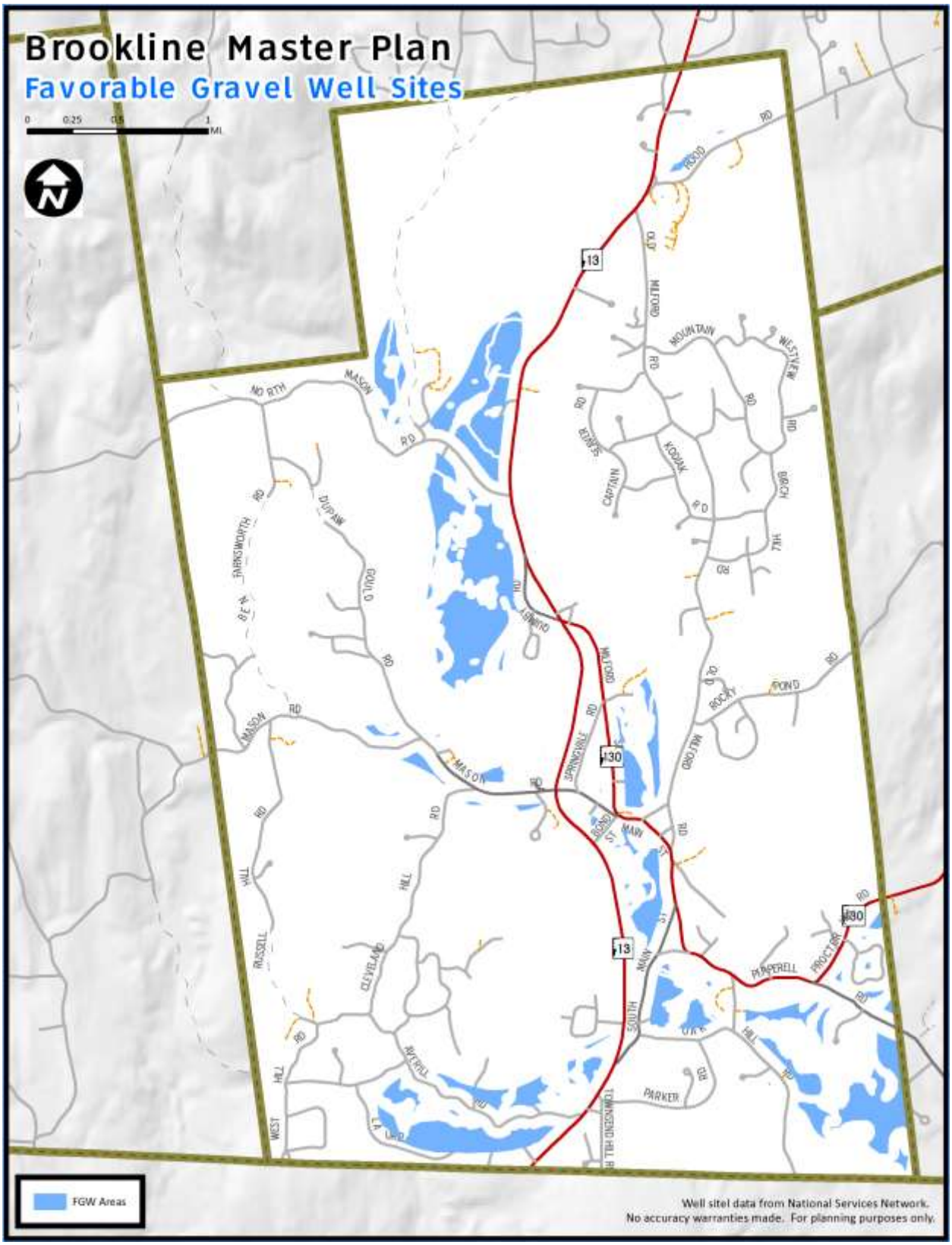


New Hampshire Dept. of Environmental Services Favorable Gravel Well Analysis

In the 1990s, the USGS and NH DES mapped stratified drift aquifers in New Hampshire. The maps showed large areas underlain by these aquifers, however, only a small fraction of these areas is likely to produce high yielding community wells. In response, NH DES developed a technique called Favorable Gravel Well Analysis to analyze these maps and account for constraints to siting a community well. This analysis provides a tool to make better use of stratified drift aquifer maps, helps planners understand the relative scarcity or abundance of potential high-yield well locations, and highlights the need to protect future drinking water resources.

The two constraints considered in this analysis are water quantity and quality. Wells must yield enough water to meet community needs and must be located far enough away from known or potential contaminants to preserve water quality.

MAP 4—Favorable Gravel Well Sites in Brookline



SECTION 5—WATER-BASED RESOURCES CONSERVATION AND PROTECTION

5.1 ~ Special Areas of Focus

Lake Potanipo and Melendy Pond

Variable milfoil *(Myriophyllum heterophyllum)* established in Lake Potanipo in 2002. Since then, this invasive aquatic plant has increased exponentially and has become very dense in several shallow locations around the lake. As of 2008, approximately 39 acres of Lake Potanipo were infested with milfoil. Variable milfoil also established in Melendy Pond in 2002. Melendy Pond is a shallow water body with a mix of sandy, silty, and organic substrates that make it a prime habitat for milfoil. In 2008, NH Dept. of Environmental Services biologists predicted that within 10 years the entire Pond will be dominated by milfoil. A significant amount of research and analysis on the topic of milfoil in Brookline's water bodies can be found in two papers written by NH DES, entitled "Long-Term Variable Milfoil Management and Control Plan for Lake Potanipo, Brookline, NH" and "Long-Term Variable Milfoil Management and Control Plan for Melendy Pond, Brookline, NH."

Nissitissit River

Water quality in the Nissitissit River has remained high, due in part to the fact that only about 7% of the land area in the Nissitissit River sub-watershed is impervious surface (Nashua River Watershed, 5 Year Action Plan, 2003-2007). In addition, there are no discharge permits for the Nissitissit River. Significant conservation efforts, particularly in Brookline, have resulted in a 300 foot vegetated buffer along almost 50% of the Nissitissit (Nashua River Watershed, 5 Year Action Plan, 2003-2007). As a result, the Nissitissit River has been identified as one of the highest quality aquatic habitats in the Nashua River watershed. It provides prime habitat for native brook trout and five listed rare species as well as valuable recreation opportunities for Brookline residents.

At the same time, while much of the Nissitissit River sub-basin currently has little or no development, the area is experiencing residential development pressure. Given that such a low percentage of the land area is impervious surface, there may not appear to be an immediate concern over stormwater runoff and non-point source pollution issues. However, sound land use planning is needed now to ensure these do not become issues in the future. It is critical not only to protect the Nissitissit River, but also to protect its associated tributaries. An important step is ensuring the preservation of forest land and contiguous open space around the streams and brooks that feed into the Nissitissit River.

Vernal Pools

Vernal pools are depressions in the land that temporarily fill with water following heavy rains, snow melt, or as a result of high water tables. Vernal pools provide many benefits to communities, including groundwater recharge, flood storage, water quality maintenance, and wildlife habitat. Threats to vernal pools include destruction of forests, draining and filling of wetlands, construction of roads and other impervious surfaces, and over-extraction of groundwater. When vernal pools are destroyed it decreases the ability of the land to absorb water after heavy rain or snowmelt. This results in increased water

runoff, which leads to more frequent and severe floods, lower water tables, and diminished groundwater recharge. It also degrades critical habitat, water quality, and recreational opportunities.

Exact definitions of vernal pools as defined by the NH Code of Administrative Rules and the Town of Brookline can be found in Section 8.1 of this chapter.

Invasive Species

Variable milfoil has been a concern for Lake Potanipo and Melendy Pond since 2002, as discussed above. Treatments to remove milfoil began on Lake Potanipo in 2003 and on Melendy Pond in 2004. Long term management plans have been developed by NH Dept. of Environmental Services for both water bodies and outline the problems and impacts of milfoil infestation, as well as recommended actions to reduce the overall density and distribution of milfoil. While much attention has been given to milfoil, it is not the only invasive species that poses a threat to Brookline's water resources. Other invasive species of concern include Purple loosestrife, Water chestnut, Hydrilla, Brazilian elodea, Fanwort, European naiad, Curly-leaf pondweed, Didymo, and Eurasian milfoil. To date, none of these plants has been found in Brookline.

