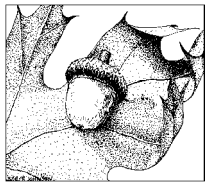
FOREST MANAGEMENT PLAN

Submitted to: Massachusetts Department of Conservation and Recreation
For enrollment in CH61/61A/61B and/or Forest Stewardship Program



CHECK-OFFS					Administrative Box			
CH61	CH61A	CH61B	STWSHP	C-S	Case No.		Orig. Case No.	
cert. ☐	cert. ☐	cert. ☐	new ☒	EEA ☐	Owner ID		Add. Case No.	
recert. ☐	recert. ☐	recert. ☐	renew ☐	Other ☐	Date Rec'd		Ecoregion	
amend ☐	amend ☐	amend ☐	Green Cert ☐		Plan Period		Topo Name	*Haverhill*
			Conservation Rest. ☐		Rare Spp. Hab.		River Basin	*Merrimac*
Plan Change: ____ to ____			CR Holder ____					

OWNER, PROPERTY, and PREPARER INFORMATION

Property Owner(s) ***City of Haverhill, Haverhill Conservation Dept., c/o Robert E. Moore (Dead Hill Reservoir)***
Mailing Address *City Hall Room 310, 4 Summer Street, Haverhill, MA 01830* Phone 978-420-3678

Property Location: Town(s) *Haverhill* Road(s) *Center Street in Groveland*

Plan Preparer ***Gary H. Gouldrup, New England Forestry Cons., Inc.*** Mass. Forester License # *81*
Mailing Address *72 Townsend Street, Pepperell, MA 01463* Phone *978-433-8780*

RECORDS

Assessor's Map No.	Lot/Parcel No.	Deed Book	Deed Page	Total Acres	Ch61/61A/61B *Excluded* Acres	Ch61/61A/61B **Certified** Acres	Stewardship *Excluded Acres*	Stewardship Acres
21	1	UK	UK	60.50	NA	NA	0.00	60.50
21	2	UK	UK	P/O Lot 1	NA	NA	0.00	P/O Lot 1
21	3	UK	UK	0.30	NA	NA	0.00	0.30
21	5	UK	UK	P/O Lot 1	NA	NA	0.00	P/O Lot 1
21	6	UK	UK	P/O Lot 1	NA	NA	0.00	P/O Lot 1
21	7	UK	UK	P/O Lot 1	NA	NA	0.00	P/O Lot 1
			TOTALS	**60.80**	**NA**	**NA**	**0.00**	**60.80**

Excluded Area Description(s) **(if additional space needed, continue on separate paper)**

There are no excluded areas from Forest Stewardship Management.

HISTORY Year acquired *Late 1800's* Year management began *2014*

Is subdivision plan on file with municipality? Yes ☐ No ☒

Are boundaries blazed/painted/flagged/signs posted? (circle all that apply) Yes ☐ No ☒ Partially ☐

Have forest products been cut within past 2 years? Yes ☐ No ☒

What treatments have been prescribed, but not carried out (last 10 years if plan is a recert.)?
Stand no. NA Treatment *NA* Reason *NA*
(if additional space needed, continue on separate page)

Previous Management Practices (last 10 years)

Stand #	Cutting Plan #	Treatment	Yield	Value	Acres	Date
NA	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

Remarks: (if additional space needed, continue on separate page)
This is the first Forest Stewardship Plan prepared for the property.

RECORDS (continued)

Assessor's Map No.	Lot/Parcel No.	Deed Book	Deed Page	Total Acres	Ch61/61A/61B *Excluded* Acres	Ch61/61A/61B **Certified** Acres	Stewardship *Excluded Acres*	Stewardship Acres
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21	6	UK	UK	P/O Lot 1	NA	NA	0.00	P/O Lot 1
21	7	UK	UK	P/O Lot 1	NA	NA	0.00	P/O Lot 1
			TOTALS	**60.80**	**NA**	**NA**	**0.00**	**60.80**

EXCLUDED AREA DESCRIPTION (continued):

There are no excluded areas from Forest Stewardship Management.

HISTORY (continued):

**Stand #*	*Acres*	*Mgt. Practice*	*Yield*	*Value*	*Year*

No Management has been conducted on the property.

This is the first Forest Management Plan for the Dead Hill Reservoir property.

There are trails that are on the property that have not been officially marked or maintained by the Haverhill Trails Committee.

Property Overview, Regional Significance, and Management Summary

The 60-acre Dead Hill Reservoir forest is located in a southern section of Haverhill along the Groveland town line with access to the property off of Center Street in Groveland. The property was once used as a water treatment facility for the City of Haverhill. Water was once pumped up hill from Johnson's Pond located just east of the property along Center Street. The Bradford Ski Area is located on the north side of the property. The property is in a semi-rural setting with working farms and residential dwellings being the primary land use in the area.

Nearby lands with long term protection include the Essex County Greenbelt Association which owns land abutting the property to the east. Groveland's Veasey Memorial Park (50-acres) is located on the east side of Johnson's Pond. Haverhill's Wheeler Woods (40-acres) is located approximately 2,000 feet to the west on Boxford Road.

The property lies in the Merrimack River Watershed. Water that passes through the property flows east into Johnsons Pond and eventually into the Merrimack River located about a mile from the property.

The forest stewardship land is dominated by mature upland forest which is comprised of mixed oak, mixed hardwood, and white pine timber resources. Timber resource quality ranges from poor to high. The forest has not been managed for timber production in the past. An abandoned gravel pit can be found along Johnsons Pond in a southern section of the property. The City abandoned the water treatment facility that is located in a northern section of the forest. The old pump house is still standing where water was once purified. Invasive and non-native vegetation on the property is present in the abandoned water treatment facility area and the abandoned gravel pit. Firebush, honeysuckle, bittersweet, buckthorn and Japanese barberry were all found growing on the property.

Forest soils on the upland sections of the property include well and moderately well drained fine sandy loam soils (Paxton). Seasonally wet drainage areas are poorly drained fine sandy loam (Ridgebury). There are disturbed soils which include the abandoned gravel pit on the south end of the property as well as the abandoned water treatment facility at the northern end of the property. The soils are productive and capable of producing high quality timber resources.

The Haverhill City Mayor, through the Conservation Department, established the Haverhill Forest Stewardship Committee in 2009. The Forest Stewardship Committee has developed the following goals for the Dead Hill Reservoir property:

Management will focus on promoting a healthy forest environment for the safety and enjoyment of the residents of Haverhill and others who will visit the property. The City would like to specifically accomplish the following on this property:

- Enhance both the quality and quantity of future timber products;
- Conduct a biomass operation to improve regeneration and aesthetics;
- Produce firewood that will be made available to residents;
- Enhance wildlife habitat by diversifying tree age and species
- Reduce and control the spread of invasive species
- Protect the water quality of Johnson's Pond; and
- Create a self-guided stewardship trail for public education and enjoyment.

