Forest Stewardship Plan

(10-Year Planning Period)

Town of Pelham
Raymond Park
Mammoth Road and Keyes Hill Road
Pelham, NH
240.5 Acres +/-
July 2, 2010

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Property Owners: Town of Pelham
6 Village Green
Pelham, NH 03076

Location: Off of Keyes Hill Road and Mammoth Road

Total Acreage: 240.5 +/-
Map/Lot Numbers: Map 2, Block 6, Lots 58,59,68,69,71,74
Map 6, Block 5, Lot 70, Block 4, Lot 176
Date Prepared: July 2, 2010

General Description of the Property

This large forested parcel is located in the northwestern part of Pelham on the Hudson border. The parcel is accessed from two locations. One road enters the property off of Mammoth Road, the other road enters the property off of Keyes Hill Road. The property is used heavily for recreation. There are a number of hiking trails that are located on the property that are marked very well and actively being maintained. A GPS was used to locate many of these trails and their location can bee seen on the boundary map in this plan. The total amount of trails that were mapped was 10,740 feet. These were just the main trails. There were several secondary trails that are also located on the property but were not mapped in this plan. There are also three ball field locations that are used for kid's baseball and soccer leagues. Two of the fields are located in the northern side of the property and accessed by Keyes Hill Road. The other larger ball field area is located on the eastern side of the property and is accessed by Mammoth Road. A gas line right of way runs from the southeast to the northwest through the eastern part of the property. Two brooks flow from the west to the east through the property. They merge in the central part of the property and continue to flow to the east off of the property and eventually into Beaver Brook. Other than the ball fields and abandoned gravel pits around the ball fields, most of the acres are forested, however there are a few small wetland areas to be found scattered around the property as well as a larger wetland complex located at the southern-most part of the property. The southern-most parcels are the most recent acquisitions made by the town, and it has increased the overall size of the property by approximately 20 acres. Most of the property was harvested within the last 10-15 years, with the exception of the above-mentioned new parcels which were purchased approximately ten years ago. The trees growing on the property are very healthy, and because the town is actively managing this forest, younger trees are regenerating very well and will soon fill in the areas that the larger trees occupied when they were harvested.

Boundaries

Most of the boundary lines on the property are discernible, as most of the property is bounded by stone walls. These walls were most likely built back in the early to mid seventeenth century, when most of southern New England was deforested for sheep pasture. The lines were blazed and painted red about ten years ago. The boundary lines

on the western side of the property were just painted approximately 3 years ago. The lines on the eastern side of the property should also be re-blazed and painted red to ensure that they are not lost over time. The southern sections of the property were just acquired over the last 10 years and not much boundary evidence can be found around these new parcels. The extreme southern part of the property is a large wetland complex, making these lines inaccessible to try and locate.

Access

Access into the property for forestry operations is very good. As stated above, there are two access roads entering the property. The first access point is off of Mammoth Road, and the second is off of Keyes Hill Road. The property is basically divided into east and west sections by the stream that runs from the southwest to the northeast. The gravel road entering the property off of Keyes Hill Road accesses the western side of the property, and the road coming off of Mammoth Road accesses the eastern side of the property. In terms of forestry operations this is crucial because the stream does not need to be crossed by machinery when harvesting. Not crossing this stream means less impact and a reduction in the chance of any sediment entering the stream.

Baldwin Hill Road runs from Keyes Hill Road to the north through the center of the property and continues off of the property to the south. This road appears to be an old class six road that is no longer being maintained by the town. It is now being used as a hiking trail. ATVs are also using the road, and have damaged it quite extensively. The road is washing out and the resulting sediment is washing into the main brook located in the northern part of the property.

A great network of hiking trails can be found throughout the property, they are marked very clearly, and are being maintained very well. A well-built foot bridge crosses the brook in the southwestern part of the property. The ATVs also appear to be utilizing these hiking trails and are causing some damage, especially on hills and where the trails are close to wetland areas..

Forest Types & Harvest History

Forests with varying composition in terms of species, age, and density are able to respond with more resiliency 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 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 property was broken out into ten separate stands. Each stand is described in detail later in this plan.

The forest in general is very healthy, except for the white ash which seems to be dying off when it reaches the medium to large pole-stage of development. White ash, however is not a large component of the forest cover on the property. The overstory of the property is primarily made up of oak and white pine from 12-20 inches in diameter.

This is a common forest type found in southern NH. Associated species found in the overstory would be red maple, hickory and black, white and yellow birch. Most of the property was harvested within the last 10-15 years. It would appear that the previous harvest "weeded" out many of the undesirable species as well as many of the poorly formed and poor quality trees. The understory benefited as well from the last harvest. The property is vigorously regenerating new tree species in most of the stands that were previously harvested. Most of the regeneration is white pine from 5-10 feet tall. There is also an abundance of hardwood regeneration from 5-20 feet tall. Although this regeneration is growing well, growth will begin to stagnate in shady conditions. That is why it is important to have periodic harvests to open up the understory to the sunlight to ensure that these younger trees continue to develop from the sapling stage into the pole stage. Harvesting will also create growing space for the residual overstory trees. These trees will then respond by adding more crown structure which will translate into increased diameter growth rates.

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 for 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 multiple small wetland areas found around the property. There are also two small vernal pools, which serve as critical habitat for breeding amphibians. There is a larger wetland complex in the southern-most part of the property. This wetland area provides great habitat for a variety of species of wildlife including birds, mammals, reptiles and amphibians. Two perennial streams flow from the west to east and converge in the center of the property. This stream continues to flow to the east and empties into beaver brook.

The terrain on the property generally slopes to the northeast. The height of land is reached in the southeastern part of the property. At this point the land begins to slope to the south towards the large wetland complex. Soils in general are moderately well drained. As would be expected, in the low lying areas, and areas along wetlands and streams, the soils are somewhat poorly-drained to poorly-drained. For the most part, the property is very accessible to forestry equipment. The exception is the southern part of the property where the terrain drops very steeply to the south. Besides the terrain being very steep, there is also exposed ledge present on this south facing slope.

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. Two of the biggest threats to biological diversity today are loss of habitat to non-forest uses and invasive species. This property is a valuable asset for the town in terms of wildlife habitat. In a town that has seen a lot of forest land broken up into smaller parcels over the last 30 years, having these large contiguous forested properties is invaluable for wildlife habitat.

The property contains a variety of wildlife habitat, which translates into a wide variety of wildlife species that will utilize the property. The overall forest cover can generally be describes as late successional. Many of the trees found in the overstory are semi-mature to mature oaks which produce an abundant amount of acorns, which provide hard mast food source for animals such as deer, turkey, and squirrels. Although there is a tremendous amount of young forest growth in the understory, most of these trees have moved out the stage in which the foliage would be considered browse for wildlife. This young growth does, however provide great cover for a variety of animals.

The presence of small wetlands areas and vernal pools on the property also offers great habitat for amphibians such as frogs and salamanders. Different species of turtles will also use these small wetland areas for breeding and foraging. The large wetland complex in the southern-most part of the property is an excellent acquisition for the town. This large wetland is provides excellent habitat for a variety of wildlife including, amphibians, reptiles, birds and an assortment of mammals.

