FOREST OBSERVATIONS, DESCRICPTIONS, AND PRESCRIPTIONS

For

RANGERS TOWN FOREST

Managed by

The Hudson Conservation Commission

Located in

Hudson, Hillsborough County, New Hampshire

Prepared by:
FULL CIRCLE FORESTRY, LLC
Antrim, NH

Eric Radlof,
NH Licensed Professional Forester #447
Assisted by Jeffrey Snitkin

October 2021

General Landowner Information
October 2021

Landowner(s) Name: Town of Hudson c/o Conservation Commission

Address: 12 School Street

Property Location: Roy Drive & Rangers Drive, Hudson, Hillsborough County, NH

Access: Roy Drive & Rangers Drive

Parcel I.D.: Map 160/ Lot 48 (Formerly Map 160/ Lot 48 (29.1 ac)
& Map 169/ Lot 3 (27.5 ac))

Acreage: +/- 56.6 Acres

Deed Book/ Page: 5441/ 0055
3671/ 119

Purchase Date: 1993
1986

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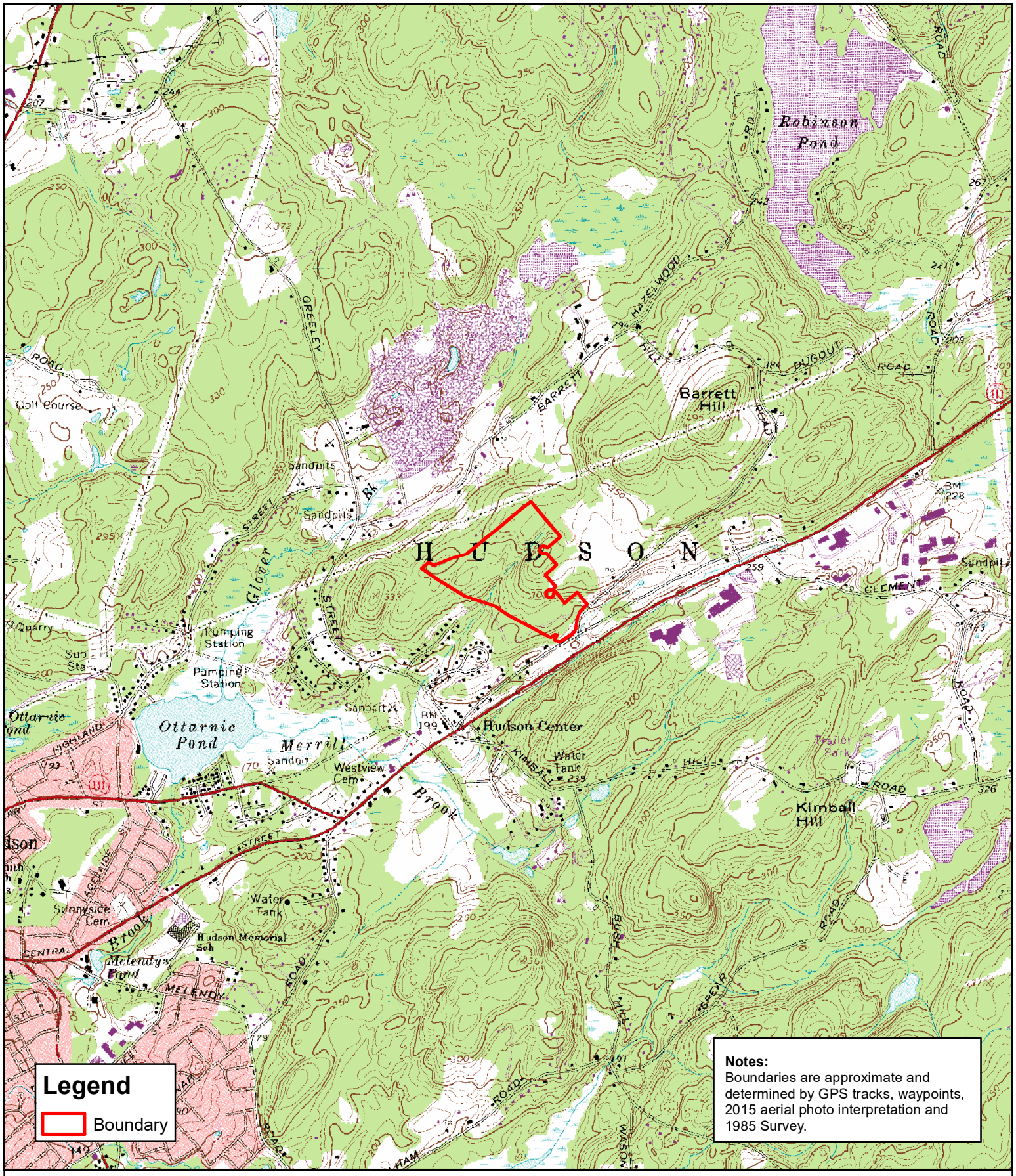


LOCUS MAP

RANGERS TOWN FOREST

Roy and Rangers Drive
Hudson, Hillsborough County, NH
Map 160/ Lot 48 (56.6 Acres)

Feet
0 500 1,000 2,000

1:24,000

N

Notes:
Drafted and prepared by: E. Radlof, NHLPF #447
GIS mapping by: E. Radlof, NHLPF #447
Full Circle Forestry, LLC
Date: October 25, 2021

FULL CIRCLE FORESTRY, LLC

I. INTRODUCTION

Rangers Town Forest is located off of Roy Drive and Rangers Drive in the northern portion of the Town of Hudson, Hillsborough County, New Hampshire. Additional access can be obtained from Windham Road and Barretts Hill Road. Being centrally located in Hudson, the towns of Litchfield and Londonderry are to the north, Windham and Pelham are to the east, Nashua is to the west and the New Hampshire/ Massachusetts state line to the south. The tract encompasses +/- 56.6 acres, of which 54 acres is considered forestland with the remaining acreage consisting of a maintained Tennessee Gas Company Easement and a small area of abandoned field at the end of Rangers Drive.

The property consisted of two parcels sharing a common boundary line and is now being managed as one parcel. Rangers Town Forest originally contained Map 160/ Lot 48 at 29.1 ac. In 2020, the Town of Hudson voted to make Map 169/ Lot 3 at 27.5 ac a Town Forest, combining this parcel with the original Rangers Town Forest parcel. Prior to being voted as Town Forest, the parcel was a proposed circumferential highway corridor.