Trail maintenance and interpretive signage will be a priority on this forest for the safety and forest stewardship education of those using the property. Existing trails on the property have not been officially approved and designated by the Trails Committee. The City will coordinate access improvements for recreation with the Essex County Greenbelt Association and the Town of Groveland. Identifying the western boundary line is a priority before management activities move forward. Wildlife habitats will be enhanced through the timber harvesting practices. Creating multiple age classes within the forest will benefit a variety of wildlife species. Identifying large "Legacy Trees" will be done to promote "Old Growth" characteristics within the forest where these trees exist and where this practice is applicable.

All forest management activities will be sensitive to protecting water quality, soils, cultural resources, wildlife habitats, rare and endangered species and their habitats, aesthetics and recreational values. When harvesting timber resources on the property a Chapter 132 Cutting Plan will be filed with the Department of Conservation and Recreation. The Division of Fisheries and Wildlife's Natural Heritage & Endangered Species Program (NHESP) will make recommendations to protect any special vegetation or wildlife and their habitats should they exist on the property.

The primary management objective of the Dead Hill Reservoir will be to preserve, maintain and improve water quality as a public water resource supply for the residents of Haverhill. The Haverhill Forest Stewardship Committee has reviewed the Quabbin Reservoir Watershed System Land Management Plan, 2007-2017 and will use it as a guide when managing the property. The Quabbin Forest Management Objectives can be found on page 144 of the Plan. The Forest Stewardship Committee would like to pursue management of the Dead Hill Reservoir as stated in the first paragraph under the "Primary Objectives" (5.2.3.1). "*The primary objective of forest management of the Quabbin* (Dead Hill Reservoir) *forest is to create and maintain a complex forest structure, which forms a protective forest cover and a biological filter on the watershed land. This watershed protection forest is designed to be vigorous, diverse in species and age, actively accumulating biomass, conserving ecological and economic values, actively regenerating, and most importantly maintaining a predictable flow of high quality water from the land*". Management on the Dead Hill Reservoir will be approached by using the "*Subwatershed Administration of Forest Management*". The Quabbin Plan defines a subwatershed on page 145 (5.2.3.21). "*A subwatershed is defined in most cases as the land area that drains to a perennial tributary of the reservoir*." The Quabbin Plan defines this management theory on page 146 (5.2.3.2.2). "*The general theory behind the use of subwatershed-based planning is to control the proportion of a drainage area that is disturbed by management activities (e.g., logging or road work) during the management period in order to reduce the chances of water quality impacts. This approach is partly based on research on experimental watersheds throughout the eastern US that indicate that until approximately 25-30% of the watershed overstory stocking is harvested (assuming nearly 100% forest cover type), there is no detectable increase in water yield (Hornbeck and Kochenderfer, 2004: Hornbeck et al., 1993). As increases in transport of sediments and nutrients to tributaries and the reservoir are directly related to increases in water yield, it follows that the 25-30% threshold also applies to water quality changes (so long as Conservation Management Practices are in place, the greatest concern is with the movement of nutrients rather than sediments). The same research also demonstrated that water yield generally returns to pre-harvest conditions as the harvested area regenerates – usually within 3-10 years*."

Landowner Goals

Please **check** the column that best reflects the importance of the following goals:

Goal	Importance to Me			
	High	**Medium**	**Low**	**Don't Know**
Enhance the Quality/Quantity of Timber Products*****	X			
Generate Immediate Income		X		
Generate Long Term Income		X		
Produce Firewood	X			
Promote Biological Diversity	X			
Enhance Habitat for Birds	X			
Enhance Habitat for Small Animals	X			
Enhance Habitat for Large Animals	X			
Improve Access for Walking/Skiing/Recreation	X			
Maintain or Enhance Privacy			X	
Improve Hunting		X		
Improve Fishing			X	
Preserve or Improve Scenic Beauty		X		
Protect Water Quality	X			
Protect Unique/Special/ Cultural Areas		X		
Other: Attain Green Certification				X
Other: Public Education & Outreach	X			

*** This goal must be checked "HIGH" if you are interested in classifying your land under Chapter 61/61A.**

1. In your own words please describe your goals for the property:

The City of Haverhill would like to improve and protect the forest resources on the Dead Hill Reservoir property for the benefit of the residents of Haverhill. Protecting the Johnson's Pond Watershed is a high priority. These goals will be accomplished by periodically harvesting timber resources, discouraging the use of unauthorized motor vehicle use (ATV's), enhancing wildlife habitat, and educating the public on forest stewardship matters.

Stewardship Purpose

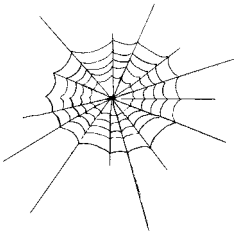
By enrolling in the Forest Stewardship Program and following a Stewardship Plan, I understand that I will be joining with many other landowners across the state in a program that promotes ecologically responsible resource management through the following actions and values:

1. Managing for long-term forest health, productivity, diversity, and quality.
2. Conserving or enhancing water quality, wetlands, soil productivity, biodiversity, cultural, historical and aesthetic resources.
3. Following a strategy guided by well-founded silvicultural principles to improve timber quality and quantity when wood products are a goal.
4. Setting high standards for foresters, loggers and other operators as practices are implemented; and minimizing negative impacts.
5. Learning how woodlands benefit and affect surrounding communities, and cooperation with neighboring owners to accomplish mutual goals when practical.

Signature(s): _____ **Date:** _____

Stewardship Issues

Massachusetts is a small state, but it contains a tremendous variety of ecosystems, plant and animal species, management challenges, and opportunities. This section of your plan will provide background information about the Massachusetts forest landscape as well as issues that might affect your land. **The Stand Descriptions and Management Practices sections of your plan will give more detailed property specific information** on these subjects tailored to your management goals.



Biodiversity: Biological diversity is, in part, a measure of the variety of plants and animals, the communities they form, and the ecological processes (such as water and nutrient cycling) that sustain them. With the recognition that each species has value, individually and as part of its natural community, maintaining biodiversity has become an important resource management goal.

While the biggest threat to biodiversity in Massachusetts is the loss of habitat to development, another threat is the introduction and spread of invasive non-native plants. Non-native invasives like European Buckthorn, Asiatic Bittersweet, and Japanese Honeysuckle spread quickly, crowding out or smothering native species and upsetting and dramatically altering ecosystem structure and function. Once established, invasives are difficult to control and even harder to eradicate. Therefore, vigilance and early intervention are paramount.

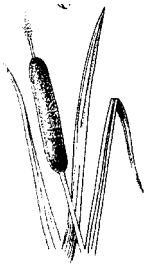
Another factor influencing biodiversity in Massachusetts concerns the amount and distribution of forest growth stages. Wildlife biologists have recommended that, for optimal wildlife habitat on a landscape scale, 5-15% of the forest should be in the seedling stage (less than 1" in diameter). Yet we currently have no more than 2-3% early successional stage seedling forest across the state. There is also a shortage of forest with large diameter trees (greater than 20"). See more about how you can manage your land with biodiversity in mind in the "Wildlife" section below. (Also refer to *Managing Forests to Enhance Wildlife Diversity in Massachusetts* and *A Guide to Invasive Plants in Massachusetts* in the binder pockets.)