Habitat that is somewhat lacking on the property would be early successional forest. This type of habitat is very important because it is rapidly disappearing from the landscape in southern New England. As the habitat disappears, the species that rely on this type of habitat such as ruffed grouse, woodcock and eastern and New England cotton tail rabbits will also disappear. Stand 5 has been typed as an abandoned field and offers some of the qualities of early successional habitat. The stand, however, is growing at a rapid rate and will move out of the early successional criteria in the not too distant future.

Invasive species are also a concern when discussing loss of habitat. Although there were no heavy outbreaks of exotic invasive plant species found on the property, some plants were noticed along the Baldwin Hill Road leading into the property. Plants seen were oriental bittersweet, Japanese barberry and autumn olive. These areas should be monitored closely to ensure these invasive plants do not continue to spread across the property and endanger the integrity of the native habitat.

Timber Cruise

A detailed timber cruise was completed on the property. Sample points were taken using a 400 foot by 400 foot grid system, which yielded 53 plots of tree and stand data. This data was used to tabulate the current volumes by species on the property and the field notes made during this cruise helped to create many of the maps in this management plan. Many of the stone walls and hiking trails were also mapped using a GPS unit. 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 ten stands are shown for this property. 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 main goal for the town acquiring land is to protect it from development by keeping areas open for recreational use and maintaining areas of forestland for wildlife habitat. 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. Forests protect water quality by providing a type of filter that keeps non-point source pollution such as sediment from entering wetlands, ponds or lakes directly.

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, meaning the town is interested in a multiple use concept for its forested properties. One of the many benefits that can be derived from long-term sustained yield forestry is the generation of periodic revenue from timber harvests. The benefits from a timber harvest are not only income production, but also the encouragement of quality wood growth on residual trees as well as the encouragement of regeneration of new trees; in order to grow tomorrow's forest beneath the forest of today. In short the main goal of long term forestry is to continually improve the overall health of the forest with each harvest entry, by removing low quality and mature trees.

The town owns many of its 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 a growing population, the municipal officials recognize that the citizens of the town 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.

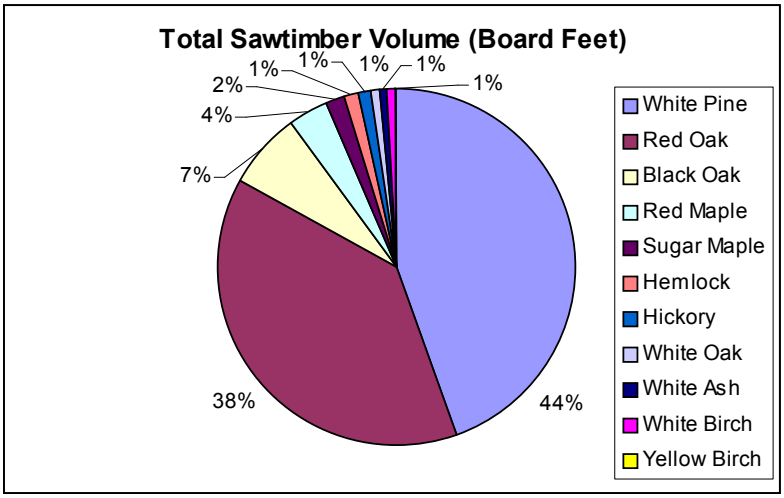
Finally, the town recognizes that the native wildlife species of New Hampshire need areas for food, water, shelter, and raising young. To that end, diversity is encouraged by utilizing proper forest management practices.

Forest Products Summary Table for Accessible Stands

Town of Pelham – Raymond Park—Pelham, NH

Total Acreage: 240.5 +/- acres

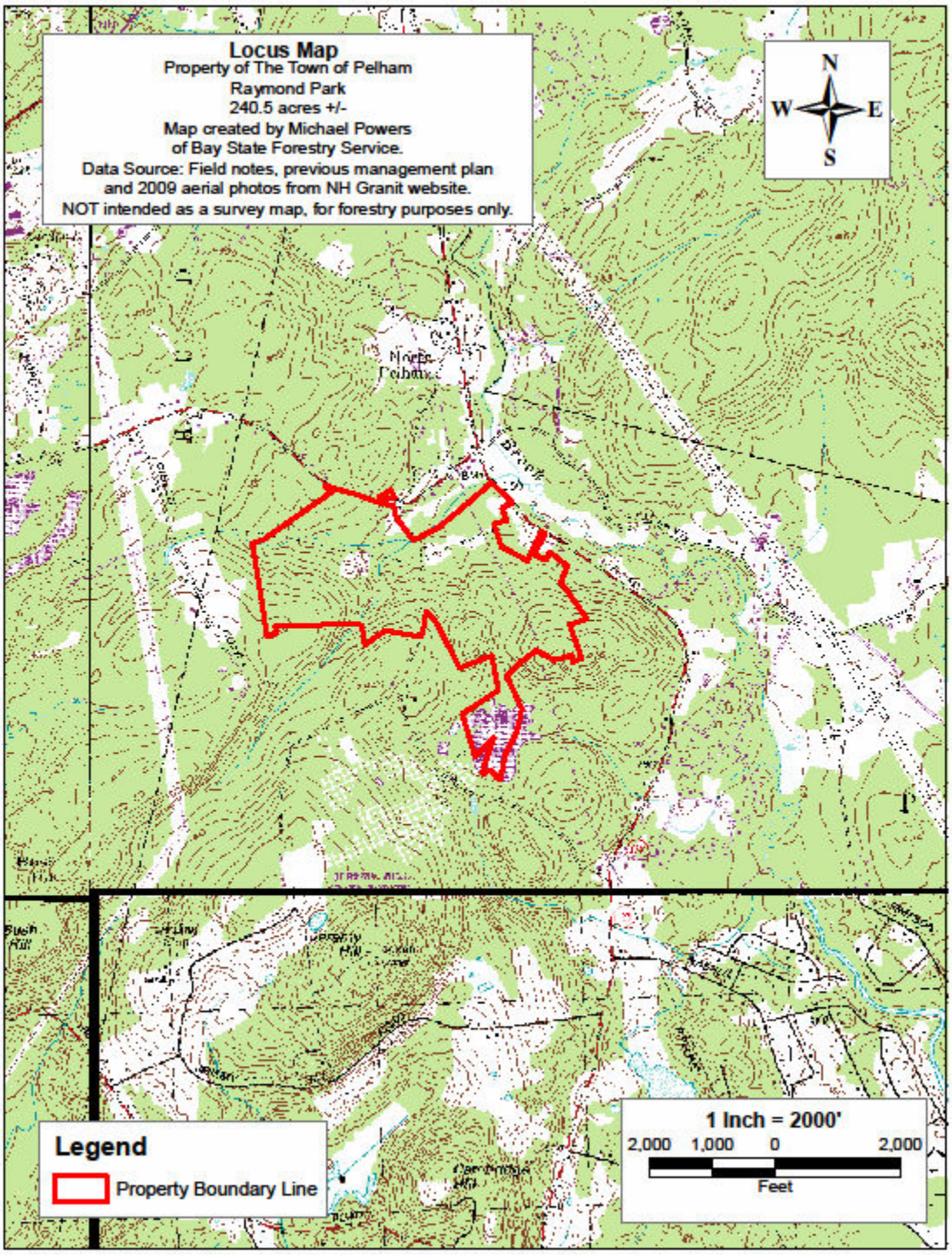
Species	Volume (Board Feet)
White Pine	629,121
Red Oak	544,640
Black Oak	99,879
Red Maple	50,616
Sugar Maple	23,685
Hemlock	17,554
Hickory	15,177
White Oak	12,674
White Ash	9,659
White Birch	8,654
Yellow Birch	1,783
Total Sawtimber	1,413,442[1]
Hardwood Cordwood	1,273 Cords
Softwood Pulpwood	164 Cords
Total Cordwood	1,437 Cords[2]



