

**Forest
Stewardship
Plan**
(10-Year Planning Period)

Town of Pelham, NH
Costa Conservation Area
116.7+/- Acres
August 28, 2009

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Property Owners: Town of Pelham
Location: Peabody Town Forest, Old Lawrence Road, Pelham, NH
Total Acreage: 116.7 +/- Acres¹
Forested Acres: 78.5 Acres (excludes Stand 8)
Powerline Acres: 13.2 Acres
Wetland Acres: 25.0 Acres
Map/Lot Numbers: Map 36, Block 10, Lots 5, 9, 10, 10.1, 10.15, 10.28, 10.30, 15
Date Prepared: August 28, 2009

General Description of the Property

This newly-acquired area of forestland is located in southern Pelham, south of Little Island Pond, on Dutton Road. Although most of the property is forested, there is a large area of forested wetland as well as a maintained powerline right-of-way that runs through the southwestern part of the property. The property is not heavily used by a large portion of the public, although the OHRVs have been using the northern part of the property heavily. A new snow-mobile trail is in the process of being built through this property to connect the forestland with the trails on the powerline. Although the Town has owned some of the out-lying parcels for a few years, it was only recently that the larger blocks of forestland were acquired from donations and agreements in conjunction with the development of Frontier Drive, and these have helped to connect the previously isolated parcels. Due to the lack of continuity between parcels before this time, very little forest management has taken place in this area.

Boundaries

The boundaries on this property range from very discernible to unknown. Some of the boundaries are stone wall, although there are a number of lines without discernible corner points. This property sits south of Dutton Road, east of Birch Lane, and northwest of the Massachusetts state line. Most of the property sits northeast of the powerline, some forestland is located west of the powerline behind the houses on Birch Lane.

The northern area, made up of the largest parcels, were recently donated to the Town, and have accurate surveys to delineate their boundaries. However, some of the corner evidence has not yet been placed around the houselots on Frontier Drive, and so some of these lines have not yet been blazed and painted. Once the surveyors finish the work on the development, these lines should be blazed and painted.

To the east of these northern parcels lies a small piece of forested wetland that the Town has owned for a while, but it has no access and is mostly underwater for much of the year. Although some discernible boundary evidence could be found, these lines (many behind houselots) should be blazed and painted. A survey map for some of the adjacent parcels has been located to aid in finding these lines, some of which are stone wall or have corner evidence.

The southern-most parcel of this property was another Town parcel that was previously isolated, and contains about 7 acres of forestland sitting between a strip of

¹ This acreage figure was ascertained using GPS field data and the latest GIS aerial photography available from the UNH GRANIT database, and may or may not match the Assessor's data exactly.

powerline and part of the forested wetland. No discernible boundary evidence can be found for this area of the property. A survey of the line coming out of the forested wetland, through the upland forest, and into the powerline would be helpful to keep from harvesting on the neighboring parcel to the south.

Finally, the area west of the poweline contains nearly 20 acres of forestland that should be managed, although the boundaries are difficult to locate. The western line (behind the houses) is stone wall, and a number of drill holes have been located there. However, the actual corners have not been located, nor is there evidence to located the northern or southern boundary lines that head into the powerline. These lines should be surveyed and monuments laid out as soon as possible in preparation for the upcoming timber sale during the early part of this planning period.



One of the difficulties involved with locating the boundaries for this property is the fact that so many of the lines and corners are located either in forested wetlands (submerged under water) or within the powerline ROW, which is frequently maintained and thus line evidence is hard to keep up.

Access

Although this land technically has road frontage in two locations on Dutton Road, both of these access points contain poorly-drained soils and head into stream crossings. Following Best Management Practices (BMPs), access to the northern part of this forest should be gained off of Frontier Drive on a higher, drier knoll, where a landing can be built. This will minimize the number of stream crossings made with forest access roads, and will centralize the landing for more of the property. Most of the eastern edges of this property will not be accessed at all for timber harvesting purposes, due to the wetness of soils. There is a very narrow neck of upland that connects the southern and western land



to the northern high ground, and although it currently appears to be wide enough for skidding, deeded access should be pursued off of Birch Lane through one or more of theouselots for forestry and emergency access purposes only. Various small footpaths can be found meandering through the property from a fewouselots abutting this land.

A parking area with a property map and kiosk should be set up at an appropriate area off Frontier Drive to facilitate more public recreational use

of the property, since better public use can often discourage trash-dumping by

irresponsible users. A trail loop should be considered around this property, highlighting any unique features such as the old cellar hole or the forested wetland areas; such a project could be undertaken by a local Eagle Scout, as has been done in the past on Town lands.

Forest Types & Harvest History

Forests with varying composition in terms of species, age, and density are able to respond with more resilience to catastrophic events than monocultures. Most trees in unmanaged, overgrown forests are chronically short of much-needed nutrients, sunlight, and water, and are therefore constantly living in a stressed environment. Pre-stressed trees are much more susceptible to disease than their healthy counterparts growing in a well-spaced, healthy forest. Forests are broken down into management units called stands, which are areas of trees with similar species composition, size, and frequency of occurrence.

This particular property has an abundance of harvest history. Judging from the stone walls and proximity to rivers, this woodlot most likely was cleared in the mid-1800s for sheep pasture, part of the movement across much of New England to increase wool production for water-powered mills along the banks of most New Hampshire waterways. When the pastures were abandoned, white pine grew in and the area was forested again. Subsequent cutting removed the white pine from some areas, and the open environment allowed red oak to seed in and become established in direct sunlight. The oldest trees on this property are likely 80-100 years old, although most are younger. With the exception of a few areas associated with the Frontier Drive development, most of this land has not been harvested in the past 40 years. Overall, the forest is overcrowded and growth has been stagnated due to lack of resources. This is particularly evident in the drier, upland forested areas in the southern and western part of the property, where trees have been dying and falling out of the overstory.

In quantitative terms, about 80 acres of this property are considered forestland, growing nearly 800 MBF (thousand board feet) of timber and about 1,700 cords of hardwood and softwood pulp. While this sounds like a high amount of low-grade wood, it should be noted that nearly half of these cords are located in Stand 8, the red maple swamp, and should not be considered accessible for harvest purposes. White pine is the dominant species in terms of volume, accounting for 40% of the standing timber volume with over 330 MBF of timber. Red oak accounts for another 1/3 of the total volume, with 280 MBF, while black oak accounts for 12% of the volume, less than 100 MBF. Red maple is the only other species of importance (in terms of volume of timber), with close to 60 MBF of timber, making up 7% of the total standing timber volume; however, half of this is growing in the red maple swamp of Stand 8, making this volume even less significant than it already is. The remaining 3% of the timber consists of small amounts of white ash, white oak, poplar, and hickory, none of which make up more than 1% of the total volume. More details on the timber cruise are available below, and a complete summary is available on Page 7.

Soils, Terrain, & Hydrology

Forests are essential for preventing erosion of existing soil and maintaining clean water. Riparian and wetland areas are the places that open water and upland sites meet. A riparian zone is the general term for the area where water and land meet, whereas a wetland is an area in a riparian zone that specifically has hydric, or wet, soils as well as vegetation that grows on that type of soil. Riparian areas are important a number of reasons. They offer critical habitat for many wildlife species, providing shelter, food, water, and travel corridors. They are also very useful for flood control by acting as a sponge during times of high water volume, and then releasing that water slowly and consistently over time. Without wetlands, streams would fluctuate greatly between periods of high flow and dry streambeds. Finally, riparian areas are key for filtering water as it travels from upland sites to the open water, keeping out many chemical impurities and keeping water silt-free.