Prevention and early detection are critical to keeping invasive species out of Brookline's water bodies. In 2010, Brookline participated in the *NH LAKES Lake Host* program. This initiative utilizes paid and volunteer "Lake Hosts" to staff public motorized boat ramps and educate visiting boaters about exotic aquatic plants. Lake Hosts also conduct courtesy boat and trailer inspections to remove all plant fragments and show boaters how to conduct these inspections themselves. During the 2010 season 1,037 inspections were conducted in Brookline. Nine "saves" were officially identified and recorded by NH DES, including one incident of fanwort and 8 incidents of variable milfoil.

Large Scale Water Extraction

Members of the Brookline Planning Board expressed concern about the potential for bottled water companies and other large scale water extraction operations to come into Town and deplete Brookline's valuable aquifers and drinking water supplies. This is a legitimate concern that requires further investigation and action. At Town Meeting 2006, voters in Barnstead, NH passed the Barnstead Water Rights and Local Self-Government Ordinance (Warrant Article 31), which declares water as a common resource for the residents of Barnstead and prohibits corporate water withdrawals for resale. Barnstead became the first municipal government in the US to ban corporations from pumping out water for sale elsewhere. In 2009, citizens and community groups in Shapleigh, Maine worked together to draft and adopt a ban preventing companies from drawing or selling the Town's water. This initiative was the result of opposition to Poland Spring's effort to test, draw, bottle, and market Shapleigh's water.

5.2 ~ Implications for Land Use

Wetlands

- The health of wetlands is critical to the functioning of other natural services. Therefore, careful consideration should be given to land use decisions that have the potential to impact wetlands.

- Vernal pools provide a number of important services and should continue to be protected under Brookline's Wetlands Conservation District ordinance.

Surface & Ground Water

- Land use decisions have a direct impact on water quality and quantity for both ground and surface water in Brookline. They can also impact downstream and downslope communities within the watershed.
- The amount of impervious surface in groundwater recharge areas impacts groundwater quantity and surface water quality. Decreasing the amount of impervious surface will result in increased recharge rates and decreased runoff.
- The shallow nature of glacial till aquifers leaves them more susceptible to contamination from land use practices. Compatible land use siting is essential to protect water quality in Brookline's aquifers.

5.3 ~ Water-based Resources Findings/Results

Residents in the Natural Resources and Conservation breakout session of the 2010 Brookline Master Plan Forum identified milfoil on Lake Potanipo and Melendy Pond as being a significant problem and expressed concerns about overfishing, particularly as a result of the ice fishing derby. Residents participating in the breakout session also advised that no additional development should be allowed around Lake Potanipo to preserve water quality and they suggested that the Town should investigate the option of obtaining the first right to purchase land surrounding Lake Potanipo if it is ever up for sale. Finally, they recommended that permeable surfaces should be considered for future development to maintain water quality and quantity.

5.4 ~ Water-based Resources Recommendations

Lake Potanipo, Melendy Pond, and Nissitissit River

- Consider limiting or prohibiting additional development around Lake Potanipo to preserve water quality.
- Pursue easements to create buffers along the Nissitissit River, Lake Potanipo, and Melendy Pond where they do not currently exist. Maintain a 300 foot vegetated buffer along the Nissitissit River and its tributaries to protect water quality and wildlife habitat, to prevent flood damage, and to provide recreational opportunities.
- Follow recommendations in "Long-Term Variable Milfoil Management and Control Plan for Lake Potanipo, Brookline, NH" and "Long-Term Variable Milfoil Management and Control Plan for Melendy Pond, Brookline, NH" prepared by NH DES. http://des.nh.gov/organization/divisions/water/wmb/exoticspecies/documents/lake_potanipo.pdf
- http://des.nh.gov/organization/divisions/water/wmb/exoticspecies/documents/melendy_pond.pdf.

- Follow recommendations in "Nashua River Watershed 5 Year Action Plan 2003-2007" prepared by the Nashua River Watershed Association and the MA Watershed Initiative Nashua Team. http://www.nashuariverwatershed.org/5yr_plan/subbasins/nissitissit.htm.

Ordinances

- Enforce the existing Wetlands Conservation District ordinance and Aquifer Protection ordinance.
- As the amount of impervious surface increases in Brookline, consider adopting a Permanent Stormwater Management ordinance, similar to the model outlined in the Innovative Land Use Planning Techniques Handbook, and/or a Maximum Impervious Surface ordinance, similar to the model developed by the Nashua Regional Planning Commission.
- Consider adopting a Shoreland Protection ordinance, similar to that outlined in the Innovative Land Use Planning Techniques Handbook.
- Consider adopting a vernal pool protection buffer of at least 50 feet from new developments and a minimum of 150 feet from future roadways.
- Consider adopting a water extraction ordinance, similar to the Barnstead, NH Water Rights and Local Self-Government Ordinance, to protect Brookline's drinking water supply from corporate water withdrawals for resale.

Impervious Surfaces

- Promote the use of permeable surfaces and Low Impact Development techniques throughout Brookline.
- Consider decreasing the required road width in new developments to reduce the amount of impervious surface.
- Research non-salt road de-icing methods to limit salt application throughout Brookline, not just within the Aquifer Protection District.

Monitoring and Education

- Educate the public on the importance of water quality and the steps they can take to improve it.
- Encourage residents to work with the Nashua River Watershed Association's volunteer water quality monitoring program for the Nissitissitt River.
- Continue and expand the Brookline Conservation Commission's water quality monitoring of Melendy Pond and Lake Potanipo.
- Develop an inspection and maintenance program for septic systems.
- Continue to participate in the NH LAKES Lake Host Program to protect Brookline from the further introduction and spread of invasive aquatic species. Encourage residents to volunteer at boat ramps to provide educational information and inspections to boaters.
- Update the Brookline Conservation Commission's vernal pool inventory and make it available to all Town boards.
- Explore opportunities for additional funding and support to help maintain water quality and recreation activities in Brookline's water bodies.

5.5 ~ Water-based Resources Implementation & Timeframe

Task	Responsible Department or Group	Timeframe
Create a conservation plan to prioritize and protect land surrounding Lake Potanipo, Melendy Pond, the Nissitissit River, and its tributaries.	Conservation Commission	1-3 years
Implement recommendations in "Long-Term Variable Milfoil Management and Control Plan for Lake Potanipo, Brookline, NH," "Long-Term Variable Milfoil Management and Control Plan for Melendy Pond, Brookline, NH," and "Nashua River Watershed 5 Year Action Plan 2003-2007."	Conservation Commission, Planning Board	1-3 years
Develop a comprehensive water quality and invasive species monitoring and education program.	Conservation Commission	1-3 years
Adopt additional ordinances as needed to protect water quality and quantity from threats associated with impervious surfaces, development, and large scale water extraction.	Planning Board, Board of Selectmen	Ongoing