A basal area factor 10 prism was used to conduct the inventory sample. A total of 53 plots, distributed across each forested stand, were taken to arrive at this cruise summary.

[1] 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.

[2] 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


Locus Map
Property of The Town of Pelham
Raymond Park
240.5 acres +/-
Map created by Michael Powers
of Bay State Forestry Service.
Data Source: Field notes, previous management plan
and 2009 aerial photos from NH Granit website.
NOT intended as a survey map, for forestry purposes only.
N
W
E
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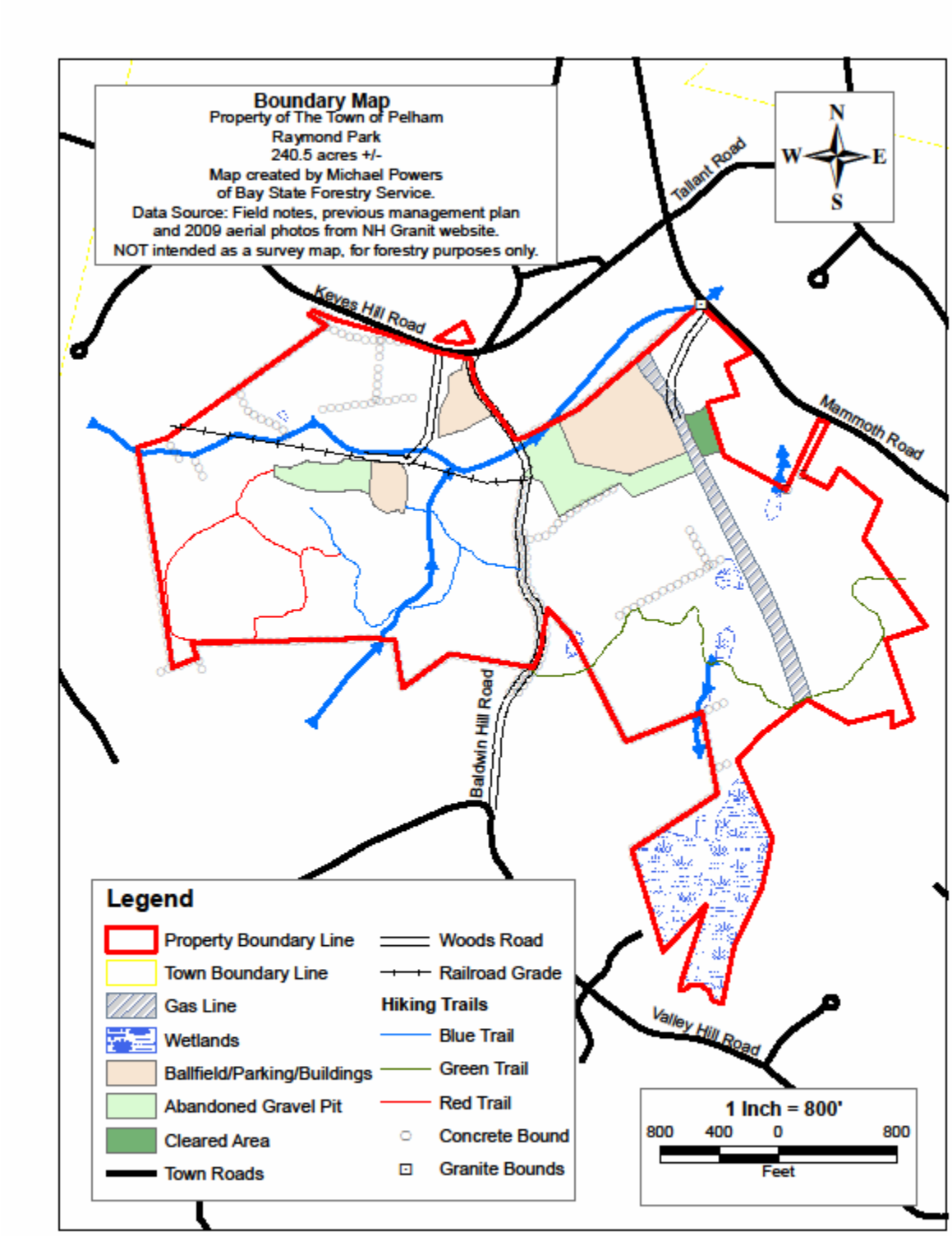
Legend
Property Boundary Line
1 Inch = 2000'
2,000 1,000 0 2,000
Feet


Boundary Map
Property of The Town of Pelham
Raymond Park
240.5 acres +/-
Map created by Michael Powers
of Bay State Forestry Service.
Data Source: Field notes, previous management plan
and 2009 aerial photos from NH Granit website.
NOT intended as a survey map, for forestry purposes only.
N
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Tallant Road
Keyes Hill Road
Mammoth Road
Baldwin Hill Road
Valley Hill Road
Legend
Property Boundary Line
Town Boundary Line
Gas Line
Wetlands
Ballfield/Parking/Buildings
Abandoned Gravel Pit
Cleared Area
Town Roads
Woods Road
Railroad Grade
Hiking Trails
Blue Trail
Green Trail
Red Trail
Concrete Bound
Granite Bounds
1 Inch = 800'
800 400 0 800
Feet