Rare Species: Rare species include those that are **threatened** (abundant in parts of its range but declining in total numbers, those of **special concern** (any species that has suffered a decline that could threaten the species if left unchecked), and **endangered** (at immediate risk of extinction and probably cannot survive without direct human intervention). Some species are threatened or endangered globally, while others are common globally but rare in Massachusetts.

Of the 2,040 plant and animal species (not including insects) in Massachusetts, 424 are considered rare. About 100 of these rare species are known to occur in woodlands. Most of these are found in wooded wetlands, especially vernal pools. These temporary shallow pools dry up by late summer, but provide crucial breeding habitat for rare salamanders and a host of other unusual forest dwelling invertebrates. Although many species in Massachusetts are adapted to and thrive in recently disturbed forests, rare species are often very sensitive to any changes in their habitat

Indispensable to rare species protection is a set of maps maintained by the Division of Fisheries and Wildlife's Natural Heritage & Endangered Species Program (NHESP) that show current and historic locations of rare species and their habitats. The maps of your property will be compared to these rare species maps and the result indicated on the upper right corner of the front page of the plan. Prior to any

regulated timber harvest, if an occurrence does show on the map, the NHESP will recommend protective measures. Possible measures include restricting logging operations to frozen periods of the year, or keeping logging equipment out of sensitive areas. You might also use information from NHESP to consider implementing management activities to improve the habitat for these special species.



Riparian and Wetlands Areas: Riparian and wetland areas are transition areas between open water features (lakes, ponds, streams, and rivers) and the drier terrestrial ecosystems. More specifically, a **wetland** is an area that has hydric (wet) soils and a unique community of plants that are adapted to live in these wet soils. Wetlands may be adjacent to streams or ponds, or a wetland may be found isolated in an otherwise drier landscape. A **riparian area** is the transition zone between an open water feature and the uplands (see Figure 1). A riparian zone may contain wetlands, but also includes areas with somewhat better drained soils. It is easiest to think of riparian areas as the places where land and water meet.

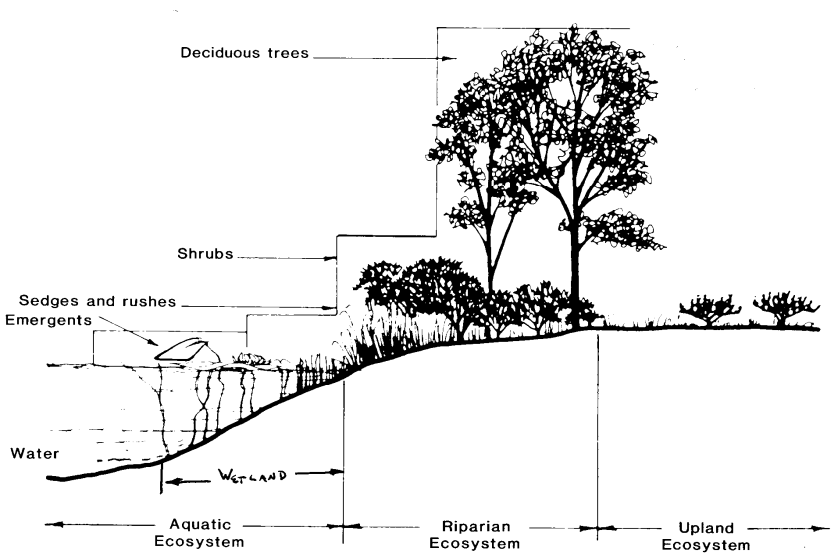


Figure 1: Example of a riparian zone.

The presence of water in riparian and wetland areas make these special places very important. Some of the functions and values that these areas provide are described below:

Filtration: Riparian zones capture and filter out sediment, chemicals and debris before they reach streams, rivers, lakes and drinking water supplies. This helps to keeps our drinking water cleaner, and saves communities money by making the need for costly filtration much less likely.

Flood control: By storing water after rainstorms, these areas reduce downstream flooding. Like a sponge, wetland and riparian areas absorb stormwater, then release it slowly over time instead of in one flush.

Critical wildlife habitat: Many birds and mammals need riparian and wetland areas for all or part of their life cycles. These areas provide food and water, cover, and travel corridors. They are often the most important habitat feature in Massachusetts' forests.

Recreational opportunities: Our lakes, rivers, streams, and ponds are often focal points for recreation. We enjoy them when we boat, fish, swim, or just sit and enjoy the view.

In order to protect wetlands and riparian areas and to prevent soil erosion during timber harvesting activities, Massachusetts promotes the use of "Best Management Practices" or BMPs. Maintaining or reestablishing the protective vegetative layer and protecting critical areas are the two rules that underlie these common sense measures. DEM's Massachusetts Forestry Best Practices Manual (included with this plan) details both the legally required and voluntary specifications for log landings, skid trails, water bars, buffer strips, filter strips, harvest timing, and much more.

The two Massachusetts laws that regulate timber harvesting in and around wetlands and riparian areas are the Massachusetts Wetlands Protection Act (CH 131), and the Forest Cutting Practices Act (CH132). Among other things, CH132 requires the filing of a cutting plan and on-site inspection of a harvest operation by a DEM Service Forester to ensure that required BMPs are being followed when a commercial harvest exceeds 25,000 board feet or 50 cords (or combination thereof).

Soil and Water Quality: Forests provide a very effective natural buffer that holds soil in place and protects the purity of our water. The trees, understory vegetation, and the organic material on the forest floor reduce the impact of falling rain, and help to insure that soil will not be carried into our streams and waterways.

To maintain a supply of clean water, forests must be kept as healthy as possible. Forests with a diverse mixture of vigorous trees of different ages and species can better cope with periodic and unpredictable stress such as insect attacks or windstorms.

Timber harvesting must be conducted with the utmost care to ensure that erosion is minimized and that sediment does not enter streams or wetlands. Sediment causes turbidity which degrades water quality and can harm fish and other aquatic life. As long as Best Management Practices (BMPs) are implemented correctly, it is possible to undertake active forest management without harming water quality.

Forest Health: Like individual organisms, forests vary in their overall health. The health of a forest is affected by many factors including weather, soil, insects, diseases, air quality, and human activity. Forest owners do not usually focus on the health of a single tree, but are concerned about catastrophic events such as insect or disease outbreaks that affect so many individual trees that the whole forest community is impacted.

Like our own health, it is easier to prevent forest health problems then to cure them. This preventative approach usually involves two steps. First, it is desirable to maintain or encourage a wide diversity of tree species and age classes within the forest. This diversity makes a forest less susceptible to a single devastating health threat. Second, by thinning out weaker and less desirable trees, well-spaced healthy individual trees are assured enough water and light to thrive. These two steps will result in a forest of vigorously growing trees that is more resistant to environmental stress.