There are numerous pockets of wetland areas, some of which are connected with overland or subterranean flows. Most of these surface streams, and many of the wet holes, dry up in the summer months, although some of the larger wet areas remain wet the whole year round. That being said, there has been little distinction made on the Stand Map between vernal pools (which are only seasonal) and year-round wetland areas.

Soils on this property vary considerably, from excessively-drained upland soils with exposed bedrock to very poorly-drained soils with standing water. Some areas have deep, fertile soils, and with appropriate management these areas have increased production of quality red oaks. Appendix A handles the soil types found on this property in depth. Drainage on this property tends to be towards the northeast or to the south, with the powerline acting roughly as the dividing line between watersheds. The southern drainage flows into Tonus Brook, which empties into Beaver Brook, which in turn flows south into the Merrimack River. The northern drainage, on the other hand, makes its way onto the Girl Scout property and flows into Little Island Pond.

Overall, this property has gently rolling terrain, with very few rock outcrops or sheer cliffs, although the southwestern corner of the southern parcel and the western areas of the powerline ROW would be exceptions to that fact.

Wildlife

Biological diversity can be described as the variety of plants and animals located in a given tract of land or landscape and the communities that are formed by that variety of species. This property has enormous value for wildlife, in the areas of food, water, cover, and breeding habitat. The wide variety of forest types and ages, the gentle terrain, and presence of standing water all help to make the property very diverse when it comes to flora and fauna.

As mentioned, the presence of water adds a great deal to the value of this property for wildlife. Wildlife professionals have often documented that water greatly increases the diversity of wildlife populations. This is most likely due to the wide variety of fish, birds, mammals, amphibians, reptiles, and invertebrates that depend on water for life, which then attract predators as well, the great horned owl being one example.

Another habitat type that is rapidly becoming rare in New England is that of early successional species. This dense, brushy growth is excellent cover and breeding grounds for a number of small upland mammals and birds. The maintained powerline provides excellent early successional habitat at no maintenance cost to the Town.

Two of the biggest threats to biological diversity today are loss of habitat to non-forest uses and invasive species. Although this property is not in danger of being altered into a non-forest use, some small pockets of invasive species have been found around the property. These small areas should be addressed aggressively while the outbreaks are still small, in order to prevent the species from spreading any further through the forest and overtaking more acreage. Overall, this property has a wealth of diverse habitats that support a large number of different species of birds, waterfowl, upland game, mammals, amphibians, reptiles, and their supporting flora.



Timber Cruise

A detailed timber cruise was completed on the property yielding 31 plots of tree data across each forested stand. This data was used to tabulate the current tree growth on the property and the field notes made during this cruise helped to create many of the maps in this management plan. A cruise is a statistical sample that is used to determine the volumes of various forest products growing on the property. This cruise generates volumes in terms of cords (for all trees 6-11" in diameter, or trees larger than 11" that are not suitable for sawtimber) and board feet (for trees 12" and greater in diameter that could be sold and sawn into boards). The diameter of a tree is measured at 4.5' above the ground, which is an industry standard referred to as diameter at breast height (DBH). From this intensive cruise, a total of 8 stands were delineated for this property, one of which (Stand 8) is classified as a forested wetland, and was not heavily inventoried due to its inaccessibility for harvesting purposes. Stands are areas of trees with similar species composition, size, and frequency of occurrence. These stands will be the basis for the methodical analysis of the forest management plan, and are depicted on the following Stand Map.

Landowner Goals & Objectives

The Town of Pelham has been very proactive in protecting various areas around the town from development by keeping areas open for recreational use and maintaining

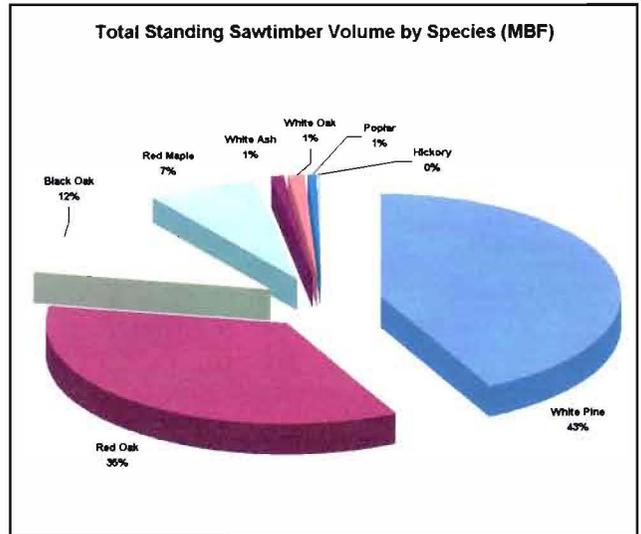
areas of forestland for wildlife habitat and timber production. Many of these parcels are associated with wetland areas that benefit greatly from the forested buffer they have instead of having pavement and lawns in the riparian zones. The Town continues to educate citizens and developers alike, explaining the benefits of forested lands around built-up areas. The general goals of the Town can best be summed up with the key words of the New Hampshire Tree Farm System, of which the Town is a member: wood, water, wildlife, and recreation. The Town is interested in managing their woodlots for long-term, sustainable forest management. They are interested in generating periodic revenue from timber harvests that encourage quality wood growth on residual trees as well as encourage regeneration, in order to grow tomorrow's forest beneath the forest of today. The Town owns many of their properties in order to protect sensitive wetland sites and waterways by maintaining a forested buffer between the open water and built-up areas. Because Pelham is a town with many people, the municipal officials recognize that families, individuals, and schoolchildren benefit from having wooded areas for walking and nature watching. The Town hopes to keep these areas open to responsible recreation without compromising the other three goals. Finally, the Town recognizes that the native wildlife species of New Hampshire need areas for food, water, shelter, and raising young. To that end, these forests are kept as biologically diverse as possible while maintaining the other three goals as simultaneously as possible.

The goals for this specific property are to periodically thin the forest to gain some revenue over the years; maintain a trail system through the area for walking, biking, and non-motorized winter activities; maintain the integrity of the wetland areas with no pollution, siltation, or alteration of the terrain; and provide a diversity of species with enough cover, food, and water so as not to lose species from living in this area of Pelham. Sound forest management will be able to meet most of these goals.

Currently, the property is being used by only a small cross-section of the public, and better access to this Town Forest by more of the general populace would be desired. To that end, a parking area and better trail system should be established for future recreation. Furthermore, a better road system should be built that would allow forestry access deeper into the forest. Finally, forests should continue to be managed under the sound, proven management of field forestry professionals.

**Forest Products Summary Table for All Stands
Town of Pelham
Costa Conservation Area
Total Acreage: 116.7 +/- acres**

<u>Species</u>	<u>Board Feet</u>
White Pine	337,699
Red Oak	281,685
Black Oak	94,891
Red Maple	58,567
White Ash	7,883
White Oak	7,815
Poplar	5,525
Hickory	1,709
White Birch	1,965
Total Sawtimber	795,774²
Hardwood Cordwood	1,517 Cords
Softwood Pulpwood	220 Cords
Total Cordwood	1,737 Cords³



A basal area factor 10 prism was used to conduct the inventory sample. A total of 31 plots, distributed across each forested stand, were taken to arrive at this cruise summary. Roughly half of the cordwood, softwood pulp, and red maple sawtimber is located in the red maple swamp known as Stand 8, and should not be considered accessible.