To the knowledge of this forester, limited history of documented forest management exists for this property. The information presented in this forest management plan is developed from an analysis of field data collected during a woodland inventory of this property in September of 2021 in addition to information researched by this forester.

The 2021 fieldwork provided baseline information of the various forest stands with respect to tree growth, commercial operations, insect and disease activity, storm events and other phenomenon affecting the forests in this region. A thorough examination of the data derived from the fieldwork allows for an accurate assessment of the current status of the various forest stands. It also provides the information needed to develop management recommendations for the next ten years as part of the general maintenance of the property and to improve the health and quality of the trees in the forest. Abandoned field areas or idle open land was assessed utilizing historical aerial photography and observations of the current status. Management recommendations are based on observations and landowners goals.

The process followed in developing the information utilized for the preparation of this management plan involved a summarization of data gathered from maps, soil surveys, field observations, and the forest inventory. The principal contribution to this summary of gathered data is the forest inventory. Data such as tree species, diameter, heights and biological observations were collected in twenty-four systematically placed sample plots throughout the forested portions of the property. The inventory data from the Rangers Town Forest was processed using a forest inventory data program developed by Forest Metrix to generate stand and stock tables. This results in a reliable estimate of densities, quality, and volumes of standing timber and roundwood presently growing on the property.

The observations and data collected were incorporated into the map of the property where appropriate and have been noted in the various stand descriptions within the plan. Together with existing information about the property this new data provides information for an evaluation of the five different forest stands in order to develop management recommendations for the coming ten- year period to realize the objectives of the landowner.

These objectives include:

- Enhancement of the quality of the various forest stands through appropriately planned silvicultural treatments.
- Protection and improvement of wildlife habitat.
- Improvement and protection of recreational opportunities.
- Protection of various non-forest product aspects such as water quality, scenic beauty and special sites.

Forest Planning History

This plan is considered to be the first forest management plan prepared for the property under the town's ownership. Minimal evidence of prior documented forest management has been obtained through the research of this forester. Such information collected pertains to the general history of the property. Little is known of forest management from the prior ownerships. Prior harvesting is evident throughout the property via visual assessment of old stumps, residual stand damage from harvesting and old skid trail evidence. It is this forester's estimate that prior harvesting occurred 30-40 years ago.

Boundary and Survey Information

Boundary lines for this property are variable in representation and visibility. Boundary lines to the north of the gas line easement generally consist of stone walls. Where stone walls are absent, old barbed wire can be found in varying

degrees and representations. Boundary lines to the south of the gas line easement contain only bearings and distances as shown on survey maps. Deed descriptions, tax maps, and field evidence were referenced to locate boundary lines while conducting the fieldwork portion of this forest management plan. A cursory search for surveys revealed a 1985 Castello, Lomasney & de Napoli, Inc engineering plan containing survey information documenting the boundary lines for both parcels as part of Phase II and Phase II development for a prior ownership. See the Appendix for a copy of each map (Drawing 2 & 3 of plan).

For a detailed description of boundary lines, see Deed Book/ Page 5441/0055 and 3671/119 for the full deed descriptions for each parcel.

Corner monuments, deed descriptions, surveys, and the field evidence described in those deeds and/or depicted on a survey (fences, walls, land features, blazed lines….) collectively define property boundaries. Blazes are a method for visually defining property boundaries and for navigating between monuments.

Clearly marked boundaries protect property owners from adverse possession claims and timber trespass, demonstrate use and occupancy and define the limits of ownership and management. Blazing, followed by painting is the traditional method for marking boundaries; this method also provides the best and longest lasting evidence of a property line. The blaze creates a durable scar that can be detected for decades. Old blazing and painting was not noticed along any portions of the boundary lines.

Blazing and painting of boundaries is highly recommended for this property to clearly define boundary lines, especially where stone walls are not present. Foresters are not considered licensed surveyors unless licensed as such. Blazing and painting can only occur when boundary evidence is visible. Where boundary line evidence is lacking, only a licensed surveyor can reestablish the boundary line location.

Recommendations

- Seek the services of a licensed NH surveyor to confirm the boundary lines for this property.
- Research abutters, provide a letter to each explaining the importance of marking boundaries, describe the process and options and hopefully obtain written permission to blaze and paint common boundaries.
- Blaze the boundary lines for which permission has been obtained in 2022-2023.
- Paint blazes one to eight months after blazing and only paint those portions of the boundary where permission has not been secured.
- Maintain boundary lines by painting blazes at 5 to 7-year intervals and re-blazing and painting at 15 to 20-year intervals.

Access

Rangers Town Forest fronts along four separate roads in the town of Hudson, NH. Opportunities for access into the property are excellent. Roy Drive and Rangers Drive provide access to the northeastern portions of the property and provide the best access to support forest management activities. The end of Rangers Road provides the best opportunity for good access to a landing area, an area utilized in the staging of forest products before being trucked to markets. The end of Roy Drive also provides good opportunity for access to a landing area with additional site work necessary to improve access from Roy Drive. Barretts Hill Road and Windham Road provide access to the southeastern portion of the property. Access from Barretts Hill Road provides good access opportunities for the property. Additional site work will be needed to support forest management activities and is considered less desirable than the previously mentioned access points. Rangers Town Forest fronts along Windham Road with no existing access points. Poorer ground conditions and less well drained soils adjacent to Windham Road do not make this access point a viable option for access supporting forest management activities.

Access within the property is generally good due to well-drained soils and navigable terrain. The terrain is variable throughout the property, considered to be rolling, generally sloping to the south. Small wetland areas, pockets of poorly drained soils and small drainages are located within the depressions of the rolling terrain. A southwesterly oriented valley is located in the western portion of the property. Within the valley an intermittent stream flows southerly, drying up during the summer months. Soils adjacent to the stream tend to be poorly drained and seasonally saturated. The terrain adjacent to the stream tends to be steep, creating areas that are considered inoperable for forest management activity.

Three easements exist within this property. The first and largest easement contains the previously mentioned Tennessee Gas Company easement that is maintained as grasses. The second easement extends from the end of Rangers Road southwesterly off of the property toward Fox Run Road. This is considered a utility easement servicing water and sewer lines. The third easement extends easterly from the end of Rangers Road to Barretts Hill Road, noted as a sewer easement. The second and third easements are less maintained with vegetation encroaching from the edges of the

easement. Prior to forest management activities the utilities within the easements must be notified. This will allow for good communication and recommendations for crossing the easements with forest management equipment. (See the ***Stand Map*** for the location of the town roads, easements and trails).