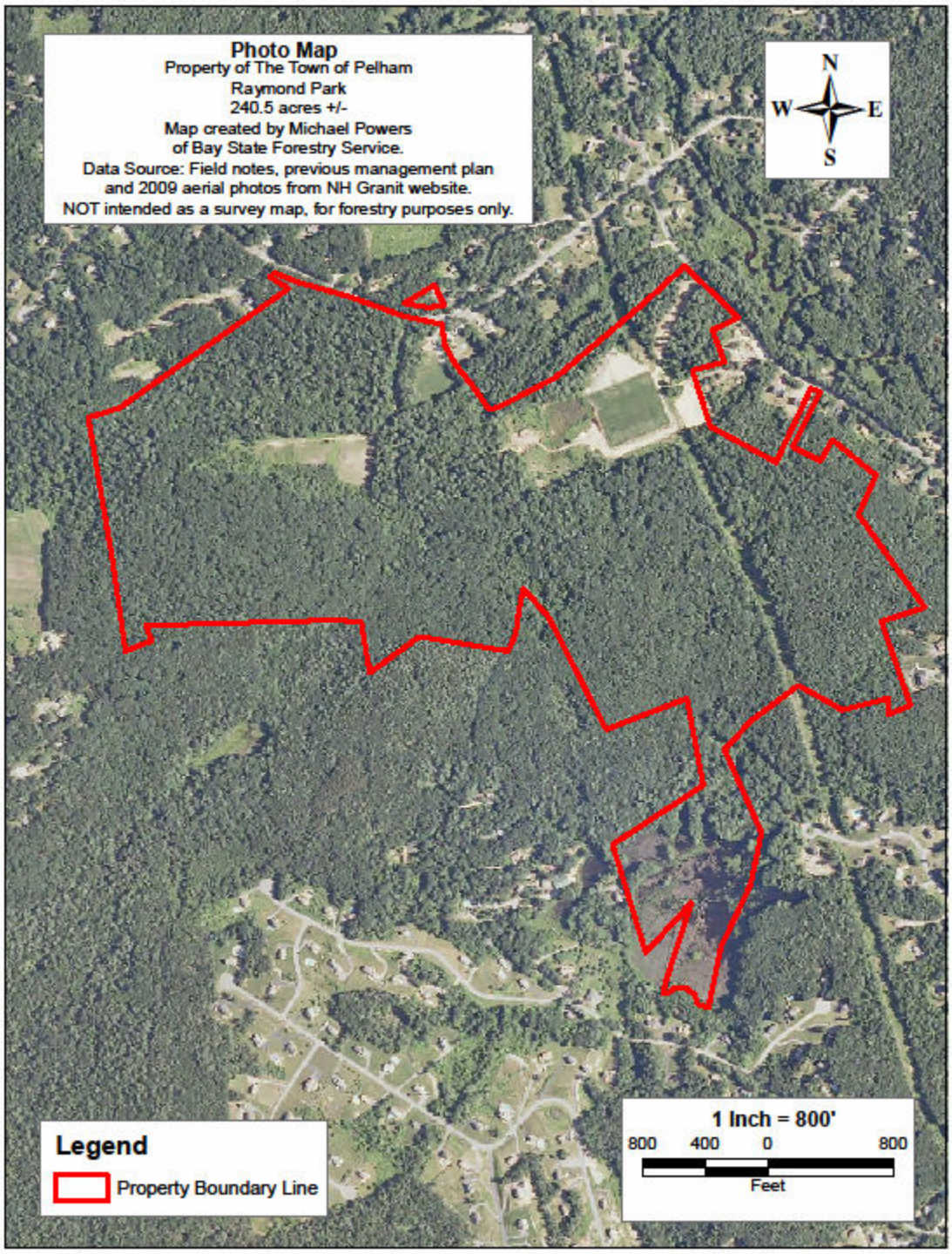
Photo Map
Property of The Town of Pelham
Raymond Park
240.5 acres +/-
Map created by Michael Powers
of Bay State Forestry Service.
Data Source: Field notes, previous management plan
and 2009 aerial photos from NH Granit website.
NOT intended as a survey map, for forestry purposes only.
N
W
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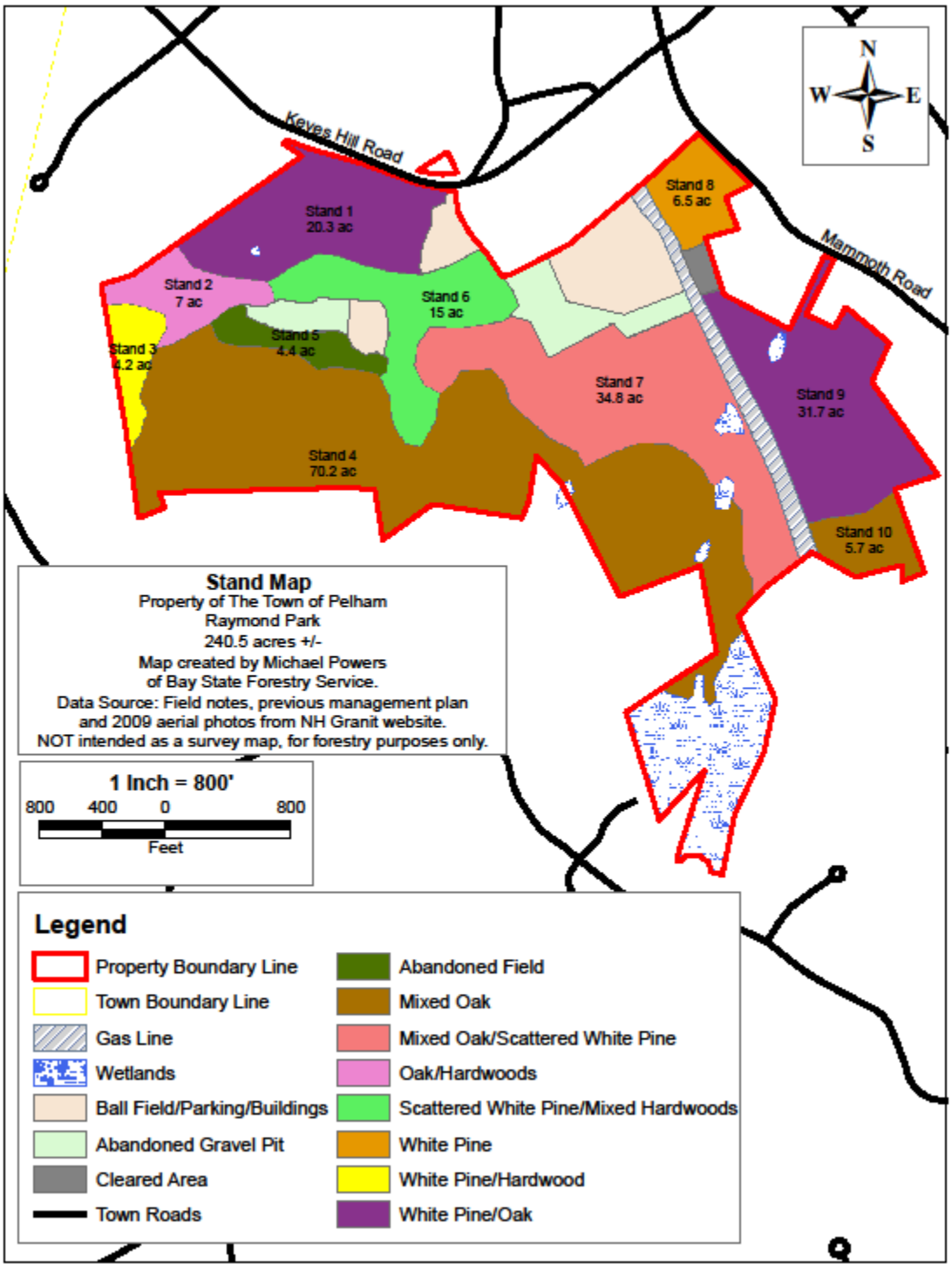
Legend
Property Boundary Line
1 Inch = 800'
800 400 0 800
Feet