² This sawtimber total represents all the trees of sawtimber quality 12 inches and greater in diameter found in this block. In order to capture this total volume, all trees of this specification would have to be harvested.

³ These cordwood totals, both softwood and hardwood, represent all the standing trees with diameters of 6-11.9 inches found in this block, as well as trees of larger diameters that do not meet sawtimber quality specifications. In order to capture this total volume, all trees of this specification would have to be harvested.

TOPOGRAPHIC MAP

Property of:

Costa Family Conservation Area

Dutton Road, Pelham, MA

116.7 +/- ac

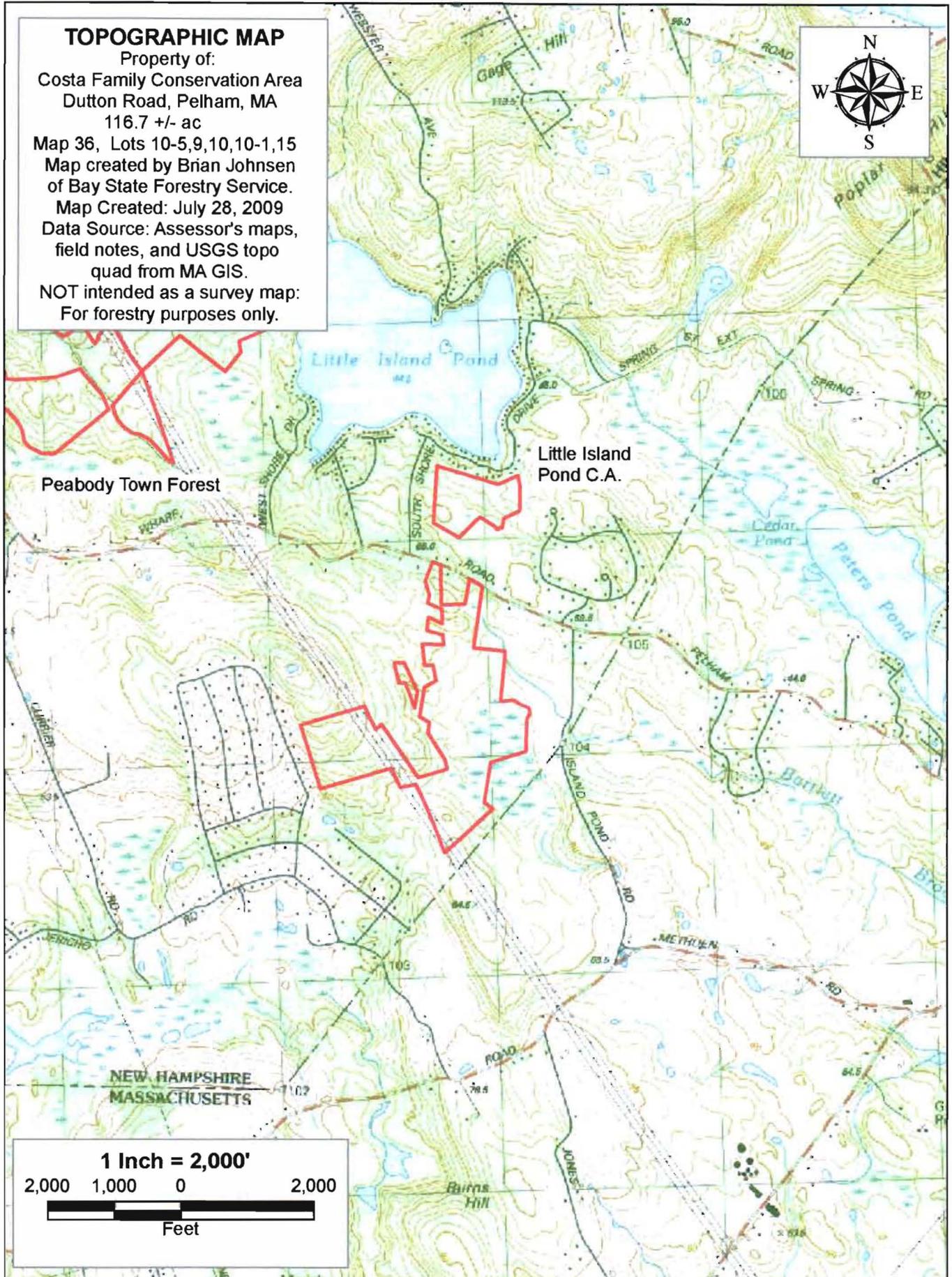
Map 36, Lots 10-5,9,10,10-1,15

Map created by Brian Johnsen
of Bay State Forestry Service.

Map Created: July 28, 2009

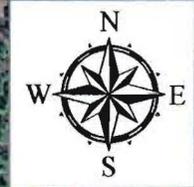
Data Source: Assessor's maps,
field notes, and USGS topo
quad from MA GIS.

NOT intended as a survey map:
For forestry purposes only.



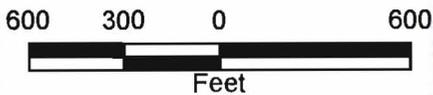
2003 PHOTO MAP

Property of:
Town of Pelham
Dutton Road area, Pelham, MA
47 +/- ac (previous ownership)
Map 36, Lots 10-5,9,15
Map created by Brian Johnsen
of Bay State Forestry Service.
Map Created: July 28, 2009
Data Source: Assessor's maps,
field notes, and 2003 aerial
photos from MA GIS.
NOT intended as a survey map:
For forestry purposes only.



Donated ~2005

1 Inch = 600'



2008 PHOTO MAP

Property of:

Costa Family Conservation Area
Dutton Road, Pelham, MA

16.7 +/- ac (with new acquisitions)