II. STAND DEVELOPMENT

Forest development is influenced by bedrock, soil, water, climate and disturbance. Shade tolerant species such as eastern hemlock, red spruce, American beech and sugar maple can reproduce and survive under low light levels. Intolerant species, such as paper birch or aspen require full sunlight to reproduce and thrive. Numerous other species fall in between both ends of the spectrum and are classified as intermediate in tolerance. The complex dynamic of forest succession occurs at different rates within stands on the property and across the landscape. These shifts are affected by past management practices, the environmental factors and natural disturbances, such as wind events and ice storms. These disturbances, human and natural, both further influence and/or interrupt what may otherwise appear to be an orderly stand progression from early-successional to "old forest" stands. Some stand transitions or progressions are readily apparent, while others are more nuanced and challenging to both detect and to predict. These successional tendencies and developmental phases are important to identify; they impact future forest composition and structure and heavily influence stand prescriptions.

Disturbance

Natural and human disturbances play an integral role in stand development. These disturbances manifest themselves in many forms: timber harvesting, pre-commercial silvicultural treatments, ice and snow damage, wind and rain events (tropical storms, tornadoes and hurricanes), herbivory, invasive plants and insects and biotic and abiotic pathogens.

Forests are subject to many natural disturbances, some small and frequent in occurrence and others extensive and infrequent. Single tree fall is the most common disturbance both in the region's forests and on the subject properties. This form of disturbance is caused primarily by wind, ice loading and/or natural mortality, expressing itself in canopy gaps created by single trees or small groups of trees.

Limited wind damage was noted during the inventory. Signs of snow and ice damage were periodically observed in the bent hardwood saplings and poles along with partial crown damage within the hardwoods. Wind throw and other disturbances allow greater light levels to reach the forest floor, modify micro-climate and frequently expose mineral soil, thereby providing a seedbed for plants. Disturbances, visualized as waves impacting the forest over time, encourage stand complexity and diversity. Human disturbances, in the form of silvicultural treatments, both pre-commercial and commercial (timber harvesting) can mimic natural disturbances.

Herbivory

Herbivory, particularly by white-tail deer, is a significant disturbance factor in southern New Hampshire. White-tail deer browse was the most evident on this property. Seedlings and saplings below the browse line are displaying varying degrees of browse. Browse on hardwood seedlings and saplings were observed on the property. Limited hardwood regeneration of commercial and desirable species was observed progressing and developing above the browse line (+/- 6'). Northern red oak, black oak, scarlet oak, white oak, pignut hickory, red maple, white ash and white birch saplings were observed. Further examination revealed these saplings have been browsed, resulting in stunted saplings. White pine and hemlock saplings were also observed displaying lesser amount of browse.

Recommendations

- Periodically monitor the property to note (changes in) the browse intensity.
- Consider using tree tops and branches from timber harvesting to protect seedlings from browse.

Invasive Plants

Invasive plants are a disturbance factor with significant negative impacts for the region's forests. Many invasive alien plants were intentionally introduced from Europe or Asia for ornamental plantings, erosion control, and wildlife food throughout the past.

These alien plants have influenced forest composition, particularly the understory, in the region. Invasive plants are frequently found in or near agricultural areas, particularly along field edges, in younger forests, especially abandoned

farmland reverting to forest and in other forest areas that experience disturbance. The fruits of these plants are consumed by various wildlife species, most notably birds, who then transport and spread seeds throughout the landscape. Invasive plants displace native species, suppress forest succession and create localized monocultures if left unchecked. These plants and their continued spread are a threat to the composition and functioning of the forest ecosystem throughout the region.

Invasive plants can, and do, displace native woody species. Disturbance, in any form, including silvicultural treatments (logging, creating early-successional habitat, pre-commercial treatments...) improve conditions for invasive plants and promote their spread. The preference by deer for browsing native species provides an additional advantage to these alien plants.

Invasive plants were observed adjacent to the gas line easement along the eastern edge extending into the property in areas of poorly drained soils. Populations of glossy buckthorn with multiflora rose are scattered and limited in size. The highest populations of invasive plant species are along the additional utility easements, mostly containing Autumn Olive, Oriental bittersweet and burning bush. Another area containing populations of invasive plant species is the southeastern corner of the property. This area is heavily infested from the end of Rangers Drive to Barretts Hill Road with Autumn Olive, burning bush and oriental bittersweet with lessor populations of glossy buckthorn and multiflora rose. Invasive plant populations are generally sparse throughout the remaining forested land but do occur as scattered individuals. Control of invasive plant species is recommended to prevent further spread and to aid in restoring natural habitat types.

Recommendations

- Continually monitor the property for the presence of invasive plants.
- Implement control measures while populations are low. Early detection and treatment is the cornerstone of successful and economical control.
- Seek cost-share opportunities to aid in the control of invasive plants.
- Consider population densities and the ability to effectively manage the current population.

Pathogens and diseases

Pathogens and diseases are real threats to the trees of New Hampshire's forests. During the field work portion of this management plan observations were taken in regards to pathogens and diseases. The following addresses the most common pathogen and disease and how they relate to the property:

Pine canker (*Caliciopsis pinea*) typically prevalent in dense pine stands, particularly on, but not limited to, soils with a hardpan layer. This fungus reduces crown density, thereby reducing tree vigor and growth. Trees and stands infected with pine canker are also more susceptible to other pathogens and environmental stresses, such as needle casts and blights which have occurred frequently over the last five or so years. This disease may affect long-term survival of infected trees. Symptoms include significant crown dieback, an increase in crown transparency (light foliage) and4 pitch flow between whorls in the mid to upper stem where bark is thin. This fungus is not well understood; it was first identified in New Hampshire in 1997. Thinning infected stands to increase light levels, temperature, and air flow, and thereby reducing moisture levels, may reduce the incidence of the fungus and mitigate its impact on tree health. This strategy appears to yield mixed results. White pine is a significant component (38% of the total basal area) of this property. Little to no signs of pine canker were observed.

White pine blister rust is a fungus which infects and kills white pine. The spores enter the needles of the tree and travel through a branch(s) to the main stem. The infected branch dies and creates a "flag", or dead limb. The fungus eventually girdles and kills the infected tree; pitching and a constriction, with a corresponding swelling of the stem above, is found at the point of entry on the stem. The visual indicators of blister rust are always observed at a branch whorl, unlike pine canker, which displays pitch between the whorls. Little to no signs of white pine blister rust was observed.