N
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Keyes Hill Road
Mammoth Road
Stand 1
20.3 ac
Stand 2
7 ac
Stand 3
4.2 ac
Stand 4
70.2 ac
Stand 5
4.4 ac
Stand 6
15 ac
Stand 7
34.8 ac
Stand 8
6.5 ac
Stand 9
31.7 ac
Stand 10
5.7 ac
Stand Map
Property of The Town of Pelham
Raymond Park
240.5 acres +/-
Map created by Michael Powers
of Bay State Forestry Service.
Data Source: Field notes, previous management plan
and 2009 aerial photos from NH Granit website.
NOT intended as a survey map, for forestry purposes only.
1 Inch = 800'
800 400 0 800
Feet
Legend
Property Boundary Line
Town Boundary Line
Gas Line
Wetlands
Ball Field/Parking/Buildings
Abandoned Gravel Pit
Cleared Area
Town Roads
Abandoned Field
Mixed Oak
Mixed Oak/Scattered White Pine
Oak/Hardwoods
Scattered White Pine/Mixed Hardwoods
White Pine
White Pine/Hardwood
White Pine/Oak

General Management Strategies

Timber – One of the main goals for this property is sound timber management to maintain forest health and to produce 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. Care will be taken retain dead snag trees which provide shelter and areas to forage for a variety of wildlife. White oak acorns seem to be preferred by wildlife as a food source. Where possible, good quality, acorn producing white oak will be retained for acorn production. Harvesting trees causes some areas to be opened up to sunlight and stimulates seedling germination and understory growth on the forest floor. The resulting sprouts and young growth can become a great food source for browsing wildlife.

Soil – Care will be taken to not harvest during wet times of the year, 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. Waterbars will be installed on skid trails where necessary.

Water Quality – In accordance to NH best management practices, buffers will be left along streams and the edges of wetlands. 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, bridges or culverts 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, *forested* wetlands will only be harvested under dry or frozen conditions if at all.

Recreational Resources – Skid roads can provide a nice network of trails for recreational opportunities, both for walking and wildlife viewing. To this end, main trails will be kept free of slash where possible.

Aesthetic Values – To maintain aesthetics, logging operations will minimize rutting and soil disturbance and will chip or cut up the tops of trees so they lay close to the ground for rapid decay.

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 a buildup of fuels which can become 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.

Forest Management Plan

Stand 1 –

Stand 1 - White pine/oak, 20.3 acres

Standing Volumes:

Species	Average BA per acre (sq. ft.)	Volume per acre (bd. ft.)	Total Volume (bd. ft.)
Pine, white	44	6,779.3	137,620
Oak, Black	22	1,856.8	37,693
Hickory, all	2	214.9	4,362
Oak, white	2	159.0	3,228
Oak, red	2	159.0	3,228
Birch, white	2	159.0	3,228
Ash, white	2	157.6	3,199
Sawtimber Total	**76**	**9,486**	**192,558**
Cordwood	26	5.6 cds	113 cds
Pulpwood	6	1.5 cds	30 cds
Cord/Pulp Total	**32**		
All Products	**108**		

Description:

This stand is located in the northwestern part of the property. The overstory consists of good quality white pine ranging in size from 14-20 inches in diameter. Associated species in the overstory include red and black oak ranging in size from 10-18 inches in diameter. A variety of tree species can be found growing in the understory including black oak, red maple, white ash and black and white birch. All these species are in the large sapling to small pole size class and are approximately 6-20 feet tall. There is also some scattered white pine saplings found growing in the understory. The understory stocking is high and the trees appear to be growing well, however the white ash seems to be dying when it reaches the medium to large pole stage of development.

The terrain in this stand generally slopes to the east, but the stand can be described as rolling. Soils are moderately well-drained, however the soils become more poorly-drained in the southern part of the stand, as the terrain drops in elevation.

Recommendations:

Since this stand is regenerating very well, a light single tree harvest would be recommended to remove some of the low quality black oak in the overstory and some of the poor quality mixed hardwood species growing in the intermediate strata of the stand. Some of the mature white pine can also be removed from the stand if the basal area can

be kept at an acceptable level. The small openings made in the forest canopy will allow sunlight to reach the developing trees in the understory. Care would need to be taken to minimize damage to the understory regeneration that is growing well in this stand.

Stand 2 –

Stand 2 - Oak/Hardwood, 7 acres

Standing Volumes:

Species	Average BA per acre (sq. ft.)	Volume per acre (bd. ft.)	Total Volume (bd. ft.)
Oak, red	37	3,923.6	27,465
Maple, sugar	20	1,876.3	13,134
Pine, white	3	652.5	4,568
Hickory, all	3	358.1	2,507
Birch, yellow	3	254.6	1,783
Ash, white	3	254.6	1,783
Sawtimber Total	**69**	**7,320**	**51,239**
Cordwood	17	3.8 cds	26 cds
Pulpwood	3	0.5 cds	3 cds
Cord/Pulp Total	**20**		
All Products	**89**		

Description:

This small stand is located in the western part of the property. The overstory species composition consists of some good quality red oak ranging in size from 14-22 inches in diameter. Other species found occupying the overstory include sugar maple, white ash, beech and pignut hickory. These trees range in size from 10-18 inches in diameter. The understory is well-stocked and consists of beech, white and black birch and sugar maple, all 10-25 feet tall.

There is a small brook that flows from west to east that runs through the middle of the stand. The terrain slopes on either side to the brook. The soils are moderately well-drained except for along the edges of the brook, where the soils become more poorly-drained, which is to be expected.

Recommendations:

The overall basal area is not that high in this stand, indicating that only a light harvest should occur here. The overall goal, post harvest, would be to add diameter growth on the small to medium size sawlog trees, and continue to encourage vigorous growth on the younger sapling and pole-size trees. The red oak and sugar maple should be the species of choice to retain as the residual trees. Other mast producing trees such as hickory and beech could also be retained for diversity of species as well as a source of food for wildlife.

Stand 3 –

Stand 3 - White pine/hardwood, 4.2 acres

Standing Volumes:

Species	Average BA per acre (sq. ft.)	Volume per acre (bd. ft.)	Total Volume (bd. ft.)
Pine, white	25	4,290.5	18,020
Oak, red	15	1,535.5	6,449
Maple, sugar	5	393.9	1,654
Hickory, all	5	382.0	1,604
Sawtimber Total	**50**	**6,602**	**27,728**
Cordwood	15	3.2 cds	14 cds
Cord/Pulp Total	**15**		
All Products	**65**		

Description:

This small stand is located in the western part of the property. The stand contains a scattered overstory of white pine from 10-24 inches in diameter as well as a variety of mixed hardwood species. These include sugar maple, red oak and yellow birch, all 8-18 inches in diameter. The stand was cut over heavily about 12 years ago. It would appear that much of the low grade timber was removed from the stand, and the resulting harvest produced a tremendous amount of regeneration in the understory. The understory species composition consists of some very good quality sugar maple along with black birch and beech, all 10-20 feet tall. Most of the trees in the stand are very healthy, but as can be seen in other stands, the white ash appears to be dying when it reaches the medium to large pole stage of development.