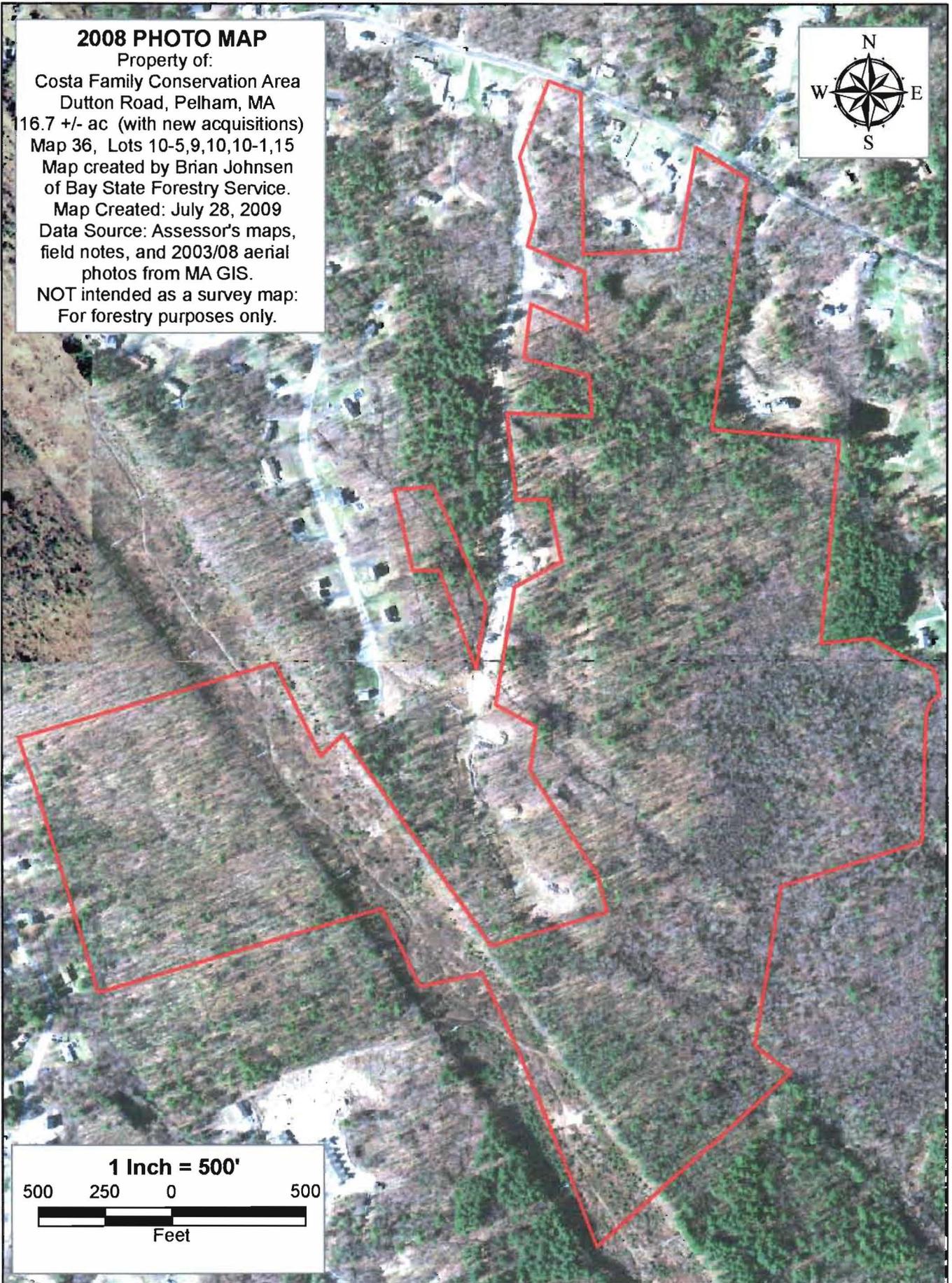
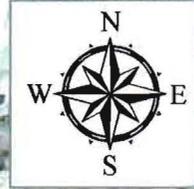
Map 36, Lots 10-5,9,10,10-1,15

Map created by Brian Johnsen
of Bay State Forestry Service.

Map Created: July 28, 2009

Data Source: Assessor's maps,
field notes, and 2003/08 aerial
photos from MA GIS.

NOT intended as a survey map:
For forestry purposes only.



1 Inch = 500'



STAND MAP

Property of:

Costa Family Conservation Area
Dutton Road, Pelham, MA
116.7 +/- ac

Map 36, Lots 10-5,9,10,10-1,15

Map created by Brian Johnsen
of Bay State Forestry Service.

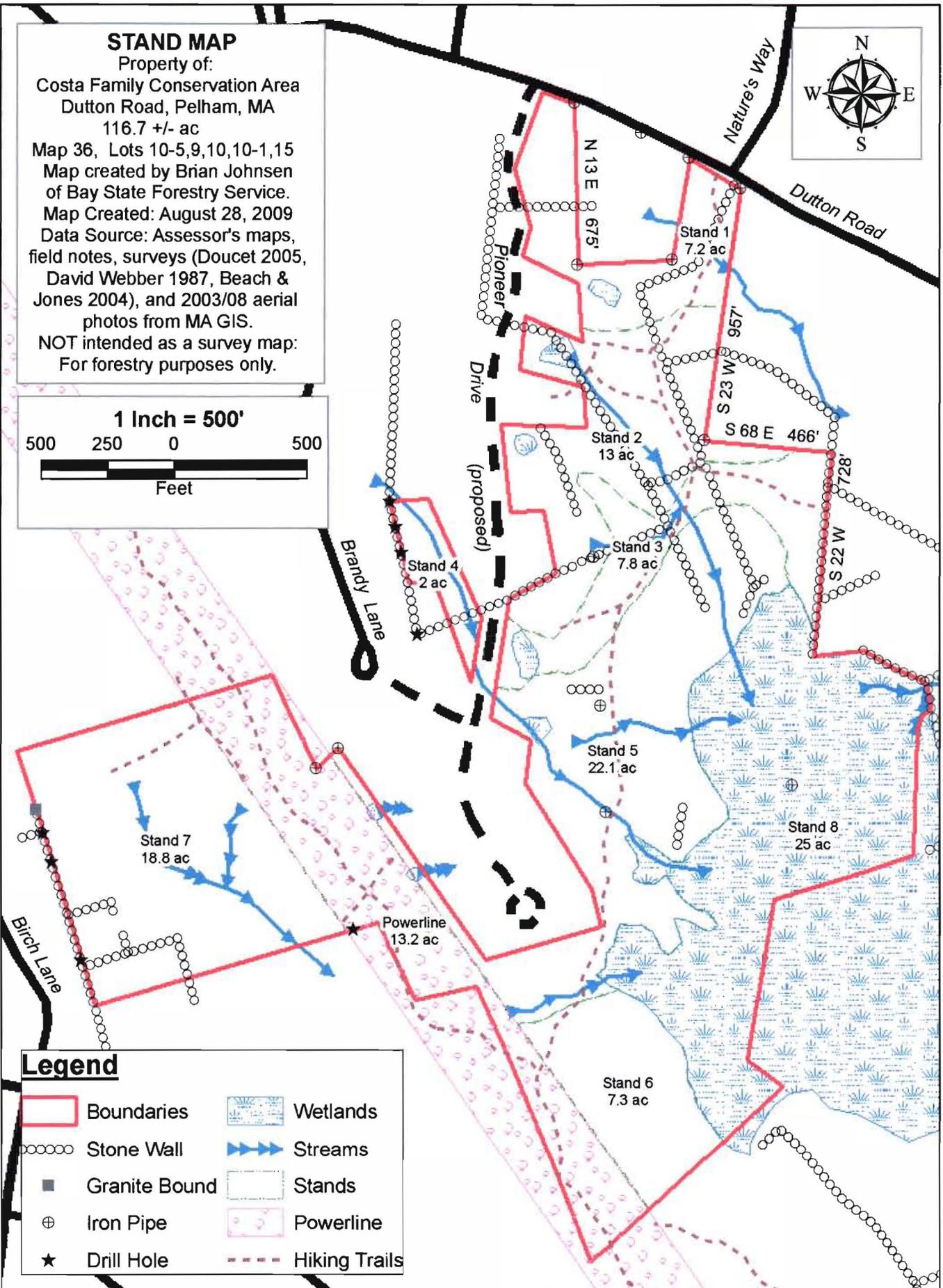
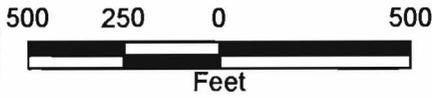
Map Created: August 28, 2009

Data Source: Assessor's maps,
field notes, surveys (Doucet 2005,
David Webber 1987, Beach &
Jones 2004), and 2003/08 aerial
photos from MA GIS.

NOT intended as a survey map:
For forestry purposes only.



1 Inch = 500'



Legend

- | | |
|---------------|---------------|
| Boundaries | Wetlands |
| Stone Wall | Streams |
| Granite Bound | Stands |
| Iron Pipe | Powerline |
| Drill Hole | Hiking Trails |

General Management Strategies

Timber – One of the main goals for this property is sound timber management in order to produce a periodic income. A list of management strategies on a stand-by-stand basis is discussed later in this plan.