Eutypella Canker of Maple is caused by a fungus, and primarily affects sugar maple in forested situations. The fungus normally affects less than 10% of the sugar maple stems in a stand, but higher incidence rates can occur. It acts by attacking host trees during dormancy, with the host tree responding with callus development during the growing season, creating concentric ridges of callus tissue, dead bark, and a flattened area on the bole, but tends to be arranged in a more circular pattern. Concerns include: bole degradation, girdling of smaller stems, and weakening of wood in the canker region, leading to susceptibility to breakage. Control measures are achieved via removal of infected stems to reduce the chance of infecting neighboring stems. Red maple is a minor component (3% of the total basal area) of this property with some trees showing varying degrees of canker typical for the region.

Perennial Nectria Canker is caused by a Nectria fungus, and is very common in the Northeast. It has the most noticeable effect on black birch, basswood, and yellow birch, although it infects dozens of other hosts. Fungus-host interaction is similar to that described above for Eutypella canker, with the fungus attacking the host tree in the dormant season, and the tree responding with callus growth in the growing season. The resulting canker region has concentric callus ridges and dead bark areas, located on branches and the main stem. The cankers appear circular on basswood and appear more elongated on the birches. The cankers can coalesce and girdle the stem, killing the tree. Bole degradation and decay are the primary concerns, reducing the value of lumber produced from afflicted trees. Control measures are generally ineffectual, given the wide range of host trees. Removal of visibly affected stems will allow capitalization of some timber value, prior to total loss to decay or mortality. Although not sampled, sparse populations of yellow and black birch were observed with stems periodically showing signs of canker typical of the region.

Strumella Canker of Oak is caused by a fungus, and can be found most commonly in red and black oak. It usually affects less than 5% of oaks in a forested situation, although higher infection rates are known. The activity of the fungus creates a canker on the main stem, usually centered on a branch stub. The fungus is active killing bark during host-tree dormancy. During the growing season, the tree responds by creating callus tissue around the canker margin. This alternating battle can go on for years, and results in a wave of callus ridges, dead bark and wood arranged in a concentric concave, elongated, large, flattened appearance on the stem surrounding the original infection site. Strumella canker rarely kills larger trees; the primary concern is devaluation, since the canker is often found on the most valuable part of the tree, the main stem. Cankers can kill smaller trees via girdling, and the decay associated with the cankers on larger stems can weaken the stem, allowing breakage and subsequent death. Control methods may involve removing those trees with evidence of infection. Northern red oak, black oak, white oak and scarlet ok are significant component (40% of the total basal area) of this property. Stems were identified with canker typical for the site and region.

Insects

Four non-native insects with the capacity to radically alter forest composition loom on the horizon or are present: hemlock woolly adelgid, elongated hemlock scale, Asian longhorn beetle and emerald ash borer. During the field work portion of this managementplan observations were taken in regards to detrimental non-native forest insects. The following addresses the most common non-native insects and how they relate to the property:

Hemlock woolly adelgid (HWA) has caused wide spread mortality of hemlock throughout the Southern portion of this species' range, from Massachusetts South to the Appalachians in the Carolinas. This insect is present in Massachusetts, in the Connecticut River valley of Vermont and throughout New Hampshire. The woolly adelgid was first detected in Exeter and Peterborough, NH in 2001. HWA has since spread to over 120 towns and all counties in New Hampshire except Coos, the Northern-most NH County. HWA is currently limited by cold minimum temperatures in the winter. Hemlock makes up 8% of the total basal area of this property. Signs of wooly adelgid were observed during the field work portion of the management plan. Woolly adelgid was identified in Hudson in 2007 and currently effects hemlock on the property. Hemlock within Hillsborough County is showing decline from HWA and is projected to continue to decline over the next 10 years.

Elongated Hemlock Scale (EHS) is an exotic scale insect that prefers to feed on hemlock, spruce and fir. Cedar, Pine and Yew have also been found infested, but usually only if adjacent to preferred hosts. EHS feeds on the underside of the hemlock needle, draining tree fluids with its piercing and sucking mouth parts. This insect was introduced to New York in 1908 from Japan and has since spread north to Maine and south to North Carolina, found in thirteen states, including New Hampshire. Left untreated EHS can kill trees within 10 years. EHS can also be found on trees infested with Hemlock Woolly Adelgid (HWA). EHS populations build slowly on healthy trees but more quickly on trees that are stressed by HWA, drought, or other factors. This insect can be recognized by the presence of dry crusty yellowish-brown (female) or white (male) elongated scales and a white woolly substance similar to HWA. Hemlock makes up 8% of the total basal area of this property. Similar to HWA, signs of EHS were identified on the property. Elongated hemlock scale was found in Hudson in 2016 and is projected to increase in populations.

Asian longhorn beetle (ALB) is responsible for killing thousands of maples, native and alien (Norway), in the Worcester, MA area. The State of NH, Division of Forest and Lands, Forest Health Program is emphasizing both prevention and early detection of this insect. ALB is not currently known to occur in NH. This insect attacks hardwoods, with a particular preference for maples. With red maple being a component of the species composition of this property (3% of the total basal area), ALB is a viable threat.

The **emerald ash borer** (EAB) infects all species of ash: white, black and green. This insect causes what is believed to be nearly 100% mortality; it will attack trees 2" and greater DBH. EAB was first discovered in the City of Concord, NH in 2013.Subsequently EAB has spread to all counties in NH except for Coos. Vermont, Massachusetts, and New Hampshire are under state- wide quarantine. This allows logs to move within and between each state; firewood may not move across state lines without a compliance agreement from USDA. The State of New Hampshire developed Best Management Practices (BMPs) for limiting the spread of EAB within the infested and high risk areas. The New Hampshire Division of Forests and Lands currently recommends harvesting ash greater than 10" or 12" DBH. Though these small diameter trees are not particularly valuable for logs, the Division believes that eliminating larger trees will reduce the habitat for emerald ash borer and thereby reduce the ability of this insect to expand its population as rapidly. Emerald ash borer was identified in Hudson in 2020. White ash occupies 2% of the total basal area within the property. Signs of emerald ash borer were observed during the field work portion of this forest management plan.