SECTION 6—IDENTIFICATION OF LAND-BASED RESOURCES AND SERVICES

6.1 ~ Conservation Land

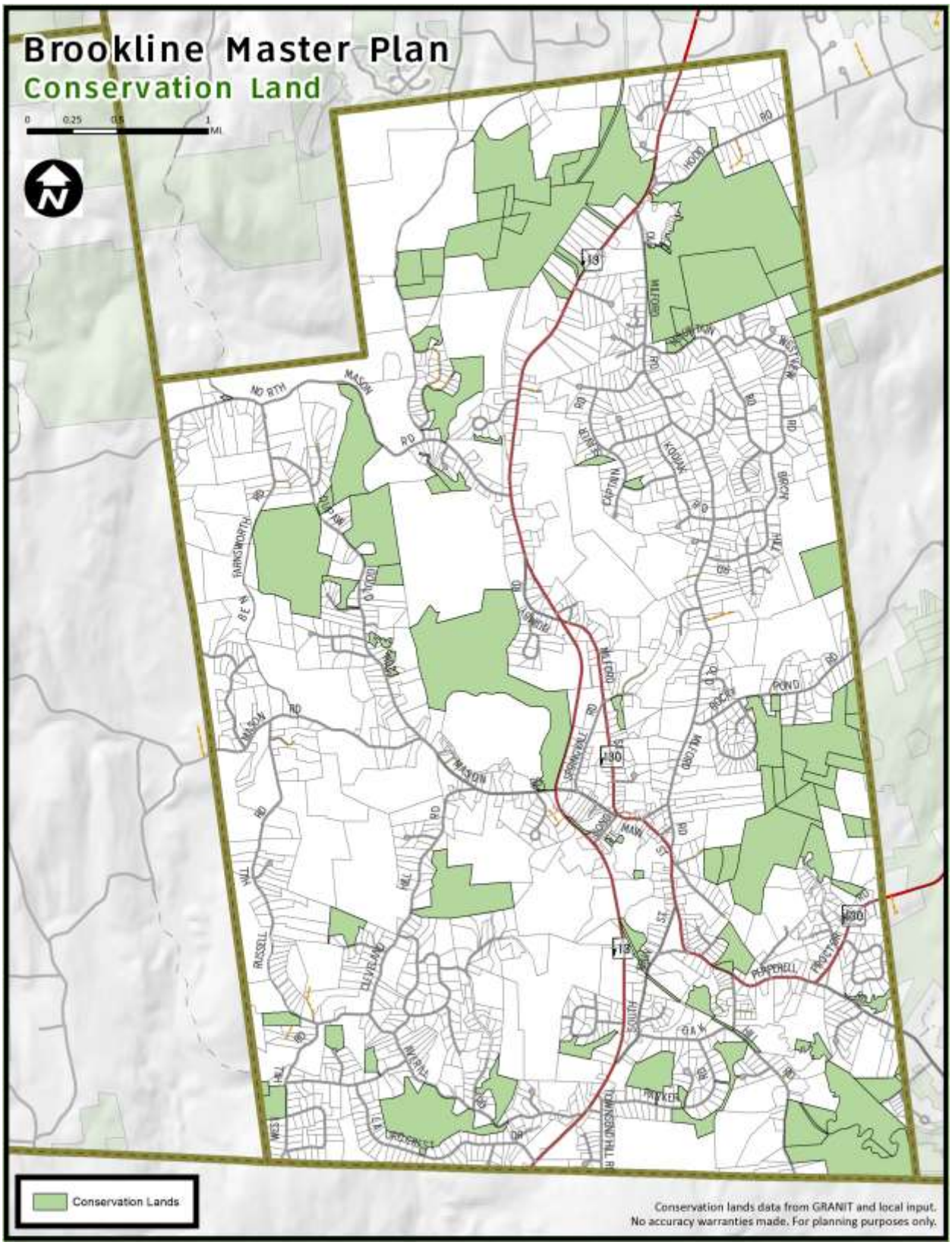
Summary of Town Goals and Plan for Conservation Land

The Brookline Conservation Commission has set a goal of protecting a minimum of 25% of the Town's land for conservation. When asked how they felt about this goal, 58% of respondents to the 2010 Brookline Master Plan Survey stated the goal seemed about right. Twenty two percent stated it should be higher and 20% thought it should be lower. Currently, about 17% of the Town's land is protected.

TABLE 2 - Conservation Land Tracts in Brookline as Reported to NH GRANIT

Tract Name	**Primary Protection Type**	**Primary Protection Term**	**Primary Protection Agency**
Beaver Brook Association	Fee Ownership	Unknown	Beaver Brook Association
Bourassa	Conservation Easement	Unknown	Town of Brookline
Cropp	Conservation Easement	Unknown	Town of Brookline
Hobart Fessenden	Unknown	Unknown	Unknown
Lorden Realty-Elevations	Conservation Easement	Unknown	Town of Brookline
Meadow Hall Lot	Fee Ownership	Unknown	Town of Brookline
Melendy Morrill	Unknown	Unknown	Unknown
Melendy Pond Land	Fee Ownership	Perpetual and Unknown	Town of Brookline
Moran	Conservation Easement	Unknown	Beaver Brook Association
Morrill Land	Fee Ownership	Unknown	Town of Brookline
Nissitissit River Land Trust	Fee Ownership	Unknown	Nissitissit River Land Trust
Palmer-Bartell Forest	Fee Ownership	Permanent	Town of Brookline
Lake Potanipo Boat Launch Facility	Fee Ownership	Unknown	NH Fish & Game
Rouillier	Conservation Easement	Unknown	Town of Brookline
Scabbard Mill Brook	Conservation Easement	Unknown	Town of Brookline
Taylor Talbot	Conservation Easement	Unknown	Town of Brookline
Town of Brookline Land	Fee Ownership	Unknown	Town of Brookline
Wallace Brook	Fee Ownership and Conservation Easement	Unknown	Town of Brookline
Whitcomb Bross	Unknown	Unknown	Unknown

MAP 5—Conservation Land in Brookline



6.2 ~ Soils

Importance of Soils in Determining Land Use and Capability of Development

Soil types are one of the most critical determinants of a parcel's capability to support development. This is particularly true in Brookline, where they serve as the sole medium for sewage purification through individual septic systems. Soil data presented in this section comes from three studies by the US Dept. of Agriculture's Natural Resources Conservation Service—"Soil Potentials for Development," "Town of Brookline Soils and their Interpretations for Various Land Uses," and "Soils Survey of Hillsborough County, New Hampshire-Eastern Part." These studies are available in Town Hall.

Soil Types and their Implications for Land Use

A majority of soils found in Brookline are either Hinckley-Windsor or Canton-Chatfield. Hinckley-Windsor soils are found in the low-lying land of the Town Center and southeast quadrant of Brookline. They are typically described as excessively drained, gravelly, and sandy, although there are some lands within this group that are poorly and very poorly drained or wetlands. Canton-Chatfield soils are well-drained, loamy, and often found on slopes and covered with forest. A more specific analysis can be accomplished by dividing Brookline's soil types into the following categories.

Wetlands or Wet Soils—these poorly and very poorly drained soils serve as water storage areas that recharge stream flows during dry months. They are often nearly level and may be ponded or have standing water on their surface. They pose tremendous problems to development and their active use for development purposes is prohibited under the Wetlands Zoning Ordinance.

Floodplain Soils—these soils are found adjacent to river and streams, which deposit the soil by flooding these waterways. Given that Brookline has only a few minor waterways, there is little floodplain soil in Town. Floodplain soils are among the finest agricultural soils in NH.

Sand and Gravel Soils—these soils are excessively drained and are characterized by their rapid permeability. They are among the predominant soil types in Brookline. Because of their rapid permeability, they act as a poor filter. These soils may also be stony, especially the Hinckley soils. They are highly erodible, are the least stable for holding slopes or banks, and do not yield significant groundwater.

Seasonal Wet Soils—these soils are moderately well drained and found in upland depressions. Because they generally form a relatively thin soil layer over bedrock, they tend to have a seasonally high water table, which imposes sever restrictions on their ability to be used for septic systems and home construction. They are found in scattered locations among the hills surrounding the low-lying Town Center and southeast portion of Brookline.

Shallow-to-Bedrock Soils—this category contains several soil types that generally form an extremely thin layer over bedrock (30-40 inches deep). They are moderately to well drained, are generally covered by woodlands, and have very limited capacity to yield groundwater. Because they are so thin, their use for septic systems is severely limited, though sites with sufficient depth to bedrock can be found.

Hardpan Soils—these soils are characterized by a 24 inch layer of well-drained soil underlain by a dense, slowly permeable hardpan layer of up to 60 inches deep. Due to this hardpan layer, these soils have severe limitations for use as septic system leaching areas. They are found in one location in Brookline, just south of Lake Potanipo on the slopes of a drumlin, or glacier-formed hill.

Deep-Stoney Soils—soils in this category represent the predominant soil type in Brookline. They are well-drained, often contain stones and boulders at or near the surface, and are found on slopes of the hilly uplands that surround the Main Street area and Route 13. Depth to bedrock is typically in excess of five feet. Much of this soil type is covered by woodland and has moderate groundwater availability. The greatest limitations to development imposed by these soils come from their stoniness and the fact that they are typically found on slopes.

Analysis of Soil Types to Support Septic Function and Associated Implications for Land Use

This analysis examines soil type and slope in combination to determine limitations for subsurface septic system installation and operation. It is based on analysis by the Natural Resources Conservation Service of the US Department of Agriculture, which examines the following characteristics of land areas for their capability to support the safe installation and operation of septic systems:

1. Permeability of soil
2. Depth to water table
3. Depth to bedrock
4. Steepness of slope
5. Stoniness or rockiness of soil
6. Susceptibility of flooding

Land areas are categorized as possessing either slight, moderate, or severe limitations to proper septic system operation due to the combination of these six characteristics.