Fish/Wildlife Habitat – Although some activities can manage for a specific plant or animal (species specialists), most forest management activity focuses on habitat generalists by managing for a diversity of species, protecting existing critical habitat, and enhancing existing habitat. Keeping large browsers in mind, there will be some areas that are opened up to sunlight to encourage young growth on the forest floor. Harvesting methods will minimize damage to young saplings to provide food low to the ground. Some large mast trees (oaks) will be maintained despite poor quality as lumber as a food source for small mammals; their presence will, in turn, help to feed the hawk population that frequents this area for food.

Soil – Care will be taken to not harvest in mud season, when the ground is too soft, or on excessive slopes, to minimize rutting and erosion during harvest operations. Landings will be seeded with a conservation mix and limed at the conclusion of the job to stabilize the soil, and waterbars will be installed on skid trails where necessary. All these erosion controls will not prevent erosion, however, if OHRV's are not controlled. The Town will need to decide the best way the handle this situation.

Water Quality – Buffers will be left along streams and the wetland edges to avoid removing too many trees at once; this will provide soil stabilization along waterways and adequate shade. This shade will decrease water temperature and therefore increase the water's oxygen-holding capacity. The wetlands and streams will be left intact to keep the water clean and silt-free. Poled fords will be used when crossing smaller streams to further prevent siltation. Fueling of machines will not take place near the water's edge to prevent pollution.



Wetlands – In order to preserve the integrity of more sensitive areas of this woodlot, wetlands will only be harvested under dry or frozen conditions. Temporary bridges are being built for snow machines to cross wet areas, although currently there is some damage occurring to the wetlands on the powerline and near the narrow neck of high ground along the wetland area between the cul-de-sac of Frontier Drive and the southern parcel.

Recreational Resources – The skid trails will provide a nice network of trails for recreational opportunities, both for walking and wildlife viewing. To this end, trails will be kept free of slash where possible. A walking trail system should be designed and completed during this 10-year period, along with a parking area and kiosk describing the natural features of the Town Forest as well as the beneficial outcomes of timber harvesting. Access should also be created off of Birch Lane to allow the many residents of that neighborhood area to enjoy this large forested area.

Aesthetic Values – To maintain good aesthetics, logging operations will not rut up the soils and will cut up the tops so they lay close to the ground for rapid decay. Logging crews may specifically leave high brush, rocks, and log barricades along trails that should be closed to OHRV's, but this will be an exception, following the landowner's goals to prevent erosion and maintain the integrity of sensitive wetlands.

Cultural Features – Care will be taken to avoid breaching or breaking the stone walls during timber harvests unless no openings exist to allow the trees to be skidded to the landing. To accomplish this, loggers will use existing barways for skidding.

Forest Protection – The diversity of tree species does well to protect this property from a forest pest looking for a monoculture of timber. By keeping logging slash low to the ground, decay is speeded up; this prevents too much of a buildup of fuels as a fire hazard.

Threatened/Endangered Species and Unique Natural Communities – During all the walks through this forestland, no species were identified as either threatened or endangered. If at some time any flora or fauna are identified on this property as such, appropriate measures will be taken to prevent disturbing that species.

Invasive Species Considerations – During all the walks through this forestland, some species were identified as non-native, exotic, invasive species. These included some of the more common forest invasives such as multi-flora rose, Norway maple, and bittersweet. Most of these invasives were located in the wetter, poor soils within a few hundred feet of Dutton Road. These locations should be pinpointed and treated aggressively through physical (cutting, removing) and chemical (herbicide) means early in this planning period in order to prevent further spread of the species to a point at which it is unmanageable.

Forest Management Plan

Stand 1 – Mixed Oak Sawtimber

Standing Volumes -- Stand 1			7.2 Acres	
Species	Average BA/acre (sq. ft./ac.)	Average Height (16' sticks)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Red Maple	13	1.0	1,000	7,200
White Ash	7	1.3	583	4,200
Red Oak	7	1.3	583	4,200
Sawtimber Total:	27	1.2	2,167	15,600
		8' sticks	Cords/ac.	Total Cords
Cordwood	60	3.4	13	95
Total BA/acre	87			

Description:

This stand, located along the northern boundary line of the property on Dutton Road, consists partly up more upland, drier conditions (west) and lower, poorly-drained conditions (east, around the stream.) Overall, the overstory consists of poor-quality red maple and white ash clumps 6-16" in diameter, along with occasional white pine and red oak of similar size. The western, more upland area of this stand appears to have grown in after a disturbance, mostly likely from abandoned field, and thus there is some weeviled white pine 4-10" in diameter, and areas of smaller pole-sized wood consisting of good black birch, white pine, white birch, red maple, white ash, and red oak 4-10" in diameter. The eastern part of this stand has had less disturbance around the stream flowing through it, and a number of trees have blown over because of shallow rooting, due to the over-saturated soils. Soils are generally deep, loamy, and wet, but fertile, sloping to the east with grades of 1-3%, although in the western part of the stand they are somewhat drier and there is even a knoll of high ground with moderately well-drained soils. Given the younger age of the forest in the western half of the stand, there is very little regeneration on the forest floor with patches of white pine 1-4' tall and some red oak and black birch up to 1" in diameter, 10-20' tall. In the eastern part of the stand, there are areas with only deciduous wetland shrubs and red maple 3-8' tall, and some areas with white pine 2-4' tall. Access to this stand will be very good once Frontier Drive has been completed, although the saturation of the soils will limit logging.

Recommendations:

Parts of this stand are growing well, and would benefit from a thinning, at times merely a TSI operation. A light thinning would be helpful to open up holes in the canopy around the best sawtimber trees in order to speed up their growth, but currently the stocking levels are about where they should be to encourage good growth. Such a harvest would only remove competing trees from the future crop trees. However, very little harvesting should be done around the wet areas on either side of the stream, to prevent damage to the soil and disrupting the flow of water. A second bridge should be built to keep walkers, snowmobiles, and ATVs out of the mud and stream channel. Such a harvest will yield very little sawtimber, but will improve the growth of the forest.

Stand 2 –White Pine Sawtimber

Standing Volumes -- Stand 2			13 Acres	
Species	Average BA/acre (sq. ft./ac.)	Average Height (16' sticks)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
White Pine	113	2.3	15,917	206,917
Red Oak	20	1.1	1,583	20,583
Black Oak	3	1.0	250	3,250
Sawtimber Total:	137	1.5	17,750	230,750
		8' sticks	Cords/ac.	Total Cords
Cordwood	13	3.3	2.8	36
Softwood Pulp	10	5.0	3.0	39
Total BA/acre	160			

Description:

This stand, located south of Stand 1, consists of a band of white pine sawtimber 10-26" in diameter through the northern block of the forest, with a light mixture of red and black oak sawtimber 14-22" in diameter. The lower strata of the canopy also has some black birch and red maple poles 6-12" in diameter. Regeneration consists of some black birch, white pine, and red maple saplings 4-10' tall, although there are pockets of very little regeneration found in shadier areas, and some patches of very good white pine seedlings 2" tall carpeting the forest floor. Soils tend to be moderately well-drained, good and productive, and at times rocky, with rolling terrain that generally slopes to the east with grades of 2-6%. Small wetland pockets give rise to an intermittent stream with a flat, poorly-drained valley that cuts through this stand and flows southeast into the red maple swamp of Stand 8. Access to this stand is currently somewhat poor, but will be much better once Frontier Drive is completed and a landing can be built off of that road.