Fire: Most forests in Massachusetts are relatively resistant to catastrophic fire. Historically, Native Americans commonly burned certain forests to improve hunting grounds. In modern times, fires most often result from careless human actions. The risk of an unintentional and damaging fire in your woods could increase as a result of logging activity if the slash (tree tops, branches, and debris) is not treated correctly. Adherence to the Massachusetts slash law minimizes this risk. Under the law, slash is to be removed from buffer areas near roads, boundaries, and critical areas and lopped close to the ground to speed decay. Well-maintained woods roads are always desirable to provide access should a fire occur.

Depending on the type of fire and the goals of the landowner, fire can also be considered as a management tool to favor certain species of plants and animals. Today the use of prescribed burning is largely restricted to the coast and islands, where it is used to maintain unique natural communities such as sandplain grasslands and pitch pine/scrub oak barrens. However, state land managers are also attempting to bring fire back to many of the fire-adapted communities found elsewhere around the state.

Wildlife Management: Enhancing the wildlife potential of a forested property is a common and important goal for many woodland owners. Sometimes actions can be taken to benefit a particular species of interest (e.g., put up Wood Duck nest boxes). In most cases, recommended management practices can benefit many species, and fall into one of three broad strategies. These are **managing for diversity, protecting existing habitat, and enhancing existing habitat**.

Managing for Diversity – Many species of wildlife need a variety of plant communities to meet their lifecycle requirements. In general, a property that contains a diversity of habitats will support a more varied wildlife population. A thick area of brush and young trees might provide food and cover for grouse and cedar waxwing; a mature stand of oaks provides acorns for foraging deer and turkey; while an open field provides the right food and cover for cottontail rabbits and red fox. It is often possible to create these different habitats on your property through active management. The appropriate mix of habitat types will primarily depend on the composition of the surrounding landscape and your objectives. It may be a good idea to create a brushy area where early successional habitats are rare, but the same practice may be inappropriate in the area's last block of mature forest.

Protecting Existing Habitat – This strategy is commonly associated with managing for rare species or those species that require unique habitat features. These habitat features include vernal pools, springs and seeps, forested wetlands, rock outcrops, snags, den trees, and large blocks of unbroken forest. Some of these features are rare, and they provide the right mix of food, water, and shelter for a particular species or specialized community of wildlife. It is important to recognize their value and protect their function. This usually means not altering the feature and buffering the resource area from potential impacts.

Enhancing Existing Habitat – This strategy falls somewhere between the previous two. One way the wildlife value of a forest can be enhanced is by modifying its structure (number of canopy layers, average tree size, density). Thinning out undesirable trees from around large crowned mast (nut and fruit) trees will allow these trees to grow faster and produce more food. The faster growth will also accelerate the development of a more mature forest structure, which is important for some species. Creating small gaps or forest openings generates groups of seedlings and saplings that provide an additional layer of cover, food, and perch sites.

Each of these three strategies can be applied on a single property. For example, a landowner might want to increase the habitat diversity by reclaiming an old abandoned field. Elsewhere on the property, a stand of young hardwoods might be thinned to reduce competition, while a "no cut" buffer is set up around a vernal pool or other habitat feature. The overview, stand description and management practice sections of this plan will help you understand your woodland within the context of the surrounding landscape and the potential to diversify, protect or enhance wildlife habitat.

Wood Products: If managed wisely, forests can produce a periodic flow of wood products on a sustained basis. Stewardship encompasses finding ways to meet your current needs while protecting the forest's ecological integrity. In this way, you can harvest timber and generate income without compromising the opportunities of future generations.

Massachusetts forests grow many highly valued species (white pine, red oak, sugar maple, white ash, and black cherry) whose lumber is sold throughout the world. Other lower valued species (hemlock, birch, beech, red maple) are marketed locally or regionally, and become products like pallets, pulpwood, firewood, and lumber. These products and their associated value-added industries contribute between 200 and 300 million dollars annually to the Massachusetts economy.

By growing and selling wood products in a responsible way you are helping to our society's demand for these goods. Harvesting from sustainably managed woodlands – rather than from unmanaged or poorly managed forest – benefits the public in a multitude of ways. The sale of timber, pulpwood, and firewood also provides periodic income that you can reinvest in the property, increasing its value and helping you meet your long-term goals. Producing wood products helps defray the costs of owning woodland, and helps private landowners keep their forestland undeveloped.

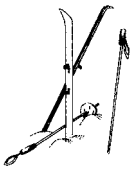
Cultural Resources: Cultural resources are the places containing evidence of people who once lived in the area. Whether a Native American village from 1,700 years ago, or the remains of a farmstead from the 1800's, these features all tell important and interesting stories about the landscape, and should be protected from damage or loss.

Massachusetts has a long and diverse history of human habitation and use. Native American tribes first took advantage of the natural bounty of this area over 10,000 years ago. Many of these villages were located along the coasts and rivers of the state. The interior woodlands were also used for hunting, traveling, and temporary camps. Signs of these activities are difficult to find in today's forests. They were obscured by the dramatic landscape impacts brought by European settlers as they swept over the area in the 17th and 18th centuries.

By the middle 1800's, more than 70% of the forests of Massachusetts had been cleared for crops and pastureland. Houses, barns, wells, fences, mills, and roads were all constructed as woodlands were converted for agricultural production. But when the Erie Canal connected the Midwest with the eastern cities, New England farms were abandoned for the more productive land in the Ohio River valley, and the landscape began to revert to forest. Many of the abandoned buildings were disassembled and moved, but the supporting stonework and other changes to the landscape can be easily seen today.

One particularly ubiquitous legacy of this period is stone walls. Most were constructed between 1810 and 1840 as stone fences (wooden fence rails had become scarce) to enclose sheep within pastures, or to

exclude them from croplands and hayfields. Clues to their purpose are found in their construction. Walls that surrounded pasture areas were comprised mostly of large stones, while walls abutting former cropland accumulated many small stones as farmers cleared rocks turned up by their plows. Other cultural features to look for include cellar holes, wells, old roads and even old trash dumps.



Recreation and Aesthetic Considerations: Recreational opportunities and aesthetic quality are the most important values for many forest landowners, and represent valid goals in and of themselves. Removing interfering vegetation can open a vista or highlight a beautiful tree, for example. When a landowner's goals include timber, thoughtful forest management can be used to accomplish silvicultural objectives while also reaching recreational and/or aesthetic objectives. For example, logging trails might be designed to provide a network of cross-country ski trails that lead through a variety of habitats and reveal points of interest.

If aesthetics is a concern and you are planning a timber harvest, obtain a copy of this excellent booklet: *A Guide to Logging Aesthetics: Practical Tips for Loggers, Foresters & Landowners,* by Geoffrey T. Jones, 1993. (Available from the Northeast Regional Agricultural Engineering Service, (607) 255-7654, for $7). Work closely with your consultant to make sure the aesthetic standards you want are included in the contract and that the logger selected to do the job executes it properly. The time you take to plan ahead of the job will reward you and your family many times over with a fuller enjoyment of your forest, now and well into the future.