The soils in this stand range from somewhat poorly drained to moderately well drained. The stand slopes to the northeast with grades of 3-10 percent.

Recommendations:

Since the stocking levels in this stand are not very high, only a light harvest should occur here, with the goal of providing sunlight to the advance regeneration that is growing in the understory. Trees that should be targeted for removal would be the mature and over-mature white pine along with the white ash that is dying out of the stand. Care would need to be taken to minimize damage to the regenerating trees in the understory. Careful skid trail layout as well as carefully planned directional felling should be employed to reduce damage to these young trees. Sections of this stand have somewhat poorly-drained soils. These areas should only be harvested under dry or frozen conditions to minimize rutting and erosion.

Stand 4 –

Stand 4 - Mixed oak, 70.2 acres

Standing Volumes:

Species	Average BA per acre (sq. ft.)	Volume per acre (bd. ft.)	Total Volume (bd. ft.)
Oak, red	52	4,644.2	326,021
Pine, white	4	561.5	39,418
Oak, Black	4	330.7	23,213
Oak, white	1	95.5	6,704
Hickory, all	1	95.5	6,704
Maple, red	1	49.7	3,489
Sawtimber Total	**63**	**5,777**	**405,548**
Cordwood	41	7.5 cds	530 cds
Pulpwood	2	0.6 cds	39 cds
Cord/Pulp Total	**43**		
All Products	**106**		

Description:

This stand is the largest stand on the property. It occupies the whole southern half of the landbase. The species composition throughout the stand stays fairly consistent. The size and quality of the oak found within the stand as well as regeneration condition varies as you move from west to east in the stand, and up and down in elevation. The stand is essentially an even-aged mixed oak stand over mixed hardwood advance-regeneration. The western part of the stand contains some very good red oak 12-18 inches in diameter on the lower elevations. The same can be said in the eastern part of the stand. As you move up the hill to the south the site quality becomes worse, the soils become more shallow and the quality of the trees declines. As you move to the north, and decrease in elevation the site improves, the soils become deeper and tree quality increases. Although the stand is typed as a mixed oak stand, scattered hickory from 6-12" in diameter can also be found in the overstory. Regeneration varies with the site conditions. The western part of the stand contains more of a mixed hardwood species composition, including red oak, black birch and hickory all 5-15 feet tall. The central part of the stand contains more white pine as well as a mix of hardwood in the understory. The white pine regeneration is generally growing quite well, however it was noticed in areas where there were heavier shade conditions the white pine regeneration would appear to be more suppressed. Regeneration throughout the stand is consistently medium to high.

In the western part of the stand the terrain slopes to the northeast with grades of 4-8 percent. The terrain in the eastern part of the stand slopes to the south. Some sections in the eastern part of the stand are also very rocky, and not very conducive to forestry operations. The soils throughout the stand tend to be moderately well-drained. A small

brook flows from the southwest to the northeast in the western part of the stand, and there are two small intermittent streams that flow to the south in the eastern part of the stand. A small wetland area is also located along one of the boundary lines in the western part of the stand.

Recommendations:

Again, like other stands the basal area is not that high. It is recommended that a light single tree selection harvest take place in this stand. The goal would be to add diameter growth to the better quality red oak that are growing in the stand by reducing competition and increasing growing space. Creating openings in the forest canopy will also allow sunlight to reach the understory regeneration that is prevalent in the stand. This is especially important for the white pine saplings, as their growth seems to be slowing as they become suppressed by shady conditions in certain areas of the stand. Poor quality black oak and hickory should be targeted for removal. Very little red oak should be cut from the stand, in order to keep the basal area at an acceptable level. Care should be taken when harvesting in this and all of the stands to reduce the amount of damage to the understory regeneration as much as possible.

Stand 5 –

Stand 5 - Abandoned Field, 4.4 acres

Description:

This small stand is located western part of the property adjacent to the practice sports field that is accessed from Keyes Hill Road. There was no inventory data taken for this stand because the trees within the stand have not yet reached a merchantable size. The stand has been typed as an abandoned field that is reverting back to forest. The tree species found in this stand include white and gray birch along with white pine. The stand has a high stem count per acre and all the trees in this even-aged stand are approximately 15-25 feet tall.

The stand slopes to the northeast towards the ball field and the soils are moderately well-drained.

Recommendations:

Since this stand is still developing and the trees do not have any merchantable value, it is recommended that no harvesting activity occur during this management cycle. The stand will provide valuable early successional habitat for wildlife.

Stand 6 –

Stand 6 – Scattered White Pine/Mixed Hardwoods, 15 acres

Standing Volumes:

Species	Average BA per acre (sq. ft.)	Volume per acre (bd. ft.)	Total Volume (bd. ft.)
Pine, white	34	5,990.8	89,861
Maple, red	34	2,892.6	43,388
Maple, sugar	6	593.1	8,897
Ash, white	4	311.8	4,677
Sawtimber Total	**78**	**9,788**	**146,824**
Cordwood	28	6.4 cds	96 cds
Cord/Pulp Total	**28**		
All Products	**106**		

Description:

This stand is located in the Central part of the property where the two main streams that are found on the property converge. The soils found in this stand are somewhat poorly-drained and access into sections of this stand will be difficult with logging equipment. The overstory of the stand is comprised of large diameter, but poor quality white pine from 16-26 inches. Overstory white pine is denser in the northern part of the stand. Associated hardwood species found in the overstory include mainly red maple with some scattered white ash and sugar maple. The sugar maple is found mainly in the southern part of the stand. The understory consists of a mix of hardwoods such as horn beam, musclewood, red maple and elm, all 10-25 feet tall. There is also an abundance of witch hazel and fern growing in the understory. The northern part of the stand sees a little more white pine regeneration occurring. These were areas that were dry enough to cut during the last harvest. Openings were made in the forest canopy which allowed the white pine to regenerate. The southern part of the stand is located in a valley and the terrain slopes to the north. The northern part of the stand is relatively flat, but does slope slightly to the east.

Recommendations:

Sections of this stand would be very difficult to access with forestry equipment to try and perform any kind of silvicultural operation, because of the wet soil conditions. If any harvesting were to occur in this stand it should be done during very dry or frozen conditions. Even so, the valley located in the southern part of the stand should probably be left intact because of wet soil conditions and because it is a unique location on the property. There is a hiking trail located at the southern tip of the stand as well as a nice bench and a bridge that crosses the brook. The bench looks down into the valley, and is a nice spot to sit and rest after hiking. Any harvesting that were to occur in this stand

should target the mature and over-mature white pine for removal, as well as the larger, poor quality red maple.