Recommendations:

This stand would benefit greatly from a sawtimber harvest that would remove much of the over-mature and crowded white pine sawtimber, allowing more room for the codominant and intermediate trees of better vigor and form to grow and develop. Such a harvest would remove some of the most mature timber, creating growing space for residual timber stock as well as providing sunlight on the forest floor to encourage growth from the advance regeneration found here. Such a harvest would remove about 60 MBF of white pine timber, as well as some hardwood sawtimber and 20+ cords of chipwood, bringing the residual basal area down closer to 100 square feet per acre.

Stand 3 – White Pine/Oak Sawtimber

Standing Volumes -- Stand 3				7.8 Acres
Species	Average BA/acre (sq. ft./ac.)	Average Height (16' sticks)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
White Pine	60	2.6	9,250	72,150
Red Oak	27	1.4	2,583	20,150
Red Maple	10	1.2	833	6,500
Black Oak	10	1.0	750	5,850
Sawtimber Total:	107	1.5	13,417	104,650
		8' sticks	Cords/ac.	Total Cords
Cordwood	63	3.7	14.9	116
Softwood Pulp	3	4.0	0.8	6
Total BA/acre	173			

Description:

This stand, located in a thin band between Stands 2 and 5, consists of a mixture of white pine and red oak sawtimber surrounded by a heavy pole component of red maple. The overstory is made up of this general mixture of species (including some black oak) 14-22" in diameter, along with hardwood poles 6-12" in diameter, including red maple, red oak, black birch, and white oak. Regeneration is comprised of decent white pine 4-8' tall in patches, many ferns, and areas with only some red maple and white pine saplings 2-6' tall. Soils range from being well-drained in the uplands to somewhat poorly-drained near the brook and wet areas, with few rocks, and sloping generally to the east with grades of 3-8%. Access to this stand will be good once the landing is established off of Frontier Drive, but is currently rather poor.

Recommendations:

This stand should be treated similarly to Stand 2, although focusing on more biodiversity here, whereas Stand 2 is almost entirely white pine. This stand would benefit greatly from a sawtimber harvest that would remove much of the over-mature and crowded white pine sawtimber, allowing more room for the codominant and intermediate trees of better vigor and form to grow and develop. Such a harvest would remove some of the most mature timber, creating growing space for residual timber stock as well as providing sunlight on the forest floor to encourage growth from the advance regeneration found here. This harvest would also remove more black oak in order to favor the red oak component and help it dominate. Finally, this harvest should also remove most of the poorly-formed hardwood trees, such as red maple, that have been over-topped and are merely taking up sunlight and nutrients at this point. Such a harvest would remove about 25 MBF of white pine timber, 10-15 MBF of mixed oak and hardwood sawtimber, and 20+ cords of chipwood, bringing the residual basal area down closer to 120 square feet per acre. This harvest should result in a slightly denser stand than that of Stand 2, given the concern over poorer soils; leaving the stand thicker will prevent excessive blowdown.

**Stand 4 – White Pine/Red Oak Sawtimber
1.94 Acres**

(excerpt taken from Management Plan for Conservation Land to be Deeded to the Town of Pelham, N.H., Feb. 21, 2006, by Daniel J. Cyr, NH LPF #121, Page 6)

Description:

“This small compartment is comprised almost entirely of red maple growth, 6-14 inches in diameter along with some scattered white pine and mixed oaks, 8-18 inches in diameter on the small uplands area. Most of this stand is found along both sides of a small intermittent stream that comes in from the property just to the west and eventually leads into the large, red maple area [Stand 8] being deeded to the Town known as Compartment C. This area has not been harvested in 30 years as well but evidence of past farming activities can be found here. An old stone ford can be found on an intermittent flow next to a stone wall. This shows that the area was at one time used for pasture and to move animals from one dry area to another using the stone crossing.”

Recommendations:

“The best management strategy for this area will be to leave it alone as a riparian buffer for the intermittent stream and the wetlands.”

Stand 5 – Red Oak/Hardwood Sawtimber & Poles

Standing Volumes -- Stand 5			22.1 Acres	
Species	Average BA/acre (sq. ft./ac.)	Average Height (16' sticks)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Red Oak	57	1.5	5,083	112,342
White Pine	7	3.0	1,167	25,783
Black Oak	5	1.0	375	8,288
Red Maple	3	1.5	333	7,367
White Oak	3	1.3	292	6,446
Poplar	3	1.0	250	5,525
White Ash	2	1.5	167	3,683
Sawtimber Total:	80	1.5	7,667	169,433
		8' sticks	Cords/ac.	Total Cords
Cordwood	57	4.4	15.3	337
Total BA/acre	137			

Description:

This very productive stand, found south of Stand 3 and west of Stand 8 along the back of the Frontier Drive houselots, consists mainly of red oak sawtimber 12-24" in diameter, with scattered black oak, red maple, and white oak of similar size. Also found scattered through the overstory is large white pine sawtimber greater than 20" in diameter. The cordwood component consists mostly of red oak and red maple 8-20" in diameter; about half of this component is the immature beginnings of a future stand, and the other half consists of poorly-formed overstory trees. Soils range from moderately well-drained to somewhat poorly-drained, given that much of this stand sits between the uplands of Stand 2 and the lowlands of Stand 8. The terrain is rolling and generally slopes to the east with grades of 2-8%. Regeneration consists of some white pine 2-5' tall, black birch and red maple 10-20' tall, and pockets of good white pine saplings 4-8' tall, along with many ferns. In at least one area there is a pocket of poplars 8-16" in diameter, which could end up being a good area for upland game birds to feed and roost. Access to this stand is currently poor, but will be very good once Frontier Drive is built. It is in this stand that there is a narrow neck of uplands around the houselots of the new development that may or may not serve to access the western and southern areas of forestland; if the access proves successful, this stand will be quite essential for connectivity between all areas of this Town forest ownership.

Recommendations:

This stand would benefit greatly from a sawtimber harvest that would remove some of the most mature timber, creating growing space for residual timber stock as well as providing sunlight on the forest floor to encourage regeneration. This harvest would remove more black oak and red maple in order to favor the red oak component and help it dominate, and should also remove most of the poorly-formed hardwood trees. An exception to this would be some excellent mast producers (both red and white oak), which should be left scattered about as a food and regeneration source. Such a harvest would remove about 45 MBF of sawtimber, and about 150 cords of chipwood.

Stand 6 – Upland Mixed Oak Sawtimber

Standing Volumes -- Stand 6				7.3 Acres
Species	Average BA/acre (sq. ft./ac.)	Average Height (16' sticks)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Red Oak	65	1.3	5,688	41,519
Black Oak	35	1.3	3,125	22,813
White Pine	5	2.8	813	5,931
White Oak	3	1.0	188	1,369
Sawtimber Total:	108	1.6	9,813	71,631
		8' sticks	Cords/ac.	Total Cords
Cordwood	38	3.9	9.1	66
Softwood Pulp	33	3.5	7.2	52
Total BA/acre	178			

Description:

This small stand, located at the southern tip of the property, consists mostly of red and black oak sawtimber 12-22" in diameter, along with scattered overstory white pine greater than 20" in diameter. The low-grade component consists of white pine, black oak, red maple, and red oak 6-20" in diameter, most of which is pole-sized, immature wood, but some of which is poorly-formed overstory "wolf" trees. Regeneration is not flourishing under this shady overstory, with some white pine, red maple, and hickory 4-20' tall. Soils are very well-drained to somewhat well-drained, following the grade from the upland ridge in the southwestern half of the stand next to the powerline sloping down to the wetland to the northeast. There are few surface rocks on this ground that slopes to the north/northeast with grades of 5-15%. Access is currently poor.