Climate

The impacts of climate change will result in temperature shifts, variations in disturbance regimes, and altered precipitation levels, all of which will influence our forests. Current predictions indicate that this region will likely become both warmer and wetter; the typical frost free growing season has already increased by a total of ten days. Winters are likely to be shorter and more precipitation is likely to fall as rain in the future. Species composition and ranges are predicted to shift over time. White pine, red maple, northern red oak, white oak, sweet birch, hickories and black cherry are all predicted to remain stable in the various climate change scenarios. Red spruce, balsam fir, sugar maple and paper and yellow birch are predicted to decline over time. White oak will likely expand its range northward; it will become more prevalent in future stands. Species composition within this property suggests a high level of resiliency moving forward as the majority of the species present are projected to remain stable. This property is located at the northernmost range of the white oak, black oak, red oak forest type (SAF #52). This hardwood forest type is generally found in southern New England extending points south and west. As the climate shifts, this forest type will become more prevalent. Review of the forest inventory data reveals tree species from this forest type make up a majority of the species composition. White pine is the most dominant species present in the species composition, lending this property to still function as a white pine, northern red oak, red maple forest type (SAF #20). This property doesn't fit nicely into either type classification. Analysis of the soils data suggest continued management of white pine and northern red oak when possible. White oak, black oak, red oak forest types tend to become established as white pine is removed however these species are currently considered "off site" resulting in poorer growth, form and defect.

Stand development patterns may not conform to those historically experienced. Disturbance regimes and patterns are expected to shift. Large scale weather events, particularly rain storms and the resulting flooding, accompanied by high winds, are expected to occur more frequently and cause more damage. Many of the impacts and implications of a shifting climate are unknown, however, such changes will create added challenges for both foresters and landowners. Additionally, climate change may create conditions conducive to both alien exotic insects and plants and potentially aid their spread.

III. MULTIPLE USE VALUES

Cultural Features

Stone walls form some of the boundary lines. Additional stone walls are located within the property. Review of ground penetrating LIDAR imagery reveals a variety of foundations, stone walls, and woods roads in the surrounding area.These traces of past agrarian use provide a reminder of just how extensively the original forests were cleared or utilized to raise livestock and crops and how aggressively the forests have regrown after such intensive and extensive disturbance. Care should be taken to minimize disturbance to stone walls found within the property as well as foundations or wells not observed during the forest inventory.

Recommendations

- Protect cultural features. Maintain the current condition of these features wherever possible, and enhance them if and when desirable. Make every attempt to minimize disturbance of historical features on the property when harvesting timber or constructing trails and roads.
- Preserve representation of trees that existed when the land was open, regardless of their species, size, form or condition. These are also historical landscape features.

Wildlife Features

This property lends supporting forest cover within a larger landscape fragmented by residential areas radiating from urban and commercial centers. In heavily populated areas such as southern New Hampshire, un-fragmented forestland is less of a land cover type. Development and urban sprawl reduce opportunities for this land cover type to exist. Properties such as this one become even more important bridging the gap between open forested areas. A variety of smaller conservation lands and Town Forests contribute to maintaining this land cover type.

Large trees, some with cavities, occur occasionally on the property; defective northern red oak, black oak scarlet oak and white pine with cavities occur. Many of these individuals display open grown characteristics of coarse limbs, poor timber quality and widespreading crowns. Down woody material was not inventoried, but appeared to occur at slightly higher than typical regional levels due to wind throw and blowdown. Broken topped live trees, encountered rarely, provide ideal perch sites for hunting raptors. These structural components add complexity to the landscape and provide a variety of habitat for a wide array of wildlife.

Hard mast is comprised primarily of northern red oak, black oak, scarlet oak, white oak and pignut hickory. Seeds from various hardwood species provide an excellent source of food for a variety of migratory birds and small mammals. Soft mast producers, such as high bush and low bush blueberry occur throughout the property. Hardwood regeneration is available and browsed. The softwood component of this property is composed primarily of white pine with scattered eastern hemlock. Eastern hemlock is found in areas of poorly drained soils. Eastern hemlock seeds are less desirable than other softwood species such as white pine or red pine but the foliage provides winter feeding opportunities for moose, white-tailed deer,and snowshoe hares. Eastern hemlock is also known for its ability to provide cover for grouse, turkey, fishers, and other interior forest dwelling mammals. During the winter, eastern hemlock provides excellent thermal cover for moose and white-tailed deer.

Early-successional habitat afforded by extensive, dense young stands is limited on the property to a small 0.6 acre area off the end or Rangers Drive. This habitat type only functions as such for a period of about 5 to 8 years and is generally a highly sought after habitat type.

A variety of wildlife has been observed on this property; white-tailed deer are ubiquitous on the property and throughout towns in southern New Hampshire. A variety of migratory birds, small mammals, and birds of prey utilize this forest habitat type for both shelter and a food source. Larger mammals such as coyote, bobcat, and fox pass through these areas in search of smaller mammals such as mice, voles and rabbits. Large mammals such as moose and black bear may utilize this property within their geographical range but will not reside solely on a property of this size. As forestland becomes more fragmented within the surrounding area, larger mammals such as moose will become less observed.

Wildlife Considerations

The important components of wildlife habitat are food, cover, and water. Forest management practices can affect these components to intensively favor habitat requirements for selected species; to create habitat that is generally favorable to a wide variety of species; or to control the population of certain species. Forest management practices on the Rangers Town Forest property should attempt to create conditions generally favorable to a diversity of wildlife species. Desirable practices include:

1. Maintaining stand diversity. An interspersion of age classes and forest types, and a mix of species within stands will usually result in the best diversity of wildlife. Proper age class (successional stage) mix will have a greater impact than forest type mix. The area where different types and successional stages meet is called ecotonal "edge". A large amount of edge is usually desirable as, in addition to having a unique habitat of its own, it brings required habitat components within the ranges of more individual animals. Categories of forest succession important to wildlife include:

a. Herbaceous Openings – Areas of mixed grasses and other herbaceous plants with few trees. Important for nesting, brood rearing, and food, in the form of herbs, grasses, and insects.

b. Shrub/Seedling Brush Areas (early-successional habitat) – young seedlings or sapling trees, or shrubs and vines, these areas provide food, nesting sites, and escape cover. This component can also be described as the shrub layer; deciduous, coniferous, and herbaceous shrubs and seedlings that occur within the 2 to 10 foot zone in forested and non-forested cover types. This habitat component is generally considered to provide more benefits to wildlife than any other successional stage.

c. Sapling/Pole Stands (young forests) – the least beneficial age component for most wildlife. Pole stands are an

important component of grouse and woodcock habitat.

d. Mature and Over-Mature Timber – these are the stands that produce the highest volumes of seeds and nuts (mast) that are an important part of the food requirement of many wildlife species. These stands also provide the best cover for canopy-nesting birds, and for other birds and mammals that require a more open forest. As a stand becomes over-mature, more trees develop cavities that provide nest and den sites. Dead trees provide habitat for insects, which are a food source for many birds. When forest management is planned for this property, some mature and over-mature mast trees, and three or more cavity (or potential cavity) trees per acre (where possible) should be retained in the residual stand for a longer rotation. Trees shouldbe assessed for potential future value to wildlife before being selected for harvest.