Slight Limitations—land areas designated as having slight limitations are the most capable of supporting safe septic system operations. Any limitations of these areas are considered to be easy and inexpensive to overcome. Unless other site characteristics limit their suitability, they are recommended for active use and development. In fact, given that there is so little land in this classification in Brookline, these parcels should be used as efficiently as possible. This land totals roughly 150 to 200 acres and is scattered throughout Town among parcels ranging in size from 5 to 20 acres.

Moderate Limitations—land areas in this category have moderate limitations or constraints to septic system installation and operation. Their development and use require planning, careful review, and usually remedial engineering or landscaping work to overcome the limitations imposed. These limitations do not preclude the development of these parcels, but they are identified to alert interested parties that special consideration and potentially expensive remedial work may be required to safely develop such sites. Land areas in this category are scattered among the hilly uplands and occur more frequently than parcels of slight limitation. However, they still comprise only about one-fifth of Brookline's total land. Therefore, they should be used as efficiently as feasible while recognizing their

limitations. Moderate density clustering may be feasible on selected sites. Land with moderate limitations is predominantly found in the southeast corner of Brookline, west and southwest of Russell Hill, south of North Mason Road, along portions of Old Milford Road, and south of Rocky Pond Road.

Severe Limitations—land areas with this designation have the poorest capability to be used for septic system operations due to one or more of the characteristics used to evaluate its potential. This designation should not be interpreted to mean that these land areas are incapable of supporting development. Rather, the severe designation alerts developers and planning board members of the need to identify the limitations and to ensure that all remedial actions to overcome the limitations are made. The importance of site inspections in such cases cannot be over-emphasized. Approximately 80% of the Town falls into this category.

It is important to remember that this analysis combines information regarding both soil types and slope, and that it does so at a scale that is unsuitable for site-specific analysis and decision making. This analysis will not replace or eliminate the need for a site investigation to determine land capability. It is provided to give a broad overview of the potential for development in Brookline and to alert the planning board about potential problems certain lands will present. In addition, while soil types are delineated on the Master Plan maps with a reasonable degree of accuracy, specific soil types referred to on the map are those of the predominant soil type within the mapped area. Actual boundaries between soils on the ground are not so easily discernable and will vary from those mapped. Therefore, site inspections and a more thorough study of the soils at any site cannot be replaced by the maps that accompany this plan.

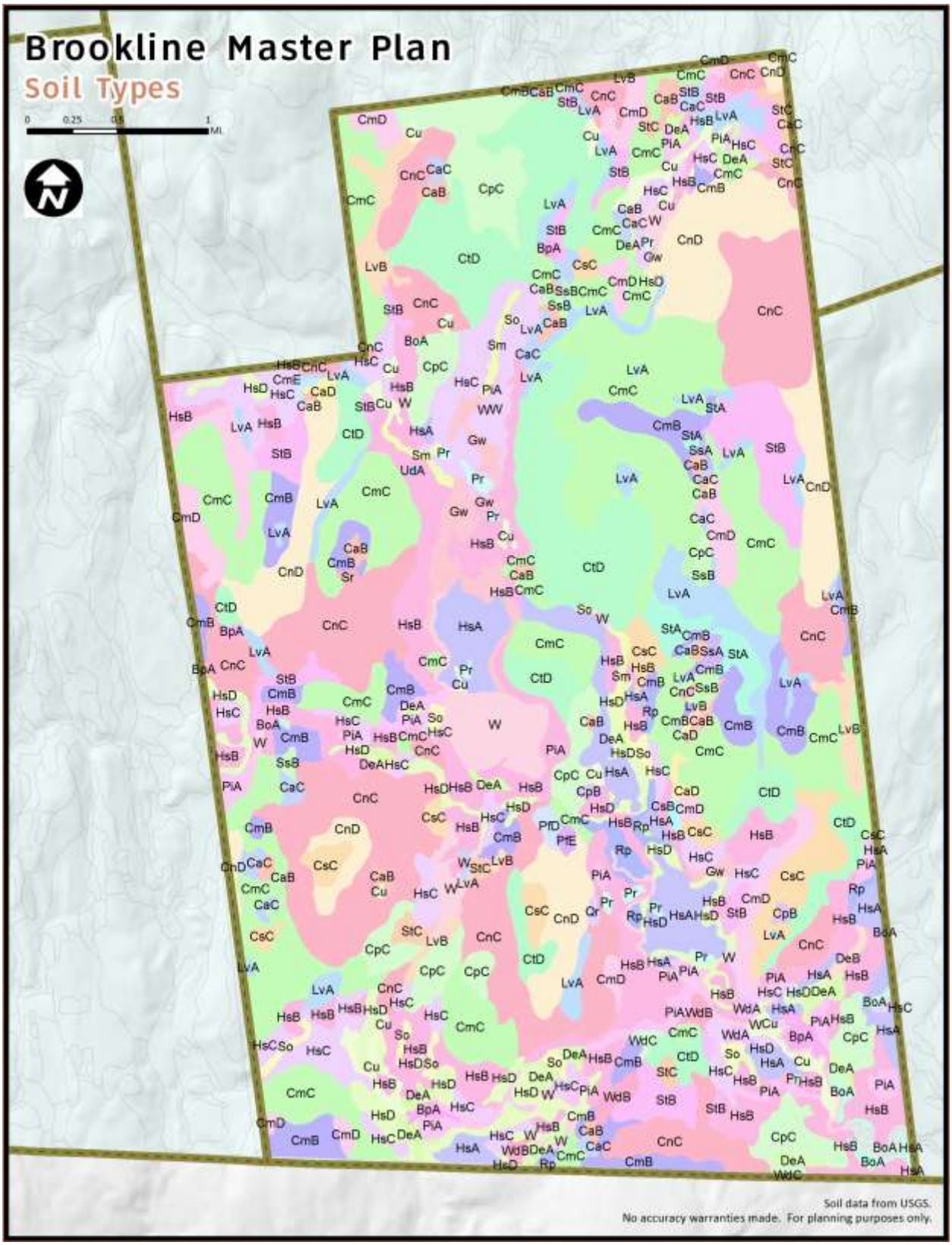
TABLE 3 - Soil Types

Abbreviation	Soil Type	Description
BoA	Borohemists	Nearly level
BpA	Borohemists	Ponded
CaB	Canton	Fine sandy loam, 0-8% slopes
CaC	Canton	Fine sandy loam, 8-15% slopes
CaD	Canton	Fine sandy loam, 15-25% slopes
CmB	Canton	Stony fine sandy loam, 3-8% slopes
CmC	Canton	Stony fine sandy loam, 8-15% slopes
CmD	Canton	Stony fine sandy loam, 15-25% slopes
CmE	Canton	Stony fine sandy loam, 25-35% slopes
CnC	Canton	Very stony fine sandy loam, 8-15% slopes

Abbreviation	Soil Type	Description
CnD	Canton	Very stony fine sandy loam, 15-35% slopes
CpB	Chatfield-Hollis-Canton Complex	3-8% slopes
CpC	Chatfield-Hollis-Canton Complex	8-15% slopes
CsB	Chatfield-Hollis Complex	3-8% slopes
CsC	Chatfield-Hollis Complex	8-15% slopes
CtD	Chatfield-Hollis-Rock Outcrop Complex	15-35% slopes
Cu	Chocorua	Mucky peat
DeA	Deerfield	Loamy fine sand, 0-3% slopes
DeB	Deerfield	Loamy fine sand, 3-8% slopes
Gw	Greenwood	Mucky peat
HsA	Hinckley	Loamy sand, 0-3% slopes
HsB	Hinckley	Loamy sand, 3-8% slopes
HsC	Hinckley	Loamy sand, 8-15% slopes
HsD	Hinckley	Loamy sand, 15-35% slopes
LvA	Leicester-Walpole Complex	Stony, 0-3% slopes
LvB	Leicester-Walpole Complex	Stony, 3-8% slopes
PfD	Paxton	Stony fine sandy loam, 15-25% slopes
PfE	Paxton	Stony fine sandy loam, 25-35% slopes
PiA	Pipestone	Loamy sand, 0-3% slopes
Pr	Pits	Gravel
Qr	Quarries	Quarries
Rp	Rippowam	Fine sandy loam
Sm	Saco Variant	Silt loam
So	Scarboro	Mucky loamy sand
Sr	Scarboro	Stony mucky loamy sand
SsA	Scituate	Fine sandy loam, 0-3% slopes