This is your Stewardship Plan. It is based on the goals that you have identified. The final success of your Stewardship Plan will be determined first, by how well you are able to identify and define your goals, and second, by the support you find and the resources you commit to implement each step.

It can be helpful and enjoyable to visit other properties to sample the range of management activities and see the accomplishments of others. This may help you visualize the outcome of alternative management decisions and can either stimulate new ideas or confirm your own personal philosophies. Don't hesitate to express your thoughts, concerns, and ideas. Keep asking questions! Please be involved and enjoy the fact that you are the steward of a very special place.

STAND DESCRIPTIONS

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	1	MH	3.27	8.2" DBH Pole	40 sqft	8.2 Cords	55 (RO)

Mixed hardwoods dominate the overstory of this understocked pole sized stand that was once used as a water treatment facility. The mixed hardwoods include black locust, mixed oaks, aspen, box elder, black cherry, and birch poles and small sawtimber sized stems of poor timber quality. Scattered white pine stems can be found as well. Forest regeneration is scattered and includes mixed hardwoods and white pine saplings competing with bittersweet, Japanese barberry, staghorn sumac, multiflora rose, honeysuckle and wild raspberry. The area contains old chain link fencing on man-made berms with an old brick pump house and an open area that once contained water. The soils are disturbed, but appear to be moderately well drained, and capable of producing fair to good timber resources (Paxton). Management will focus on improvement thinning and invasive species control in areas that potentially could be thinned when harvesting is conducted in Stand #2. The desired future condition is a stand that is growing high quality timber resources of desired species without the high density of invasive species that currently occupy the interior sections of the area, while protecting water quality on the Johnsons Pond watershed.

STEW	2	OM	31.20	11.9" DBH Sawtimber-Pole	117 sqft	7,140 BF & 22.0 Cds	63 (RO)

Red oak, black oak, and mixed hardwoods dominate the overstory of this well stocked sawtimber and pole sized stand. The red oak stems are generally well formed and fair to good in form and timber quality. The other mixed hardwoods include white oak, red maple, hickory, and birch poles and sawtimber of poor to good form and timber quality. Scattered white pine can also be found. Forest regeneration is scattered and includes white pine and mixed hardwood saplings. The area is flat to gently sloped with moderately well and well drained fine sandy loam soils in the upland areas (Paxton). The soils are capable of producing high quality timber resources. Management will focus on timber resource management as well as recreation and aesthetic improvements. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing wildlife habitat and recreational opportunities for the public, while protecting water quality on the Johnsons Pond watershed.

STEW	3	WH	19.31	15.3" DBH Sawtimber	155 sqft	17,224 BF & 26.0 Cds.	65 (WP)

White pine is the dominant overstory species in this overstocked sawtimber sized stand. The white pine stems are generally poor to good in form and timber quality. Scattered mixed oaks, hickory, pitch pine, red maple, white ash, and red maple poles and sawtimber of poor to good form and timber quality can also be found. Individual and small pockets of hemlock sawtimber sized trees are also present within the stand. The hemlock woolly adelgid has been found in the hemlock foliage. Forest regeneration is limited due to the dense overstory canopy, although mixed hardwood saplings are present. The area is gently to moderately sloped with moderately well to well drained fine sandy loam soils (Paxton) capable of producing high quality timber resources. Management will focus on timber resource management. The desired future condition is a stand that is growing high quality timber resources in several size and age classes, while protecting water quality on the Johnsons Pond watershed.

STAND DESCRIPTIONS

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	4	MH	4.96	12.7" DBH Sawtimber-Pole	130 sqft	5,982 BF & 28.6 Cds.	63 (RO)

Mixed hardwoods dominate the overstory of this well stocked sawtimber sized stand of poor timber quality. The mixed hardwoods include black oak, black locust, red maple, elm, black cherry, and white ash sawtimber and pole sized stems can all be found. Scattered white pine sawtimber sized trees of poor quality are present as well. Forest regeneration consists of scattered mixed hardwood saplings competing with a dense understory of honeysuckle, firebush and bittersweet. The area is gently to moderately sloped with moderately well and well drained fine sandy loam soils (Paxton). The soils are capable of producing high quality timber resources. Management will focus on timber resource management as well as recreation and aesthetic improvements. The desired future condition is a stand that is growing high quality timber resources in several size and age classes while providing wildlife habitat and recreational opportunities for the public, while protecting water quality on the Johnsons Pond watershed.

STEW	5	MH	1.60	4.8" DBH Sapling-Pole	20 sqft	1.7 Cords	60 (WP)

Aspen, black locust, river birch, white birch, and mixed oaks are the primary species in this abandoned gravel pit and young forest stand that is adequately stocked with trees. Honeysuckle is present in the understory. The area is flat to steeply sloped on the north side of the stand. The soils are disturbed and mostly well drained and capable of producing high quality timber resources. No timber management is recommended at this time. The desired future condition is a stand that is growing high quality timber resources and provides recreational opportunities for the public, while protecting water quality on the Johnsons Pond watershed.

STEW	6	P	0.46	Pond	NA	NA	NA

This area is part of Johnsons Pond that extends into Groveland. Johnsons Pond is a public drinking water supply.

MANAGEMENT PRACTICES
to be done within next 10 years

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	

Timber Management

STEW	2	OH	Selection Harvest Improvement Thin	15+/-	30 sqft	30 MBF & 40 Cords	2014-2023

Management will focus on improvement thinning by selection harvesting. The target is to harvest approximately 1/4 of the overstory volume. Management will focus on harvesting mature oak and hardwood sawtimber sized stems (18" DBH+) in order to improve growing conditions within this overstocked stand. Suppressed and low quality stems of all sizes will also be harvested and utilized as firewood and wood chips. Thinning will release well-formed and high quality stems in order to improve their growth and canopy development. A portion of the trees that are healthy and have reached a diameter of 25-30" DBH will be retained as "Legacy Trees". These special trees will be highlighted by harvesting trees below and around them. Advanced regeneration will be released and the site will be prepared for new production in the understory as a result of thinning. High value sawtimber will be sold as sawlogs, low quality hardwoods will be utilized as firewood, and tops of trees will be chipped and burned at wood burning facilities for generating electricity. Please see page 15 for details about the Haverhill Home Fuelwood Program. Chipping the tops of trees will be important for protecting and improving aesthetics and reducing the threat of forest fires.