2. Maintaining softwood cover when possible. Patches of conifers interspersed through a woodland provide needed cover for many wildlife species, from predators and from weather conditions, and are required nesting areas for some bird species. White-tailed deer depend on these dense conifer stands for winter yarding areas.

3. Releasing and/or planting individual trees and shrubs of particular value to wildlife. These would include apple trees and or fruit /nut bearing shrubs such as blueberry, dogwood, hazelnut, hawthorn, elderberry, viburnam, and holly. Apple trees are very important as the fruit often hangs on the tree into winter, and is still available when other foods are scarce, This is especially crucial to turkey, deer, and grouse. On this property, blueberry (high bush and low bush) was observed growing along with other shrubs such as witch hazel. Planting additional nut and/or fruit producing trees is a viable option.

4. Protection of wetlands and riparian zones. Wetlands are of crucial value to many wildlife species. Riparian zones (the wooded area bordering wetlands) are usually a unique habitat because of their association with the wetlands. These zones, in turn, help to protect the wetlands. Forest management activities should avoid damaging wetlands with equipment, and should avoid creating conditions that would cause heavy silt loads or pollutants to enter wetland areas.

5. Constructing brush piles. These will provide cover and nesting sites. The brush piles should be loosely structured, using large diameter pieces at the bottom of the pile to maintain openings. Logging slash can serve the same purpose. It would be beneficial in future harvests to leave more tops intact rather than removing or crushing all of them. Abundant logging slash can also aid in slowing the potential for browse by protecting seedlings and saplings.

6. Retained organic material. These are the larger limbs and stems that fall or are left in the forest following logging activity, and which provide habitat for insects, amphibians, and other small species of wildlife, as well as improving nutrient cycling in the forest floor.

Threatened/Endangered Species, Special Sites, Forests of Recognize Importance, and Unique Natural Communities

During the forestland examination, no species were identified as either threatened or endangered. Contact with the Natural Heritage program further determined that no species were identified as either threatened or endangered within this property. See the Appendix for the attached Natural Heritage Report for further details.

Recreational Features and Uses

The Town of Hudson highly values their land for wildlife habitat, aesthetics, conservation and recreation. The majority of the hiking trails exist within the utility easements on the property. Portions of old skid trails help connect these hiking trails to create a network of hiking trails. During the fieldwork portion of the forest management plan hikers were observed utilizing these trails. Abandoned campfire rings and old forts were also observed throughout the property. Dumping of construction and yard materials resulting in boundary line encroachment were observed along the houses from Rangers Drive abutting the property. Off highway vehicle usage appears to be minimal within the property. All of these observations are typical of properties surrounded by residential areas. The property can be monitored for increased illegal off highway vehicle usage and illegal dumping. Tree stands for hunting were observed in the northern portion of the property with limited signs of additional hunting activity throughout the remainder of the property.

Recommendations

- Encourage continued deer hunting to control the deer population.

- Establish a hiking trail network that allows for both logging and recreational access.
- Limit recreational disturbance to environmentally sensitive areas on the property.
- Explore opportunities for an interpretive trail discussing the multiple wildlife habitats throughout the property.

Timber

The property was harvesting approximately 30-40 years ago. The current stand structures suggest the harvesting intensity was variable throughout the property targeting white pine. No additional harvesting has occurred since then on the property. A list of management strategies on a stand-by-stand basis is discussed later in this plan.

IV. EXAMINATION METHOD & FOREST TYPE CLASSIFICATION

Forest Inventory and Stand Classification

Forest trees were sampled using a twenty basal area factor (20 BAF) prism during the inventory. At each sample point all trees over 6" at diameter breast height (DBH) were tallied by species, 2" diameter classes, crown class, and timber growing stocking category (Acceptable Growing Stock (AGS) or Unacceptable Growing Stock (UGS)). Additional notes pertaining to individual trees were made regarding form, damage and cavities.The inventory data from the property was processed using Forest Metrix to generate stand and stocking tables. Data was referenced with stocking guides and stocking levels allowing for comparison of existing number of trees and square feet of basal area in a stand to the amount desired for optimum growth of diameter and volume.

An inventory grid was established and sample points were numbered where each north/south line intersects each east/west line. Samples are sometimes moved from their predetermined grid location, either in the office prior to conducting the inventory, or in the field. This occurs when samples land in non-forested areas, at type changes, in non-productive forest (I. e.: forested wetlands) or in areas that are not dedicated to the production of timber. Inventory points are also "dropped" for various reasons, including, but not limited to those reasons for moving sample points.

The property was inventoried in September of 2021 by Eric Radlof and Jeffrey Snitkin of Full Circle Forestry, LLC. The inventory grid was established using grid north in ArcMap with transects and sample points both located at 300' intervals. The grid contained 24 samples located as described above. The inventory grid was transferred into Avenza Maps and onto a handheld unit which was utilized to navigate to and locate samples. Additional GPS data was taken to support observations in the field.

A total of 24 samples were measured on 54.0 acres of "working" commercial forest for an average sampling intensity of one per 2.25 acres. Five commercial, productive forest stands were delineated as a result of the 2021 inventory. No forested areas were deemed non-commercial for the purpose of the inventory. Areas within this working forest may be excluded from timber harvesting to protect water, soil and fragile sites, or because they are inaccessible or inoperable.

Soil Classification and Forest Typing

Soils information was obtained from the Web Soil Survey (WSS), an online tool that provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. The site is updated and maintained online as the single authoritative source of soil survey information.