Abbreviation	Soil Type	Description
SsB	Scituate	Fine sandy loam, 3-8% slopes
StA	Scituate	Stony fine sandy loam, 0-3% slopes
StB	Scituate	Stony fine sandy loam, 3-8% slopes
StC	Scituate	Stony fine sandy loam, 8-15% slopes
UdA	Udipsamments	Nearly level
WdA	Windsor	Loamy sand, 0-3% slopes
WdB	Windsor	Loamy sand, 3-8% slopes
WdC	Windsor	Loamy sand, 8-15% slopes
W	Water	Less than 40 acres

MAP 6—Soil Types in Brookline



6.3 ~ Forest Lands

To date, the Town of Brookline does not have a formal forest management plan. The Conservation Commission has contracted with a local forester to develop a harvest management plan, which will provide guidance on how to maintain the health and quality of Brookline's forests. The plan will identify areas that should remain forested as well as those that should be selectively cut to maintain the health of the forest and open strategic habitat. Harvesting plans for the Melendy-Morrill lands will be the first to be developed. Other parcels that will be addressed include Palmer-Bartell Forest, Whitcomb-Bross, and Hobart-Fessenden. The Conservation Commission's goal is to establish a rolling management schedule so that the first parcel to be selectively harvested will not be cut again until all other parcels have been harvested, allowing adequate time for regrowth. The harvest management plan will also make recommendations on how forestry revenues should be spent, however, this will ultimately be decided by voters at Town Meeting.

6.4 ~ Hilltops, Elevation, and Slopes

TABLE 4 - Scenic Views in Brookline

Name	Location	Elevation (feet aMSL)	Trail or Road Access (Y/N)	Protected* (Y/N)
Birch Hill	Abutting Melendy-Morrill land, Brookline/Hollis border	810	Yes	No
Russell Hill	West of Russell Hill Road	738	No	No
Unnamed	Northwest corner, south of North Mason Road	642	No	No
Potanipo Hill	Andres Institute of Art	627	Yes	No
Bear Hill	West of Old Milford Road	615	Yes	No
Unnamed	Southwest of Rocky Pond	613	No	No
Hutchinson Hill	Palmer-Bartell Forest	600	Yes	Yes
West Hill	Southwest corner	590	No	No
Unnamed	Northwest corner	557	No	No
Unnamed	East of Corey Hill	523	No	No
Corey Hill	Hobart-Fessenden	515	Yes	Yes
Hobart Hill	Hobart-Fessenden	508	Yes	Yes
Rock Ramond	Camp Tevya	477	Yes	No

**Protected land is defined by NH GRANIT Conservation Lands Standards as "land permanently protected from development through legally enforceable conservation easement, deed restriction, or outright ownership by an organization whose mission emphasizes protecting land in perpetuity. More than 50% of the area will remain undeveloped."*

Slope Categories and Associated Land Use Implications

Slope measures the pitch or steepness of land between two points. It is expressed as a percentage, which is calculated by dividing the change in elevation between two points by the distance between the two points. Steep slopes are defined as having 15 feet or greater of vertical rise over 100 feet of horizontal run, or a 15% slope. Maps and descriptions of slopes should not be used as a definitive guide to where development should and should not occur. Rather, specific site characteristics should be investigated to identify potential problems and to decide whether they can be overcome. Slope data must be used in conjunction with soil and water resources data to determine a specific site's natural capability to support a proposed use.

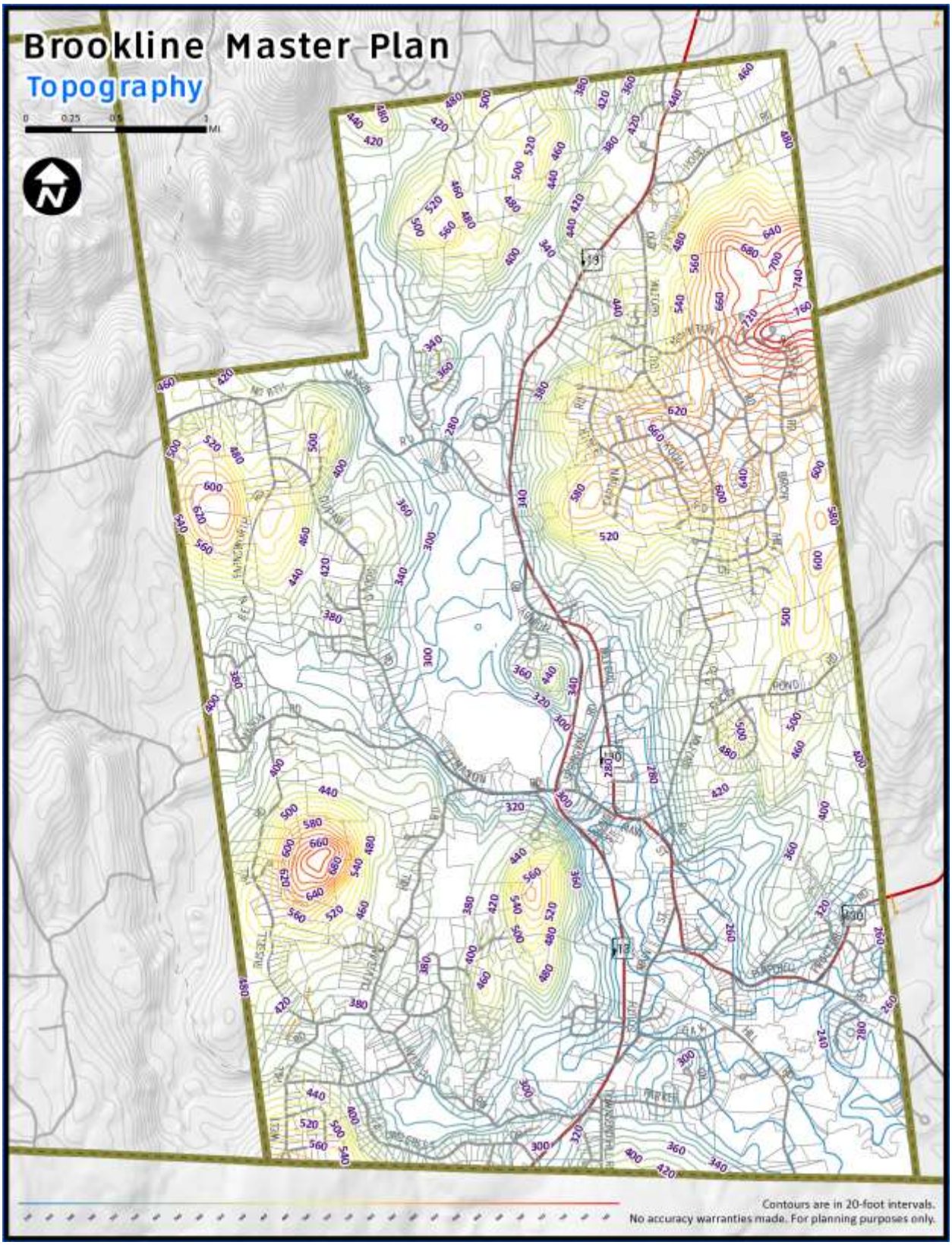
25% and Greater Slopes—land with slopes greater than 25% are the most difficult to develop. They require extreme care and typically need special landscaping and engineering to be developed properly. There are several concerns with developing slopes this steep. The loss of vegetation and disruption of natural drainage patterns brought about by development on steep slopes can cause erosion problems leading to potential flooding, stream sedimentation, and slope instability. In addition, providing infrastructure to hillside development can be expensive to engineer and construct. The typically shallow, poorly draining soils on slopes are not suitable for septic systems. High failure rates of septic systems on steep slopes are a serious threat to ground and surface water quality. Furthermore, road construction requires switchbacks and extensive regrading to regulate the gradient and ensure motorist safety.

15% to 25% Slopes—although they are somewhat less severe, development on 15-25% slopes face the same difficulties in terms of erosion, septic, infrastructure, and road construction limitations.

8% to 15% Slopes—land in this category will have similar limitations to land with steeper slopes, however, in many cases the costs to overcome these concerns are not prohibitively expensive to make development unfeasible. Development potential of sites with these slopes will most likely be determined by site specific characteristics, such as soil depth, soil type, and the intensity of proposed development. As a result, site specific investigations and a close review of proposed septic and erosion safeguards are critical for any development in this category. It is expected that more proposals will be submitted for development on slopes in this category as suitable flatter land becomes less available.