Stand 7 –

Stand 7 – Mixed Oak/Scattered White Pine, 34.8 acres

Standing Volumes:

Species	Average BA per acre (sq. ft.)	Volume per acre (bd. ft.)	Total Volume (bd. ft.)
Pine, white	25	4,179.3	145,440
Oak, red	31	2,809.0	97,752
Oak, Black	7	551.4	19,190
Birch, white	2	155.9	5,426
Maple, red	1	107.4	3,739
Oak, white	1	78.8	2,742
Sawtimber Total	**67**	**7,882**	**274,287**
Cordwood	31	5.7 cds	197 cds
Pulpwood	4	0.8 cds	29 cds
Cord/Pulp Total	**35**		
All Products	**102**		

Description:

This large stand is located in the central-eastern part of the property. Red and black oak are the main species occupying the overstory. These trees are good quality and range in size from 10-20 inches in diameter. Scattered white pine can also be found in the overstory from 10-24 inches in diameter. It would appear that much of the red maple and black oak were removed from the northern part of the stand during the last harvest. The resulting openings in the forest canopy have created very desirable growing conditions for white pine regeneration. Heavy amounts of white pine can be found in this area ranging from 10-15 feet tall. Other species found in the understory include red maple sprouts, hickory, red and white oak, all 10-20 feet tall.

Again as we see in other stands, the higher the elevation, the more the site quality decreases. The southern part of the stand is at the highest elevation, so it is here that we see trees that are not growing so well. The terrain in the southern part of the stand slopes to the southwest. The northern part of the stand slopes to the northeast. The soils tend to be moderately well-drained to well-drained. There is a small vernal pool located in the eastern part of the stand, that provides good habitat for amphibians. Another small wetland area can be found in the southern part of the stand. It would appear that there is an old borrow pit which was used for gravel extraction some years ago, in the western part of the stand along the old road that runs up through the middle of the property. This area is reverting back to forest, and we find early pioneer tree species such as, white and gray birch, poplar and white pine growing in this area. There also appears to be and old tire dump just below the borrow pit area, which was probably used quite frequently back when the road was in better shape.

Recommendations:

A light single tree/group selection harvest is recommended for this stand. Poor quality black oak and red maple should be targeted for removal. Scattered white oak can also be found in this stand, and an effort should be made to retain some of the better quality stems for mast production, which is a preferred food source for wildlife. If stocking levels can be kept at acceptable levels some of the large, mature red oak could be removed for sawtimber.

Stand 8–

Stand 8 - White pine, 6.5 acres

Standing Volumes:

Species	Average BA per acre (sq. ft.)	Volume per acre (bd. ft.)	Total Volume (bd. ft.)
Pine, white	55	10,871.2	70,663
Oak, Black	5	397.6	2,584
Sawtimber Total	**60**	**11,269**	**73,247**
Cordwood	25	5.2 cds	34 cds
Pulpwood	5	1.5 cds	10 cds
Cord/Pulp Total	**30**		
All Products	**90**		

Description:

This small stand is located in the northern-most part of the property. It is cut off from the rest of the forested acreage by the ball fields and parking areas located in this section of the property. The stand is growing some large white pine in the overstory, ranging is size from 10-24 inches in diameter. Red and black oak along with red maple can also be found in the overstory, and intermediate strata of the stand. The understory regeneration consists of white pine, red maple and black birch, all 4-15 feet tall. The wetter sections of the stand contain more alder and witch hazel in the understory.

The stand is divided in half by an access road from Mammoth Road to the ball fields. The soils on the northern side of the road are well drained. The soils on the southern side of the road are somewhat poorly-drained.

Recommendations:

Because this stand is cut off from the rest of the property and because it is so small, it is recommended that no management activity take place here. The stand will provide good habitat for wildlife as well as a buffer from the ball fields to the houses located on Mammoth Road.

Stand 9 –

Stand 9 - White pine/oak, 31.7 acres

Standing Volumes:

Species	Average BA per acre (sq. ft.)	Volume per acre (bd. ft.)	Total Volume (bd. ft.)
Pine, white	24	3,541.9	112,279
Oak, red	27	2,250.8	71,351
Hemlock	4	553.8	17,554
Oak, Black	6	542.6	17,199
Sawtimber Total	**61**	**6,889**	**218,384**
Cordwood	36	6.8 cds	214 cds
Pulpwood	7	1.5 cds	49 cds
Cord/Pulp Total	**43**		
All Products	**104**		

Description:

This large well managed stand is located in the eastern part of the property. In terms of timber production, this stand is growing some of the best quality trees on the property. Good quality white pine from 12-18 inches can be found occupying the overstory, along with red and black oak from 10-18 inches. Pole-size red and black oak along with red maple, white birch and white pine can be found in the intermediate strata of the stand. A small section of hemlock is located in the western part of the stand along the gas line. This area was not large enough to type it as its own stand. The understory consists of some very good quality white pine regeneration that is 4-10 feet tall. Associated hardwood species also growing in the understory include red maple, and red and black oak. The northern part of the stand was cut a little heavier during the last harvest, and it is here where we find heavier amounts of regeneration.

The terrain slopes to the north in this stand, and the soils are well drained to the south in the higher elevations. In the lower elevations to the north the soils become moderately well drained. There is also a small wetland area in the northern-most part of the stand where the soils are somewhat poorly-drained.

Recommendations:

This stand is very operable for forestry equipment except in the northern-most section where the soils are more poorly-drained. The silvicultural goals in this stand would be to add more diameter growth to the better quality white pine and red oak, by removing some of the poorer quality pine with suppressed tops, and the poor quality black oak. Some of the red maple can also be harvested out of the stand for firewood. Another goal, similar to other stands would be to encourage the growth of the understory regeneration by creating openings in the forest canopy which will allow much needed

sunlight to reach these developing trees. Care must be taken when harvesting to minimize damage to the regeneration.

Stand 10 –

Stand 10 - Mixed oak, 5.7 acres

Standing Volumes:

Species	Average BA per acre (sq. ft.)	Volume per acre (bd. ft.)	Total Volume (bd. ft.)
Oak, red	27	2,171.8	12,379
Pine, white	17	1,974.0	11,252
Sawtimber Total	**44**	**4,146**	**23,631**
Cordwood	53	8.6 cds	49 cds
Pulpwood	3	0.7 cds	4 cds
Cord/Pulp Total	**56**		
All Products	**100**		

Description:

This small stand is located in the southeastern part of the property. It can be characterized as an even-aged mixed oak stand on top of white pine regeneration. The red and black oak found in the overstory are poor quality and range in size from 8-12 inches in diameter. The understory is densely stocked with very good quality white pine regeneration.

The terrain slopes to the north, and the soils appear to be shallow and well drained. This does not appear to be a good oak site, but it looks like the stand is better suited to growing white pine.

Recommendations:

It would be very difficult to enter this stand with forestry equipment whithout damaging the white pine regeneration that is found in the understory. It is recommended that very little harvesting occur in this stand, in order to protect the pine regeneration that is present in the stand. Any harvesting that occurs should take place along the edge of Stand 9 to allow some sunlight to reach the regenerating pine. The low quality black oak should be targeted for removal.