Forest types were classified with the publication by the Society of American Foresters (SAF): Forest Cover Types of North America, copyright 1954, reprinted 1975 and Forest Cover Types of the United States and Canada, F. H. Erye, Editor, revised and published in 1980 were used to define what a stand type is. The publication defines a forest type as: "A descriptive term used to group stands of similar character as regards composition and development due to given ecological factors by which they may be differentiated from other groups of stands." Further, "A cover type is a forest type now occupying the ground, no implication being conveyed as to whether it is temporary or permanent." The bulletins emphasize composition instead of development as the basis for identifying forest types and utilize the following principles to recognize them:

"The cover type occupies large areas in aggregate. The type does not necessarily cover a large area in a single stand, but composition is characteristic and typical throughout a considerable range".

"The cover type is distinctive and easily separated from other types that it closely resembles. Transition areas are always found in the field and result from natural occurrences, including those of man".

V. FOREST PLAN STAND SUMMARIES

Stand #1 Forest type: Eastern White Pine (SAF #21) *Acreage: 3.5 acres*

Soil type (% slope): Chatfield-Hollis-Canton complex, 3 to 35 percent slopes

Forest Soil Group: I, IIA

Sampling: Date: September 21, 2021; ***Protocol:*** 6"+ DBH & by crown class; ***Method:*** Point, 20 BAF; ***#:*** 1 (1/ 3.5ac.)

Stand History: Evidence of prior harvesting; 30+ years ago

Health Issues: Light canker in the black oak. Signs of Hemlock Wooly Adelgid and Elongated Hemlock Scale observed.

Invasive Plants: None observed.

***Species Composition* (% overstory BA):** White Pine 83% and Red Oak 17%

Structure: Even-aged ***Stocking:*** Under ***AGS*** 100 sq. ft. ***UGS*** 20sq. ft. ***Total*** 120 sq. ft. ***MSD:*** 16.1"

Stand Description: This stand occupies the northeastern corner of the property adjacent to Roy Drive, bisected by the gas line easement. The terrain is relatively level throughout the stand with increased slope along the drainage in the southwestern portion of the stand. The aspect is southerly and westerly. Soils are excessively well-drained; pockets of poorly drained soils occur along the drainage in the western portion of the stand. White pine (14-22" at dbh) and northern red oak (16-18" at dbh) dominate the stand and seem well suited to the site; black oak, white oak, and scarlet oak (12-18" at dbh) seem less suited to site, often containing defect, poor growth form and lack vigor. Eastern hemlock (4-6" at dbh) is scattered throughout the stand generally occurring in the understory. Red maple and white birch (8-12" at dbh) of variable quality were observed within the stand although not falling within inventory points.

Total stocking is below the unmanaged "C" line for white pine stocking. AGS stocking is also below the unmanaged "C" line for white pine. 83% of the basal area is considered AGS. This includes 80% of the white pine basal area and 100% of the northern red oak basal area. UGS primarily includes 20% of the white pine basal area. Regeneration is considered advanced and represented as eastern red oak, black oak, white oak, red maple and white pine poles 2-6" in diameter; distributed throughout the stand. Saplings and seeding of similar species are present in sparse densities. Varying degrees of browse were observed on the hardwoods in the seedling to sapling size below the browse line resulting in undesirable regeneration. Access is good due to the close proximity of Roy Drive. Hiking trails were also observed in the stand along Roy Drive.

Silvicultural objective: Even-aged management; favor site-suited white pine and northern red oak.

Diam. Objectives: White pine 20-22" at dbh; Hardwoods 16-18" at dbh;

Estimated current age: 70-80+ years

Cut Cycle: 10-20 yrs; based on growing conditions

Silvicultural Prescription: Although total stocking is below the "C" line a light thinning (from below) is recommended while conducting forest management of adjacent stands. Thinnings are performed to control growth, adjust composition and improve timber quality. Various thinning methods and applications are available and utilized. These methods refer to a single operation, not a sequence thereof or a "system". A low thinning or thinning from below is recommended, involving removal of trees from the lower crown classes, thereby mimicking, at an accelerated rate, self-thinning and the natural mortality that occurs during the stem exclusion stage of development. This thinning method can be applied in a range of severities, with that severity dependent on the degree of removal by crown class. Low thinnings remove numerous weak competitors in the lower crown classes. Dominant and codominant trees are generally untouched except

for the occasional weak competitor. AGS is currently below the minimum stocking level. Harvesting will focus on removing UGS from the lower crown classes as part of harvesting of the remainder of the property, allowing for AGS to increase in growth.

Stand # 2 Eastern White Pine/ Northern Red Oak/ Red Maple (SAF #20) Acreage: 10.5 acres

Soil type (% slope): Chatfield-Hollis-Canton complex, 3 to 35 percent slopes and Canton stony fine sandy loam, 8 to 15 percent slopes

Forest Soil Group: IB, IIA

Sampling: Date: September 21, 2021; ***Protocol:*** 6"+ DBH & by Crown Class; ***Method:*** Point, 20 BAF; ***#***: 5 (1/ 2.1 ac.)

Stand History: Evidence of prior harvesting; 30+ years ago

Health issues: Canker in the northern red oak, black oak, white oak and scarlet oak; Hemlock Wooly Adelgid and Elongated Hemlock Scale observed.

Invasive Plants: Scattered and limited; glossy buckthorn

Species Composition (% overstory BA): Black Oak 47%, White Pine 28%, Northern Red Oak 21% and Scarlet Oak 4%

Structure: Even ***Stocking:*** Under ***AGS*** 80 sq. ft. ***UGS*** 48 sq. ft. ***Total*** 128 sq. ft. ***MSD:*** 14.1"

Stand Description: This stand is located in the northwestern corner of the property extending along the western boundary line. The terrain is rolling and slopes to the south and west. Soils are excessively well-drained with inclusions of poorly drained soils resulting from shallow soils to ledge. White pine and northern red oak (14-22" at dbh) are suited to the site, representing 70% of the AGS. Black oak and scarlet oak (10-16" at dbh) are less suited to the site, often containing defects, poor growth form and lacking vigor; 40% of the black oak and 0% of the scarlet oak are considered AGS. White oak and hemlock (6-8" at dbh) are present in the stand in lessor densities and considered suppressed.

Total stocking is just above the "B" line for mixedwood stocking guides. AGS stocking is below the "C" Line for mixedwood stocking guides. The stocking levels are a result of the stands condition based on growth since prior harvesting. Stand structure suggest prior harvesting 30+ years ago was heavy reducing the total stocking. Regeneration is considered advanced and is inadequate to marginal; white pine, northern red oak, white oak, black oak and hemlock saplings with scattered distribution 2-6" in diameter. Varying degrees of stagnation and mortality were observed within the white pine and hardwood saplings. Hardwood seedlings are sparse and displaying signs of heavy browse. Access is good to the adjacent stands. The gas line easement will need to be crossed for timber management activities. Hiking trails are present in the stand and should be protected during timber management activities.