0% to 8% Slopes—land in this category is typically best for supporting active development, provided that the soil types are suitable and other site characteristics do not impose constraints. One notable area not suited for development in this category is wetlands or land of 0-3% slope at low elevations with poorly or very poorly drained soils.

MAP 7—Topographic Map of Brookline



6.5 ~ Excavation Materials

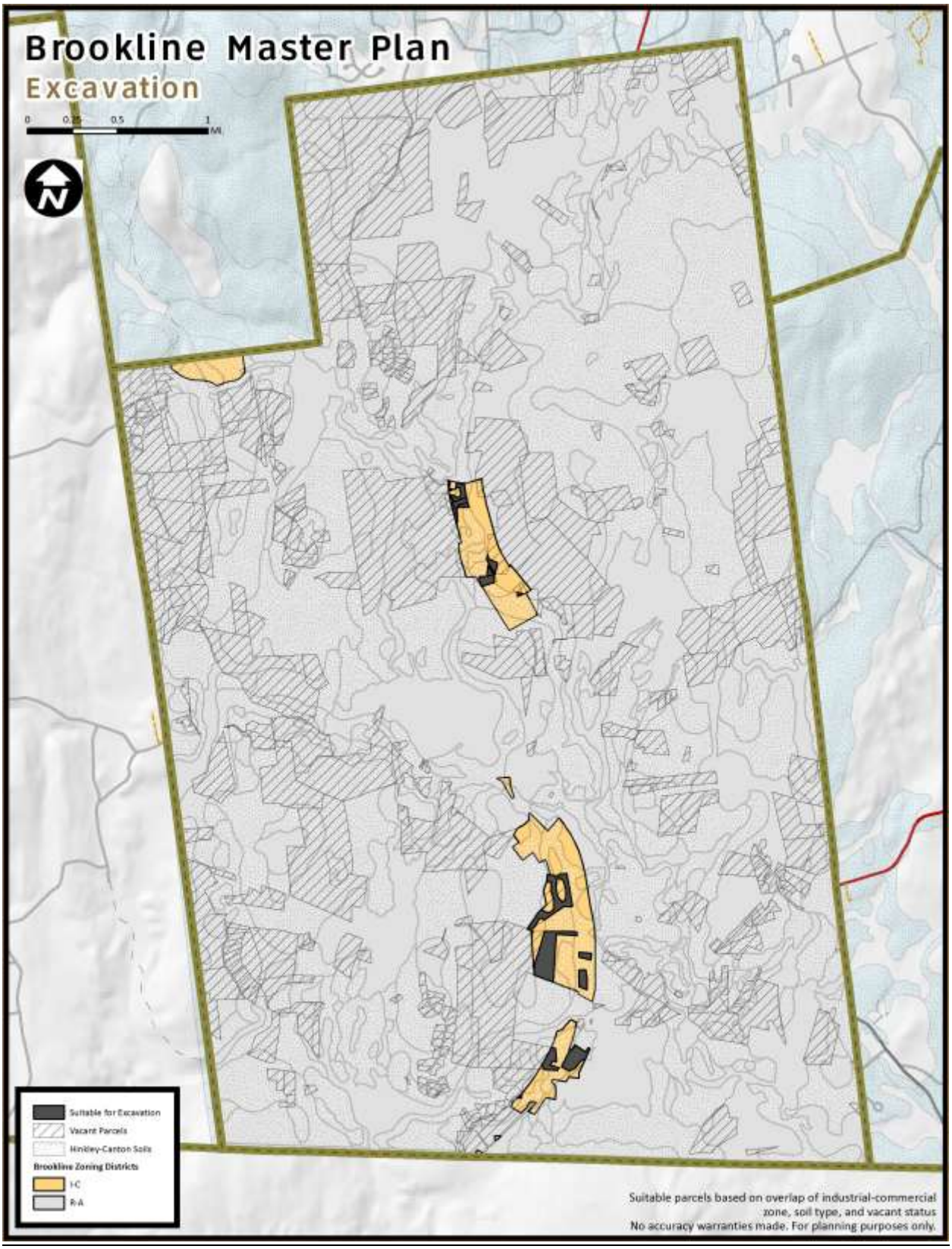
Likely Locations for Excavation Materials

Excavation materials, such as sand and gravel, are typically found in areas with stratified drift deposits. Canton and Hinckley soils, which are found throughout most of Brookline, are also good indications of the presence of sand and gravel.

Local Ordinances Regulating Excavation Materials

The 2011 Brookline Zoning and Land Use Ordinance 1000 *Earth Removal* states that "excavation shall be deemed to be a use allowed by special exception in the Industrial-Commercial District as provided in RSA 674:33 IV. Excavation performed exclusively for the lawful construction, reconstruction, or maintenance of a class IV or V highway by the Town of Brookline shall be permitted within Town by special exception as provided in RSA 674:33 IV." Special exceptions shall be granted by the Zoning Board of Adjustment provided that the applicant demonstrates that excavation will not unreasonably decrease area property values, unreasonably change the character of the neighborhood, unreasonably accelerate the deterioration of highways or create safety hazards, cause erosion of adjacent property, or destroy endangered species habitat. The applicant must also demonstrate that the excavation site will contain buffers to protect the health, safety, and welfare of abutters and Town residents.

MAP 8—Suitable Excavation Areas



6.6 ~ Wildlife

Species Found in Brookline Listed as Threatened or Endanger by NH Natural Heritage Inventory

The NH Natural Heritage Bureau is part of the Division of Forests and Lands. Its mission is to find, track, and facilitate the protection of New Hampshire's rare plants and exemplary natural communities. The Natural Heritage Bureau provides information to facilitate informed land-use decision making to help protect the State's natural heritage while meeting land use needs. As of January 2011, the NH Natural Heritage database contained information on more than 6,000 species or natural community occurrences throughout the state. The following table is derived from the NH Natural Heritage Bureau's January 2011 publication "Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns" for Brookline.

TABLE 5 - Rare Plants, Animals, and Natural Communities Found in Brookline

Name	Flag[1.]	Federal Listing	State Listing	# reported in Brookline in past 20 years	# reported in NH in past 20 years
Natural Communities					
Chestnut oak forest/woodland 	None	No	No	Historical (not reported in past 20 years)	6
Plants					
Fringed Gentian *(Gentianopsis crinita)* 	None	No	Threatened	Historical (not reported in past 20 years)	27

Name	Flag[1.]	Federal Listing	State Listing	# reported in Brookline in past 20 years	# reported in NH in past 20 years
Piled-up Sedge *(Carex cumulate)*	None	No	Threatened	Historical (not reported in past 20 years)	16
Prostrate Tick Trefoil *(Desmodium rotundifolium)* 	None	No	Threatened	Historical (not reported in past 20 years)	12
Sickle-pod *(Boechera canadensis)* 	None	No	Threatened	Historical (not reported in past 20 years)	8
Vertebrates—Birds					
Great Blue Heron (Rookery) *(Ardea herodias)* 	None	No	No	Historical (not reported in past 20 years)	39

Name	Flag[1.]	Federal Listing	State Listing	# reported in Brookline in past 20 years	# reported in NH in past 20 years
Vertebrates—Reptiles					
Blanding's Turtle *(Emydoidea blandingii)* 	Very High Importance	No	Endangered	2	469
Eastern Hognose Snake *(Heterodon platirhinos)* 	Very High Importance	No	Endangered	3	36
Northern Black Racer *(Coluber constrictor constrictor)* 	Very High Importance	No	Threatened	1	44
Spotted Turtle *(Clemmys guttata)* 	Very High Importance	No	Threatened	2	94