Management Schedule

2010

- Prepare the forest management plan.
- Blaze and paint identifiable boundary lines.
- Conduct a conventional timber harvest on the western side of the property.
- Seed and lime the landing at the conclusion of the timber harvest.

2011-2020

- Conduct a timber sale on the eastern side of the property.
- Monitor the property for wind damage, ice damage, fire, or disease and take appropriate corrective actions as needed to ensure the continued health of this forest block.
- Re-assess the property in 10 years and write a new 10-year management plan.
- (Recommended Item) Make this property available for Project Learning Tree excursions for the local schools.

Concluding Remarks

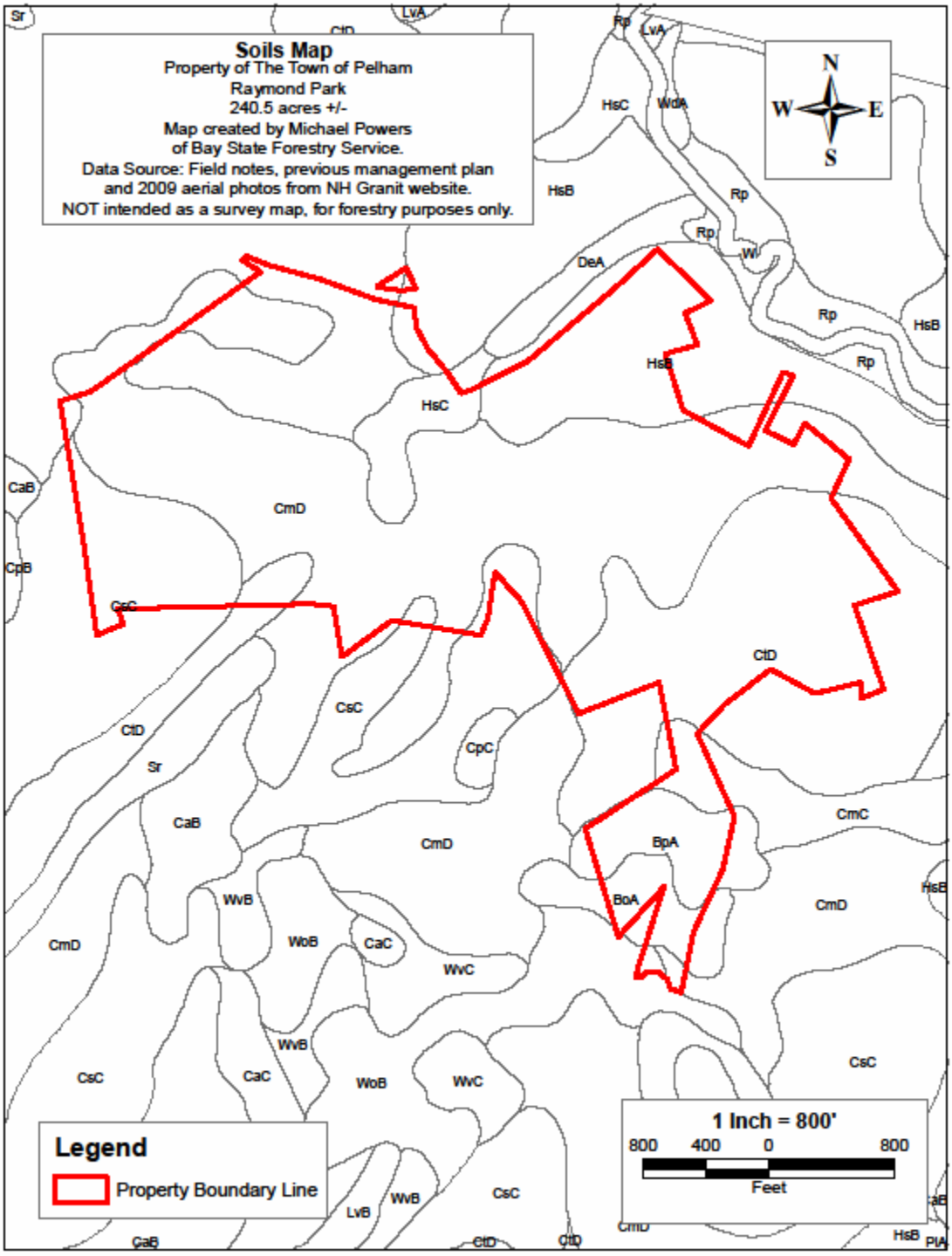
The recommendations proposed in this 10-year management plan should be implemented within the next 10 years, although timing will depend on landowner priorities, market conditions, and environmental conditions such as pest outbreaks and weather. Through sound silvicultural practices and using best management practices (BMP's), mature, diseased, and defective trees will be harvested to allow healthier, better quality 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 Town's objectives for their property. Implementing these recommendations will help ensure that this forestland is being managed with long-term sustainability in mind.

Respectfully Submitted,

Michael Powers, Consulting Forester
N.H. License #379

Appendix A.

SOILS INFORMATION


Soils Map
Property of The Town of Pelham
Raymond Park
240.5 acres +/-
Map created by Michael Powers
of Bay State Forestry Service.
Data Source: Field notes, previous management plan
and 2009 aerial photos from NH Granit website.
NOT intended as a survey map, for forestry purposes only.
N
W
E
S
Legend
Property Boundary Line
1 Inch = 800'
800 400 0 800
Feet
Sr
CtD
LvA
Rp
HsC
WdA
HsB
DeA
Wl
CaB
CmD
CpB
CsC
CpC
BpA
BoA
CmC
WvB
WoB
CaC
WvC
LvB

Hillsborough County Soils Profiles

BpA – Borohemists, nearly level

Most areas of these soils are in sparsely wooded bogs. The high water table and organic material make these soils unsuitable for farming, woodlands, or most other uses unless fill material is used.

BoA – Borohemists, nearly level

These soils are very poorly drained and are in depressions on terraces, uplands and outwash plains.
Most of these areas are in sparsely wooded bogs
The soils are unsuitable for farming, woodland or most other uses.

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.

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.

CtD –Chayfield-Hollis-Rock outcrop complex, 15-35% slopes

Suitability for growing wetland plants for wildlife habitat – Very 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 – Poor.
The complex is poorly suited to most tree species. Slope and areas of exposed rock limit the use of equipment.

HsB—Hinckley loamy sand, 3 to 8% slopes.

Suitability for growing wetland plants for wildlife habitat – Very poor.
Suitability for growing coniferous and hardwood trees –Poor.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Poor.
The soil is suited to drought- tolerant tree species, but productivity is low. Doughtiness causes a high rate of seedling mortality.

HsC—Hinckley loamy sand, 3 to 8% slopes.

Suitability for growing wetland plants for wildlife habitat – Very poor.
Suitability for growing coniferous and hardwood trees –Poor.
Suitability for area as habitat for wetland wildlife – Very poor.

Suitability for area as habitat for woodland wildlife – Poor.
The soil is suited to drought- tolerant tree species, but productivity is low.
Droughtiness causes a high rate of seedling mortality.