STEW	3	WH	Shelterwood 1	18+/-	40 sqft	90 MBF & 720 Tons	2014-2023

Management will focus on harvesting through the shelterwood system. The target is to harvest approximately 1/4 - 1/3 of the overstory volume. The emphasis will be to harvest mature white pine sawtimber (18" DBH+) in order to improve the growing conditions of the developing high quality white pine sawtimber sized stems. Poorly formed and low quality white pine and mixed hardwood stems of all sizes will also be harvested to improve the growing conditions within the stand. High value sawtimber will be sold as sawlogs, while the low quality softwood trees and portions of trees will be chipped and utilized at wood burning facilities that generate electricity. The low quality hardwoods that are harvested will be cut, skidded and landed for the purpose of providing firewood to the citizens of Haverhill. Please see page 15 for details about the Haverhill Home Fuelwood Program. Whole-tree chipping the tops of trees will be important for protecting and improving aesthetics and reducing the threat of forest fires. Some of the largest trees within the stand (25" DBH+) will be selected as "Legacy Trees" and retained for biological diversity. This shelterwood harvest will prepare the understory for establishing new regeneration. Hemlock trees that have died or are severely infested with the hemlock woolly adelgid will also be harvested. Some of the dead snags will be left as wildlife habitat trees.

STEW	1	MH	Patch Cut-Scenic Vista	2+/-	40 sqft	16.4 Cords	2014-2023

Approximately two acres around the old drinking water reservoir will be completely cleared of trees and invasive species for the purpose of creating a scenic vista on this very high section of land. The project may also include the removal of chain link fences and brick structures as well as grading the earth berms around the reservoirs perimeter. The Forest Stewardship Committee will consult with the Water Department prior to implementing this practice. The desired future condition is an area where the terrain has been restored to a more natural topography and has the potential of being a scenic vista.

OBJECTIVE CODE: CH61 = Forest Products (for Ch. 61/61A) STEW= Stewardship Program practices
STD= stand Type= Forest type AC= acre MBF= thousand board feet BA= basal area VOL= volume

Owner(s) Haverhill – Dead Hill Reservoir Town(s) Haverhill

MANAGEMENT PRACTICES
to be done within next 10 years

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	4	OH	Improvement Thin Group Selection	4.5+/-	40 sqft	3.5 MBF & 23 Cords	2014-2023

Management will focus on improvement thinning and group selection harvesting. The target is to harvest approximately 1/3 of the overstory volume. Harvesting will focus on harvesting the very poor quality timber resources which will include the black locust, mixed oak, white pine, red maple and black cherry stems of all sizes. Trees to be retained will be the mixed oaks and white pine stems that are well formed and have the potential of producing high quality timber resources in the future. An emphasis will be to cut as much of the invasive species that are present in the understory. Firebush, honeysuckle, and bittersweet in particular are well established and are preventing the establishment of new regeneration. Cutting the invasives and skidding timber through the understory will reduce the density, scarify the soil and prepare the site for new regeneration of native tree species. High value sawtimber will be sold as sawlogs, low quality hardwoods will be utilized as firewood, and tops of trees will be chipped and burned at wood burning facilities for generating electricity. Please below for details about the Haverhill Home Fuelwood Program. Chipping the tops of trees will be important for protecting and improving aesthetics and reducing the threat of forest fires.

Wood landing areas will be seeded to ensure stability and provide alternative wildlife habitat.

Home Fuelwood Program

The Forest Management Committee has developed the *Haverhill Home Fuelwood Program* as a means of making firewood available to the residents of Haverhill. The low quality hardwood stems that are harvested in the recommended timber sales within the Dead Hill Reservoir property will be one of the sources of wood for this program. Hardwood stems that are cut on the property will be skidded to landings on the property used for the commercial timber harvesting project. The trees will be cut to a length of approximately 24 feet and then trucked to the Haverhill Highway Facility at 500 Primrose Street where the firewood will be stacked in one-cord piles. Haverhill residents will be allowed to bid on the one-cord piles at the completion of the commercial harvest. Successful bidders will be required to cut the trees into stove lengths and remove the firewood on their own. The successful bidders will be required to sign a liability waiver that does not hold the City of Haverhill liable for any accidents, injury or death as a result of cutting and removing the stacked firewood. The intent is to make the project revenue neutral and as safe as possible. There will be a cost of having the firewood trees cut, skidded, landed and trucked to the Haverhill highway facility at 500 Primrose Street of approximately $75-$80 per cord. Bids for the stacked firewood must at least cover this cost.

Boundary Maintenance

STEW	All	All	Blaze & Paint	40+/-	NA	NA	2014-2023

The boundary lines are in need of identification, blazing and painting prior to any management on the property. The western boundary in particular is currently unknown. No physical evidence of a boundary line was seen on most of this section of line. Property deeds and available abutter surveys will be used to locate the property lines. Please see the Boundary & Stand Type Map for boundary evidence found.

MANAGEMENT PRACTICES
to be done within next 10 years

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	

Biological Diversity

STEW	1-6	All	Invasive Species Control	60+/-	NA	NA	2014-2023

The Forest Stewardship Committee is interested in promoting biological diversity on the property. Eliminating invasive and non-native trees, plants and shrubs will be done where these species exist and when economically feasible and practical. Invasive species are prolific in a few areas of the Dead Hill Reservoir property. Stands 1 & 4 contain the majority of the problem areas. Buckthorn, firebush (winged euonymus), bittersweet, honeysuckle, Norway maple, and Japanese barberry are all present on the property. Cutting the stems of invasive species with saws, or with other mechanical means, will help reduce and control the spread of the invasive species. Controlling the invasive species through well timed timber management activities is another management tool. Encouraging vigorous growth of native tree species in the forest understory will be accomplished by scarifying the soil prior to seed dissemination. Another biodiversity issue is the distribution of forest growth stages. Trying to maintain multiple forest age and size classes on the property will also be pursued by the landowner on this property through periodic timber harvests and wildlife habitat management. Please see the Biological Diversity issues on page #6 for more details.

The Forest Stewardship Committee will seek council from the UMass Amherst Extension Center for Agriculture and the United States Forest Service with regard to controlling invasive species as part of a forest stewardship program to ensure active management activities do not result in proliferation of these species in any of the City's forest lands.

Recreation Management
Forest Stewardship Education

STEW	1-5	All	Trail Maintenance Forest Stewardship Education	60+/-	NA	NA	2014-2023

The existing trails on the Dead Hill Reservoir property have not been officially designated by the Haverhill Trails Committee. The trail system will be extended into new areas of the forest and existing trails will be improved and officially designated and maintained for the safety, enjoyment and education of the residents of Haverhill. Trail maps, tags, interpretive signs, picnic tables, and a gate will all be variables associated with the management of the trails and the education of those who will be using the trails. Interpretive signs along the trails will help educate the property users about Forest Stewardship matters within the forest interior. Improving the parking lot area and prohibiting vehicular access to the forest will also be a priority. Parking lot improvements off of Center Street and access to the property will be negotiated with the Town of Groveland and possibly with the Essex County Greenbelt Association for any trails that could potentially be constructed on their property.

Signature Page Please check each box that applies.

☐ **CH. 61/61A Management Plan** I attest that I am familiar with and will be bound by all applicable Federal, State, and Local environmental laws and /or rules and regulations of the Department of Conservation and Recreation. I further understand that in the event that I convey all or any portion of this land during the period of classification, I am under obligation to notify the grantee(s) of all obligations of this plan which become his/hers to perform and will notify the Department of Conservation and Recreation of said change of ownership.