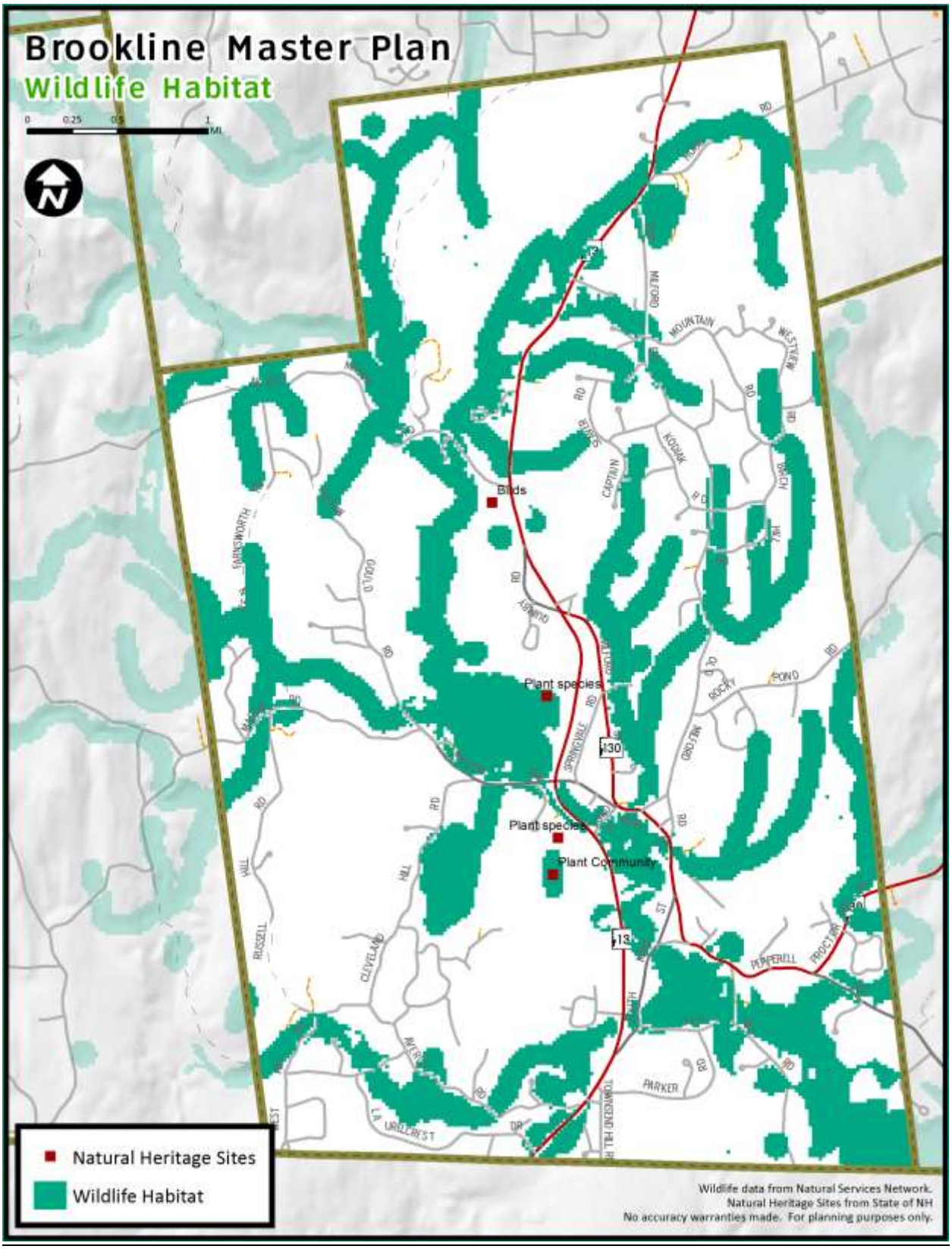
Name	Flag[1.]	Federal Listing	State Listing	# reported in Brookline in past 20 years	# reported in NH in past 20 years
Vertebrates—Fish					
Banded Sunfish *(Enneacanthus obesus)* 	Very High Importance	No	Special Concern	1	30
Swamp Darter 	Very High Importance	No	Special Concern	1	13

1. Flags are based on a combination of how rare the species or community is and how large or healthy its examples are in the Town.

Strategies for Managing Land for Wildlife

Since many animals require a large territory to find food and adequate breeding grounds, wildlife habitat protection should occur at the largest scale possible. Small, isolated segments of habitat may not contain enough resources to sustain a species, resulting in its decline. Maintaining contiguous habitat blocks as development occurs will protect wildlife and create a network of viable habitats. A model Habitat Management Ordinance is available in the Innovative Land Use Planning Techniques Handbook.

MAP 9—Wildlife Habitat



SECTION 7—LAND-BASED RESOURCES CONSERVATION AND PROTECTION

7.1 ~ Special Areas of Focus

Undeveloped and Marginal Land

There are 4,006 acres of vacant land in Brookline's Residential-Agricultural zoning district. Of these, 1,577 acres or 39% are considered undevelopable due to steep slopes, open water, wetlands, and poorly drained soils (note—this does not necessarily indicate that state and local regulations would preclude development). Of the 111 vacant acres within the Industrial-Commercial zoning district, 32 acres or 29% are considered undevelopable. As more suitable vacant land is developed, there will be increasing pressure to build on these marginal lands. Proper planning is needed to protect these marginal lands and their natural resources before pressure increases to develop them.

Invasive Species

Much like their aquatic counterparts, there are a number of invasive species that threaten Brookline's land based resources, and in particular its forests. The Asian Longhorned Beetle, as its name implies, is native to Asia. They have few natural predators in North America and attack many species of hardwood. While there have been no confirmed reports of Asian Longhorned Beetles in NH, they have come close to the state. Asian Longhorned Beetles arrived in Worcester, MA in August 2008 and resulted in the cutting and chipping of roughly 30,000 trees to prevent their spread. The beetles were also found in Boston in July 2010. The Emerald Ash Borer is another concern. Native to Asia, it only attacks Ash trees and is responsible for killing millions of trees in the mid-west. The closest sighting to NH has been in eastern NY near the MA border. An invasive species already in NH is the Hemlock Woolly Adelgid. It was first found in Merrimack, NH in 1999. The Hemlock Woolly Adelgid damages hemlock trees by depleting their nutrient reserves, making them more susceptible to stressors such as drought and other pests.

7.2 ~ Implications for Land Use

Slopes

- As flat land becomes more built up there is increasing pressure to develop land at higher elevations and steeper slopes. Development of these parcels can impact scenic views and cause erosion and runoff. Surface water bodies near developed slopes are particularly vulnerable. Development on steep slopes is also more costly.

Excavation Materials

- Commercial sand and gravel operations can alter the land's ability to filter and recharge groundwater, which can lead to decreased quantity and degraded quality. Excessive removal of materials overlying aquifers increases the potential for groundwater contamination. The soil above groundwater acts as a filter by removing suspended contaminants as the water

percolates down. If too much material is removed, the filtering capacity of the soil is diminished.

Soils

- Soil characteristics, such as depth, permeability, wetness, and slope play a significant role in determining development cost, suitability, and density.

Forest Land

- Forests are a valuable resource for Brookline; they provide habitat, control erosion, improve water quality, regulate temperature, and can be a source of income.
- Timber harvesting is a renewable resource that can contribute to the local economy and provide access to local forest products.
- Timber harvests that do not follow best management practices can result in erosion, non-point source pollution to water bodies, and harm to abutters.

Conservation Land

- Conservation land provides critical natural services and valuable wildlife habitat. It also plays a key role in the community's quality of life.
- Once open space is developed it cannot quickly or easily be returned to its natural state.
- Fragmented conservation land cannot support wildlife as well as contiguous parcels can.

7.3 ~ Land-based Resources Findings/Results

Conservation Land

- Residents in the Natural Resources and Conservation breakout session of the 2010 Brookline Master Plan Forum recommended that some parcels of conservation land should be kept in a completely natural state with no amenities or recreational development. They also recommended that parcels of conservation land should be kept contiguous and that the Conservation Commission should put large tracks of presently undeveloped land under protection.
- 74% of residents participating in the 2010 Brookline Master Plan Survey stated they are in favor of maintaining current forestry practices on Town land, including selective cutting of trees. 58% stated that the Conservation Commission's goal of protecting a minimum of 25% of the Town's land for conservation aligned with their vision for the future of Brookline. 20% of respondents stated the goal should be lower and 22% stated it should be higher. 49% of residents participating in the Survey stated that conservation land and scenic view access in Brookline should be expanded and/or improved. 27% of respondents stated it should be left as is.

Recreation

- Residents in the Natural Resources and Conservation breakout session of the 2010 Brookline Master Plan Forum identified a need for more trails and recreational infrastructure (signs, parking, maps) on certain parcels of conservation land.
- 51% of residents participating in the 2010 Brookline Master Plan Survey stated that nature/hiking trails in Brookline should be expanded. 24% of respondents stated they should be left as is.