Recommendations:

Management of this stand should be similar to that of Stand 5, conducting a sawtimber harvest that would remove some of the most mature timber, creating growing space for residual timber stock as well as providing sunlight on the forest floor to encourage regeneration. This harvest would remove more black oak and red maple in order to favor the red oak component and help it dominate, and should also remove most of the poorly-formed hardwood trees. An

exception to this would be some excellent mast producers (both red and white oak), which should be left scattered about as a food and regeneration source. Some large overstory white pine should be left for seed, but much of it is mature and ready to be removed to allow sunlight to reach the advance regeneration on the forest floor. Such a harvest would remove about 25 MBF of sawtimber and 30-40 cords of chipwood.

Stand 7 – Upland Mixed Oak Sawtimber

Standing Volumes -- Stand 7				18.8 Acres
Species	Average BA/acre (sq. ft./ac.)	Average Height (16' sticks)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Red Oak	51	1.2	4,409	82,891
Black Oak	35	1.2	2,909	54,691
White Pine	8	3.0	1,432	26,918
Hickory	1	1.5	91	1,709
Sawtimber Total:	95	1.7	8,841	166,209
		8' sticks	Cords/ac.	Total Cords
Cordwood	34	3.9	8.2	155
Softwood Pulp	5	3.8	1.1	20
Total BA/acre	133			

Description:

This stand, in the southwestern corner of the powerline behind the Birch Lane houses, is similar to Stand 6, and consists mostly of mixed oak 8-24" in diameter along with scattered overstory white pine 16-24" in diameter. This stand has very dry soils, sometimes excessively drained, and rocky, with shallow soils and bedrock close to the surface in some places. Other areas are more fertile with slightly more water and soil available, where the red oak grows well. Many of the black oaks have butt rot and are falling out of the overstory, which may indicate a fire in the past. The understory consists mainly of good red oak and black oak poles, along with some scattered white oak and red maple, growing over an understory of blueberries and saplings. The sapling component is comprised of white pine, red oak, black oak, and white oak 2-10' tall, very good in some pockets, but generally somewhat thin, with heavier amounts of blueberries covering the forest floor or nestled between exposed rock. This stand offers an excellent source of acorns and berries near the powerline, providing very good food and cover for mammals and birds so close to the powerline. Hawks seem to particularly enjoy this area for hunting small mammals. The terrain is rolling, and generally slopes gently to the south with grades of 4-12%. This stand is not currently accessible in any means, although the narrow neck of uplands in Stand 5 may be the only answer to reach this area. Access may be sought from the neighboring houselots on Birch Lane.

Recommendations:

Management of this stand should be similar to that of Stand 6, conducting a sawtimber harvest that would remove some of the most mature timber, creating growing space for residual timber stock as well as providing sunlight on the forest floor to encourage regeneration. This harvest would remove more black oak and red maple in order to favor the red oak component and help it dominate, and should also remove most of the poorly-formed hardwood trees, while leaving some excellent mast producers scattered about as a food and regeneration source. Some large overstory white pine should be left for seed, but much of it is mature and ready to be removed to allow sunlight to reach the advance regeneration on the forest floor. Such a harvest would remove about 50 MBF of sawtimber and 30-40 cords of chipwood.

Stand 8 – Wet Red Maple and Swamp

Standing Volumes -- Stand 8			25 Acres	
Species	Average BA/acre (sq. ft./ac.)	Average Height (16' sticks)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Red Maple	20	1.0	1,500	37,500
Sawtimber Total:	20	1.0	1,500	37,500
		8' sticks	Cords/ac.	Total Cords
Cordwood	110	4.2	28.5	711
Softwood Pulp	10	7.0	4.1	102
Total BA/acre	140			

Description:

This very wet stand, making up much of the eastern part of this property, consists mostly of a red maple swamp. The overstory generally consists of red maple 4-16" in diameter growing on hummocky soils that are fairly saturated with water much of the year. Occasional red oak, white pine, and white oak 14-24" in diameter can also be found growing around the edges of this stand or on dry hummocks, but in general this stand has very little in the way of sawtimber-quality wood. The cordwood component of the stand is almost entirely red maple, with only a little bit of white ash and white oak mixed in. Regeneration is comprised mostly of skunk cabbage, ferns, and deciduous wetland shrubs. Soils tend to be very poorly-drained, often with standing water on the surface, and slope generally to the east with grades of 0-3%. The stand is generally submerged and is inaccessible by conventional harvesting practices.

Recommendations:

This stand is more or less inaccessible for harvesting purposes and should be left alone as a wetland area to help regulate water quality and flow amounts. That being said, if it is possible to reach any sawtimber from the edges of this stand, such harvesting should take place in conjunction with harvesting of adjacent areas, since this timber will merely rot and fall to the ground eventually, and it would make better financial sense to capture this value before it is lost. A biomass harvest can be especially useful in this scenario, or conventional felling with a long cable to remove the trees from the wet area. Any such action should be conducted during very dry or frozen conditions, being sure to maintain the integrity of these sensitive soils.

Management Schedule

2009

- Prepare the forest management plan.
- Blaze and paint identifiable boundary lines and survey unknown boundaries.

2009-10

- Conduct a timber harvest in harvestable areas, using either biomass or conventional equipment. Seed and lime the landing at the conclusion of the timber harvest. A timber access road and landing should be constructed into Stands 5 and 7 to access the forest from both ends. A steel gate should be installed at the entrance of these access roads.
- Construct a parking area and kiosk in conjunction with the timber harvest.

2010-19

- Monitor the woodlot for wind damage, ice damage, fire, or disease and take appropriate corrective actions as needed to ensure the continued health of this forest block.
- Address parking issues for trailheads, and trail creation and maintenance.
- Re-assess the woodlot in 10 years and write a new 10-year management plan, specifically looking at TSI potential and another harvest midway through the next management period.
- (Recommended Item) Make this property available for Project Learning Tree excursions for the local schools.

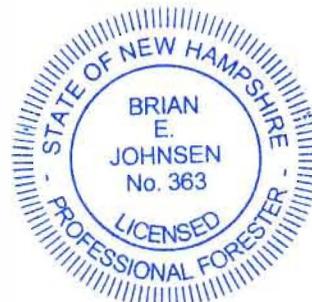
Concluding Remarks

The recommendations proposed in this 10-year management plan should be implemented within the next 10 years, although timing will depend on landowner priorities, market conditions, and environmental conditions such as pest outbreaks and weather. Through sound silvicultural practices and using best management practices (BMP's), mature, diseased, and defective trees will be harvested to allow residual trees to grow in their place. This forest should be monitored for pest outbreaks and destructive weather events; corrective action should be taken as needed over the next 10 years in response to any such events. These recommendations are silviculturally and operationally sound and should result in meeting the landowners' objectives for their woodlot. Implementing these recommendations will help ensure that this forestland is being managed with long-term sustainability in mind.

Respectfully Submitted,



Brian E. Johnsen, Consulting Forester
N.H. License #363



Appendix A.