☒ **Forest Stewardship Plan**. I pledge to abide by the management provisions of this Stewardship Management Plan for a period of at least ten years, following approval. I understand that in the event that I convey all or a portion of the land described in this plan during the period of the plan, I will notify the Department of Conservation and Recreation of this change in ownership.

Signed under the pains of perjury:

Owner(s) _____ Date _____

_____ Date _____

I attest that I have prepared this plan in good faith to reflect the landowner's interest.

Plan Preparer _____ Date _____

I attest that the plan satisfactorily meets the requirements of CH61/61A and/or the Forest Stewardship Program.

Approved, Service Forester _____ Date _____

Approved, Regional Supervisor _____ Date _____

In the event of a change of ownership of all or part of the property, the new owner must file an amended Ch. 61/61A plan within 90 days from the transfer of title to insure continuation of Ch. 61/61A classification.

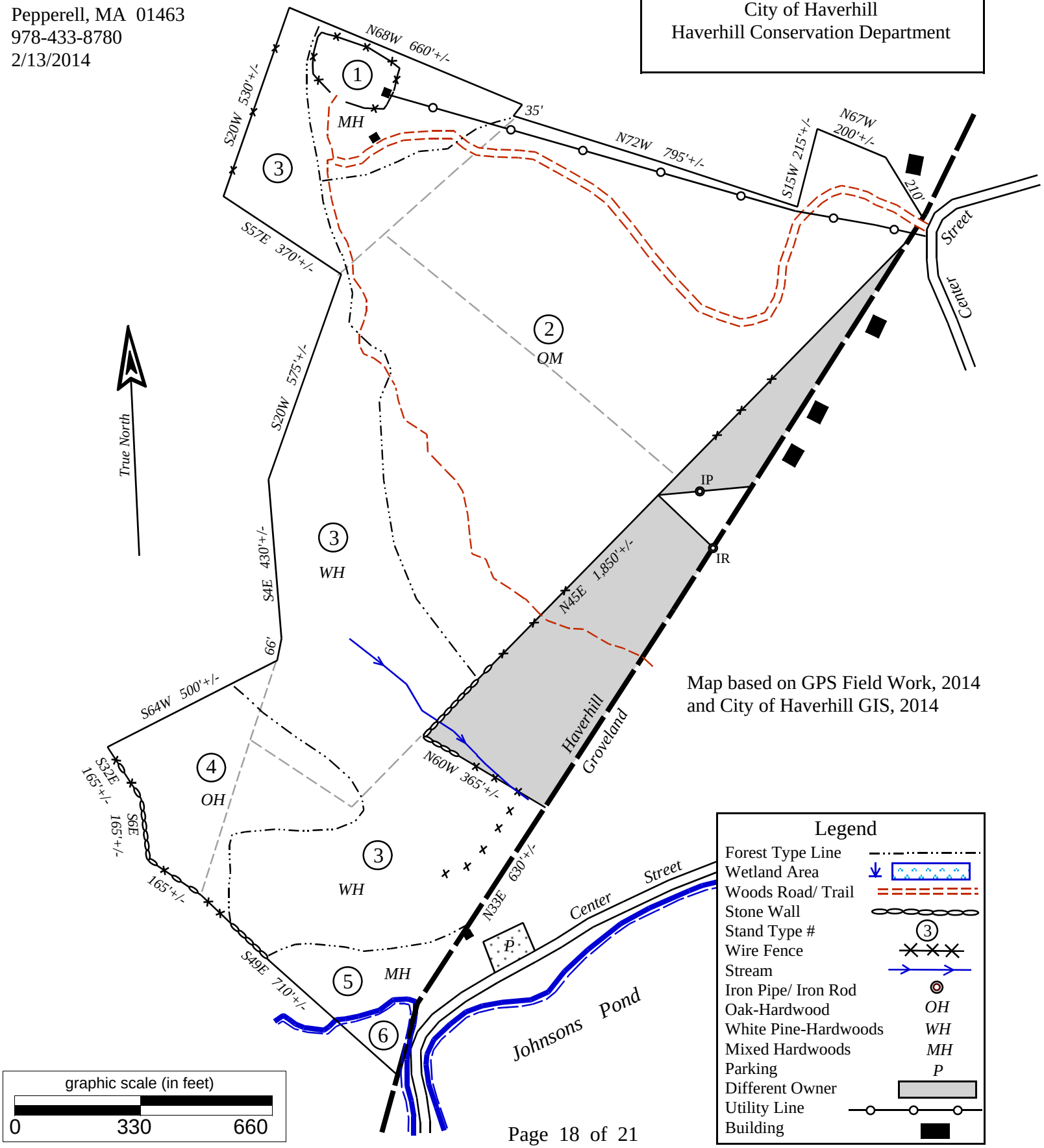
New England
Forestry Consultants, Inc.

Prepared By:
Gary H. Gouldrup
Consulting Forester
72 Townsend Street
Pepperell, MA 01463
978-433-8780
2/13/2014

BOUNDARY & STAND TYPE MAP

Land in Haverhill, MA
Dead Hill Reservoir Lot

Owned By:
City of Haverhill
Haverhill Conservation Department



Map based on GPS Field Work, 2014
and City of Haverhill GIS, 2014

graphic scale (in feet)
0 330 660

Legend

Forest Type Line	
Wetland Area	
Woods Road/ Trail	
Stone Wall	
Stand Type #	3
Wire Fence	
Stream	
Iron Pipe/ Iron Rod	
Oak-Hardwood	*OH*
White Pine-Hardwoods	*WH*
Mixed Hardwoods	*MH*
Parking	*P*
Different Owner	
Utility Line	
Building	