Natural Resource Protection

- The 2008 Vision Plan for Route 13 & 130 calls for the Town of Brookline to maintain its natural features to the greatest extent possible, including trees, conservation areas, lakes, farm lands, and wildlife.
- There is no strong consensus on methods to protect natural resources among residents participating in the 2010 Brookline Master Plan Survey. The only category that received a majority response was Wildlife Habitats. 61% of respondents stated that the purchase of more conservation land should be used to protect wildlife habitats.
- Residents in the Natural Resources and Conservation breakout session of the 2010 Brookline Master Plan Forum recommended that the Town should investigate the option of obtaining the first right to purchase land surrounding Lake Potanipo if it is ever up for sale. Participants also identified the need to protect marginal land such as steep slopes and poor soils as the Town grows and development pressure increases on these lands.

7.4 ~ Land-based Resources Recommendations

Slopes

- Consider adopting innovative land use ordinances such as Steep Slope and Ridgeline Protection and/or Erosion and Sediment Control During Construction to protect these lands as development pressure increases. Model ordinances for these topics are outlined in the Innovative Land Use Planning Techniques Handbook.
- Investigate land protection opportunities at all elevations to ensure contiguous habitat. Varied elevation is necessary for wildlife habitat and biodiversity.
- Consider providing incentives to encourage private property owners to permanently protect land with scenic views.

Excavation Materials

- Revisit regulations with regard to earth removal to ensure they adequately address the potential for large scale extraction and protect natural resources, including aquifers and major water supplies.
- Pursue recreation opportunities and/or conservation easements on inactive and former excavation sites after reclamation activities are complete.

- Consider and mitigate erosion, traffic, noise, and airborne particulates that abutters are exposed to.

Soils

- Encourage open space development to conserve valuable soils by clustering development in the most appropriate, least impactful areas.
- Ensure lot size is based on the suitability of soil for the required septic capacity.

Forest Land

- Continue to pursue the development of a formal forest management plan for the Town.

Conservation Land and Recreation

- Keep conservation land data current in NH GRANIT database.
- Pursue protection of land adjacent to parcels already in protection to create contiguous blocks of conservation land.
- Encourage private landowners to consider land protection measures such as conservation easements. Lead by example and place conservation easements on environmentally sensitive Town lands.
- Create signage and develop recreational amenities such as parking on certain conservation lands. Ensure these amenities are maintained. Keep other parcels of conservation land in a completely natural state with no amenities or recreational development.
- Encourage developers to utilize open space development and conservation subdivisions that cluster development, leaving more contiguous open space.

Wildlife

- Manage Town land for wildlife habitat and encourage private land owners to do the same.
- Create design guidelines for new development that provide specific criteria for protecting wildlife habitat.
- Concentrate land acquisition for habitat protection on preserving corridors and providing access to water, food, and breeding grounds.
- Investigate the impacts of recreational fishing, including ice fishing, on local fish stocks and develop a plan to ensure that the practice remains sustainable.
- Work with neighboring communities to manage and protect wildlife habitat that crosses town lines.

7.5 ~ Land-based Resources Implementation & Timeframe

Recommendation	Responsible Department or Group	Timeframe
Conduct an analysis of potential threats to steep slopes and scenic viewpoints to determine if these lands are adequately protected.	Conservation Commission, Planning Board	1-3 years
Revisit regulations with regard to extraction to ensure they adequately protect natural resources and abutting properties.	Planning Board	1-3 years
Establish an outreach program to engage private land owners in voluntary land protection efforts.	Conservation Commission	3-5 years
Provide incentives for open space development and conservation subdivisions.	Planning Board	3-5 years
Adopt a Habitat Management Ordinance, including a Habitat Protection Site Plan and Subdivision Review Checklist.	Planning Board	3-5 years
Implement the recommendations and harvesting plan outlined in the Brookline Forest Management Plan.	Conservation Commission	Ongoing
Budget for land acquisition of valuable conservation parcels and the development of recreational amenities.	Conservation Commission, Board of Selectmen, Town of Brookline residents	Ongoing

SECTION 8—REFERENCES

8.1 ~ Definitions

- Aquifer—underground bed or layer of permeable rock, sediment, or soil that yields water.
- Vernal pool—the NH Code of Administrative Rules, Env-Wt 101.99, defines vernal pools as “a surface water or wetland, including an area intentionally created for purposes of compensatory mitigation, which provides breeding habitat for amphibians and invertebrates that have adapted to the unique environments provided by such pools and which:

a) Is not the result of on-going anthropogenic activities that are not intended to provide compensatory mitigation, including but not limited to:

   i) Gravel pit operations in a pit that has been mined at least every other year; and
   ii) Logging and agriculture operations conducted in accordance with all applicable New Hampshire statutes and rules; and

b) Typically has the following characteristics:

   i) Cycles annually from flooded to dry conditions, although the hydroperiod, size, and shape of the pool might vary from year to year;
   ii) Forms in a shallow depression or basin;
   iii) Has no permanently flowing outlet;
   iv) Holds water for at least 2 continuous months following spring ice-out;
   v) Lacks a viable fish population; and
   vi) Supports one or more primary vernal pool indicators, or 3 or more secondary vernal pool indicators."

Env-Wt 101.71 defines primary vernal pool indicators as "the presence or physical evidence of breeding by marbled salamander, wood frog, spotted salamander, jefferson-blue spotted salamander complex, or fairy shrimp."

Env-Wt 101.82 states secondary vernal pool indicators include but are not limited to "caddisfly larvae and cases (Limnephilidae, Phyrganeidae, or Polycentropodidae), clam shrimp and their shells (Laevicaudata, Spinicaudata), fingernail clams and their shells (Sphaeriidae), aquatic beetle larvae (Dytiscidae, Gyrinidae, Haliplidae, and Hydrophilidae), dragonfly larvae and exuviae (Aeshnidae, Libellulidae), spire-shaped snails and their shells (Physidae, Lymnaeidae), flat-spire snails and their shells (Planorbidae), damselfly larvae and exuviae (Coenagrionidae, Lestidae), and true fly larvae and pupae (Cuculidae, Chaoboridae, and Chironomidae)."

- Vernal pool—the Town of Brookline Zoning and Land Use Ordinance 1102.18 defines vernal pools as "a confined basin depression which, at least in most years, holds water for a minimum of two continuous months during the spring and/or summer, provides essential breeding habitat for certain amphibians and invertebrates, and is free of adult fish populations."

8.2 ~ Relevant State Statutes and Model Ordinances

- RSA 674:21 Innovative Land Use Controls—innovative land use controls include but are not limited to intensity and use incentives, transfer of density and development rights, cluster development, performance standards, and environmental characteristics zoning. An innovative land use control adopted under RSA 674:16 may be required when supported by the master plan. Model ordinances are available for each innovative land use technique.
- Model ordinances for innovative land use controls related to natural resources, including Permanent Stormwater Management, Steep Slope and Ridgeline Protection, Habitat

Management, Shoreland Protection, and Erosion and Sediment Control During Construction are available at:
http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm

- Maximum Impervious Surface—model ordinance developed by the Nashua Regional Planning Commission.
http://www.nashuarpc.org/publications/environmental/impervious_surface_model_ordinance.pdf

8.3 ~ Resources

- *Innovative Land Use Planning Techniques Handbook*—to address the need for guidance and technical assistance on Innovative Land Use Controls authorized by RSA 674:21, DES and its partners, the NH Association of Regional Planning Commissions, the NH Office of Energy and Planning, and the NH Local Government Center, produced *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development*. The handbook includes sections dealing with development density, environmental characteristics, and site level design. Each of the 23 chapters includes model ordinances and regulations for use by municipalities interested in implementing the innovative land use techniques.
http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm
- *Identification and Documentation of Vernal Pools in New Hampshire*, published by NH Fish and Game Department, Nongame and Endangered Wildlife Program.
http://www.wildlife.state.nh.us/Wildlife/Nongame/RAARP/Vernal_pool_manual.pdf
- "Long-Term Variable Milfoil Management and Control Plan for Lake Potanipo, Brookline, NH," prepared by NH Department of Environmental Services.
http://des.nh.gov/organization/divisions/water/wmb/exoticspecies/documents/lake_potanipo.pdf
- "Long-Term Variable Milfoil Management and Control Plan for Melendy Pond, Brookline, NH," prepared by NH Department of Environmental Services.
http://des.nh.gov/organization/divisions/water/wmb/exoticspecies/documents/melendy_pond.pdf
- "Nashua River Watershed 5 Year Action Plan 2003-2007" prepared by the Nashua River Watershed Association and the MA Watershed Initiative Nashua Team.
http://www.nashuariverwatershed.org/5yr_plan/subbasins/nissitissit.htm