**SOILS
INFORMATION**

SOILS MAP

Property of:
Costa Family Conservation Area
Dutton Road, Pelham, MA
116.7 +/- ac

Map 36, Lots 10-5,9,10,10-1,15

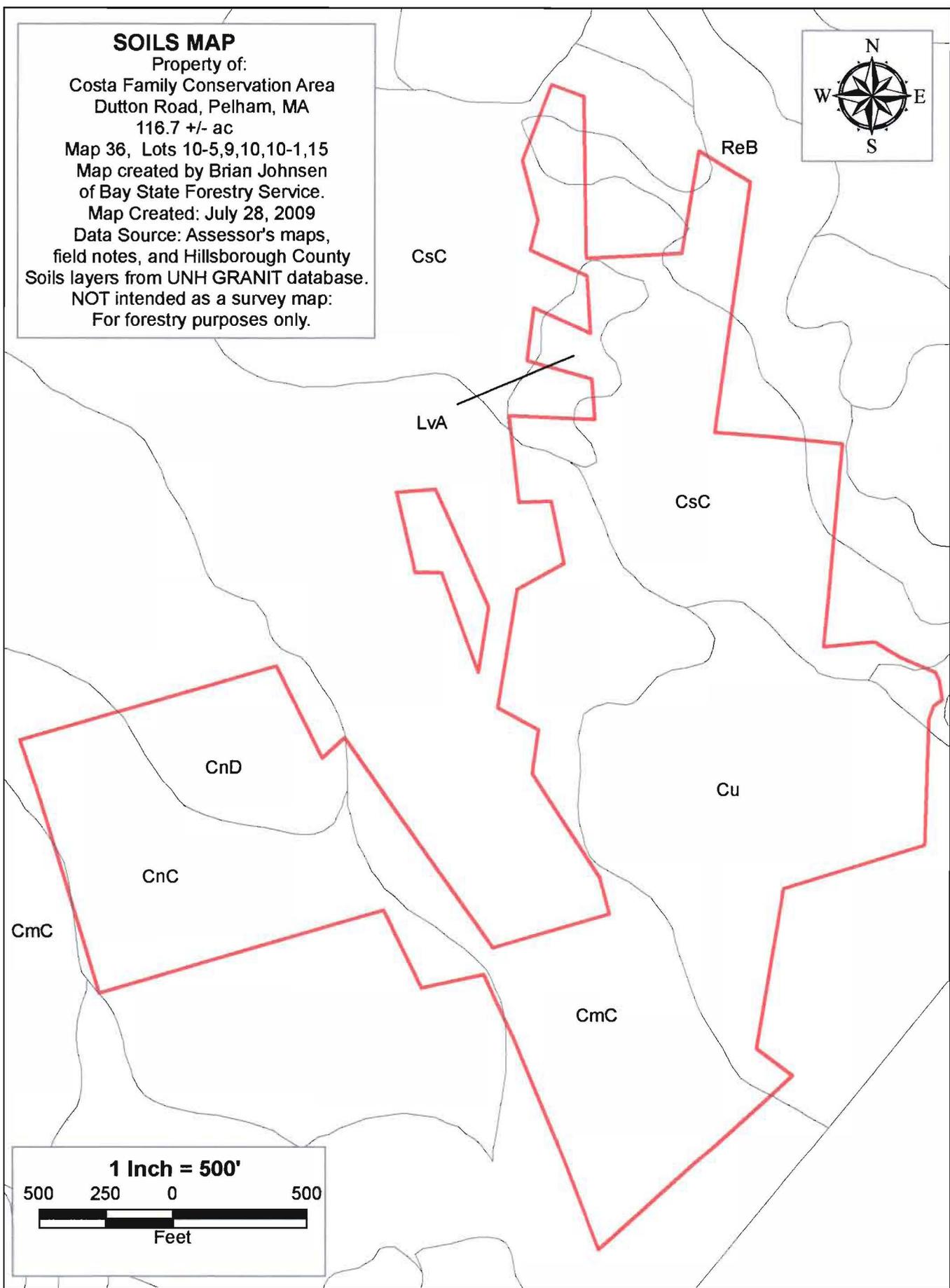
Map created by Brian Johnsen
of Bay State Forestry Service.

Map Created: July 28, 2009

Data Source: Assessor's maps,
field notes, and Hillsborough County
Soils layers from UNH GRANIT database.

NOT intended as a survey map:

For forestry purposes only.



1 Inch = 500'

500 250 0 500



Feet

Hillsborough County Soils Profiles

- CmC – Canton stony fine sandy loam, 8-15% slopes**
Suitability for growing wetland plants for wildlife habitat – Very poor.
Suitability for growing coniferous and hardwood trees – Good.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Good.
Suitability for area as habitat for openland wildlife – Poor.
Has a good site index (greater than 60) for red pine.
Has only slight erosion hazard and slight windthrow hazard.
Well-drained, moderate permeability, low productivity as forestland, steep slopes can limit logging.
- CnC – Canton very stony fine sandy loam, 8-15% slopes**
Suitability for growing wetland plants for wildlife habitat – Very poor.
Suitability for growing coniferous and hardwood trees – Good.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Good.
Suitability for area as habitat for openland wildlife – Poor.
Has a good site index (greater than 60) for red pine.
Has only slight erosion hazard and slight windthrow hazard.
Well-drained, moderate permeability, low productivity as forestland, steep slopes can limit logging.
- CnD – Canton very stony fine sandy loam, 15-25% slopes**
Suitability for growing wetland plants for wildlife habitat – Very poor.
Suitability for growing coniferous and hardwood trees – Good.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Good.
Suitability for area as habitat for openland wildlife – Poor.
Has a good site index (greater than 60) for red pine.
Has only slight erosion hazard and slight windthrow hazard.
Well-drained, moderate permeability, low productivity as forestland, steep slopes can limit logging.
- CsC – Chatfield-Hollis complex, 8-15% slopes**
Suitability for growing wetland plants for wildlife habitat – Poor.
Suitability for growing coniferous and hardwood trees – Fair.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Fair.
Suitability for area as habitat for openland wildlife – Good.
Has a good site index (greater than 60) for sugar maple, white ash, red oak, white pine.
Has only slight erosion hazard and slight windthrow hazard.
Well-drained, granite bedrock within 2', high permeability, high drought susceptibility, moderately productive as forestland.
- Cu – Chocorua mucky peat**
Suitability for growing wetland plants for wildlife habitat – Good.
Suitability for growing coniferous and hardwood trees – Very poor.
Suitability for area as habitat for wetland wildlife – Good.
Suitability for area as habitat for woodland wildlife – Very poor.
Poor suitability for trails, high windthrow hazard.
Very poorly-drained, thick organic layer, moderately permeable, high water table, generally grows shrubs or red maple.

LvA – Leicester-Walpole complex stony, 0-3% slopes

- Suitability for growing wetland plants for wildlife habitat – Good.
- Suitability for growing coniferous plants – Fair.
- Suitability for area as habitat for wetland wildlife – Good.
- Suitability for area as habitat for woodland wildlife – Fair.
- Has a good site index (greater than 60) for eastern white pine and red maple.
- Has only slight erosion hazard and severe windthrow hazard.
- Often poorly drained, seasonal high water table limits tree species and operability.

ReB – Ridgebury stone loam, 3-8% slopes

- Suitability for growing wetland plants for wildlife habitat – Poor.
- Suitability for growing coniferous and hardwood trees – Fair.
- Suitability for area as habitat for wetland wildlife – Very poor.
- Suitability for area as habitat for woodland wildlife – Fair.
- Suitability for area as habitat for openland wildlife – Fair.
- Has a good site index (greater than 60) for eastern white pine.
- Has only slight erosion hazard and severe windthrow hazard.
- Poorly-drained, hardpan 1-2' below surface slows permeability and limits root depth, seasonal high water table limits tree species and operability, moderate productivity for water-tolerant species such as red maple.