City of Haverhill
Dead Hill Reservoir Lot
Haverhill, MA
2013 Aerial Photo

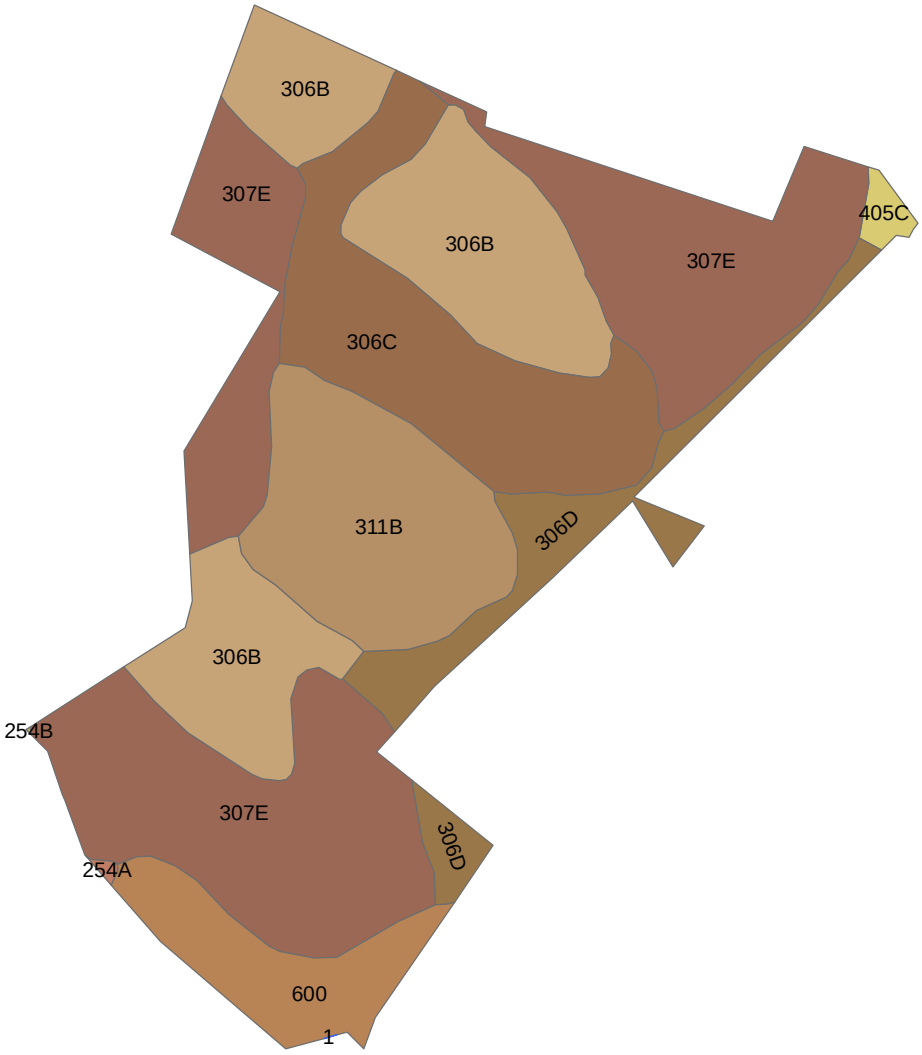
500 250 0 500 1,000 Feet

N
W E
S

Prepared by:
New England Forestry Consultants, Inc
Sherman R. Small, Consulting Forester
Maine License # LF655
New Hampshire License # 409
April 16, 2014

Sketch map for management and planning purposes only, NOT A LEGAL SURVEY
Data obtained from MASS GIS, & New England Forestry Consultants, Inc.

City of Haverhill
Dead Hill Reservoir Lot
Haverhill, MA
Soils Map



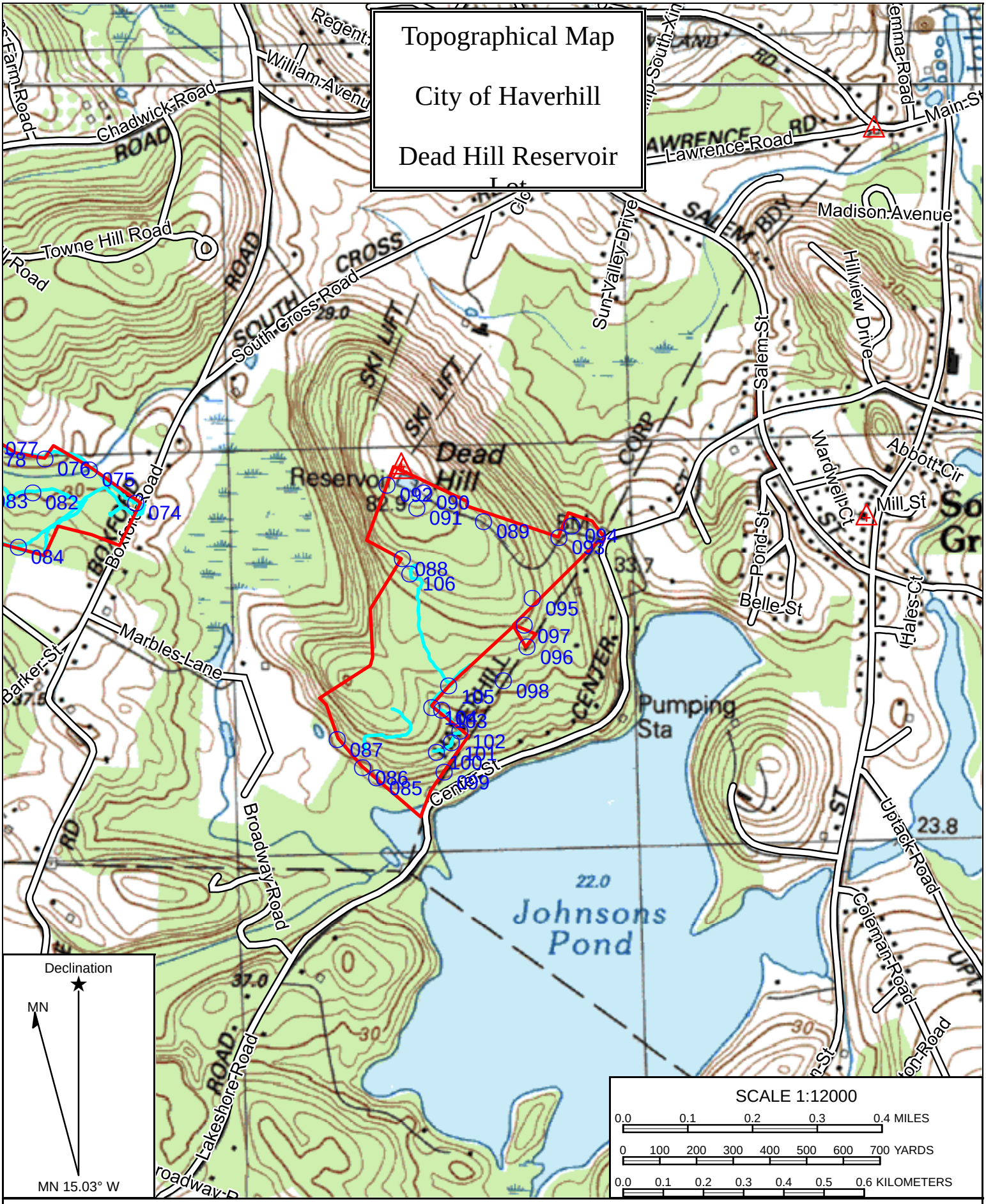
307B Soils Symbol

500 250 0 500 1,000 Feet

N
W E
S

Prepared by:
New England Forestry Consultants, Inc
Sherman R. Small, Consulting Forester
Maine License # LF655
New Hampshire License # 409
April 16, 2014

Sketch map for management and planning purposes only, NOT A LEGAL SURVEY
Data obtained from MASS GIS, & New England Forestry Consultants, Inc.



Name: LAWRENCE
Date: 04/28/14
Scale: 1 inch = 1,000 ft.

Location: 042° 44' 18.38" N 071° 03' 23.78" W
Caption: Dead Hill Reservoir