Silvicultural objective: Even-aged management; favor site-suited white pine and northern red oak

Diam. Objectives: White pine 20-22" at dbh; hardwoods 16-18" at dbh

Estimated current age: 80-90+ years

Cut Cycle: 10-20 yrs; based on growing conditions

Silvicultural Prescription: With AGS stocking below the "C" line, there is not enough critical mass of AGS to continue to carry the stand. As a result, this stand can be regenerated utilizing the shelterwood method. The shelterwood method of regeneration involves the gradual removal of the entire stand in a series of partial cuttings that extend over a fraction of the rotation. These cuttings resemble heavy thinnings, and under management, logically follow a series of thinnings. Regeneration is initiated under the protection (or shelter) of the older stand and is subsequently released to provide the new crop with full use of the site and growing space. The establishment of a new crop prior to the end of the preceding rotation is a fundamental characteristic of the shelterwood method. Regardless of the number of cuttings, retaining the largest, most vigorous and best-formed trees of desirable species until the final cutting is a key principle of the shelterwood method. Retain good quality white pine and northern red oak. To a lesser degree, retain well-formed black oak. Conduct the harvest during bare ground conditions and ideally during a white pine seed year. The timing of second entry for this method will be determined by the resulting regeneration from the first entry, known as the preparatory or establishment cutting. Review the stand 1-2 years after the harvest for invasive plant populations, determining control

measures as necessary.

Stand #3 Forest type: Eastern Hemlock (SAF #23) *Acreage: 3.0 acres*

Soil type (% slope): Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes

Forest Soil Group: IIA

Sampling: Date: September 21, 2021; ***Protocol:*** 6"+ DBH & by crown class; ***Method:*** Point, 20 BAF; ***#:*** 2 (1/ 1.5 ac.)

Stand History: Evidence of prior harvesting; 30+ years ago

Health issues: Signs of Hemlock Wooly Adelgid and Elongated Hemlock Scale observed.

Invasive Plants: Light; glossy buckthorn

***Species Composition* (% overstory BA):** Hemlock 60%, White Pine 34% and Pignut Hickory 6%

Structure: Even ***Stocking:*** Adequate ***AGS*** 110 sq. ft. ***UGS*** 40 sq. ft. ***Total*** 150 sq. ft. ***MSD:*** 17.4"

Stand Description: This small stand is located to the west of Stand 1 and south of Stand 2, in a depression in the terrain. A southwesterly flowing drainage forms the eastern boundary of the stand. A smaller drainage surrounded by seasonally wet soils is located in the southwestern portion of the stand. Similar to Stand 1, this stand is bisected by the gas line easement. Ground conditions to the north of the easement are well-drained than soils found in the southern portion of the stand. Hemlock (12-18"+ at dbh) are well suited to the site. Scattered coarse dominant white pine (22-26" at dbh) remain from prior harvesting. To the south of the gas line easement is the addition of scattered red maple, white birch, white ash and pignut hickory (8-14" at dbh).

Hemlock represents the majority of the basal area considered AGS at 73%. AGS in this stand represent 73% of the total basal area. The majority of the UGS is represented by coarse dominant white pine with 40% of the white pine basal area considered UGS. Total stocking is above the "B" line for hemlock stocking guides. AGS is just below the "B" line for hemlock stocking guides. Regeneration is generally absent due to crown closure but is represented as Hemlock poles (2-4" at dbh) and saplings observed in small openings in the canopy from prior logging and along the edges of the stand.

Access to the stand is good from Stand 2. Access within the stand, to the south of the easement, is challenging due to poorly drained soils in the western portion of the stand. Steep terrain and a drainage in the eastern portion of the stand restrict access from Stand 1 and Stand 5. Harvesting or skidding within the stand is limited to dry or frozen ground conditions.

Silvicultural objective: Even-aged management; favor site-suited white pine and hardwood species; reduce hemlock component; retain riparian buffers

Diam. Objectives: Hemlock 18-20" at dbh, Hardwoods 16-18" at dbh,

Estimated current age: 90+ years

Cut Cycle: Variable; based on growing conditions and objectives; 10-20 years

Silvicultural Prescription: Due to the stands species composition and the presence of Hemlock Wooly Adelgid and Elongated Hemlock Scale, the clearcutting method is recommended for the portion of the stand north of the easement. The clearcutting method involves the removal of all trees, both large and small in one entry within a stand or portion thereof. In practice all trees over 1" or 2" DBH are cut. This method and its variations, is most applicable when residual trees are: 1) largely UGS; 2) will not increase in value; 3) are not a desired seed source; 4) are not needed to protect the new crop; and/or 5) in stands that are thoroughly mature or over mature. This method is also only applicable with species that are capable of establishment in conditions of full exposure and that can be depended on to develop satisfactorily in even-aged aggregations. When depending on surrounding trees for the only seed source, the clearing must be sufficiently small (usually long and narrow) to allow for adequate dissemination. Safe widths for clearings intended to be stocked by wind-disseminated seed, vary by species and range from 1 to 5 times the height of the adjacent seed trees. White pine trees can be retained along the edges of the clearcut to aid in seed disbursement and regeneration of this portion of the stand.

In the portion of the stand to the south of the easement, a light selection thinning is recommended. A selection thinning is best applied to remove poorly formed, coarse dominants in favor of satisfactory crop trees chosen from the highest possible level in the lower crown classes. This method is also appropriately applied to remove faster growing trees, typically intolerants, in stratified even-aged stands (e.g.: aspens and/or paper birch). Vigorous, deep crowns on the favored lower crown classes is essential to ensure their response to release and their development into thrifty individuals. Trees with live crown ratios less than 30% are rarely suitable for retention and future growth. Tolerant species are generally more forgiving in this regard. Coarse dominant white pine and hemlock will be targeted for removal while retaining vigorous hemlock and hardwoods.

Areas within this portion of the stand act as riparian buffers, protecting drainages and poorly drained soils. Harvesting is not recommended in these areas. During the planning portion of forest management, harvesting may decide to exclude this portion of the stand due to additional goals and objectives at that time.

Stand # 4 Eastern White Pine/ Northern Red Oak/ Red Maple (SAF #20) Acreage: 12.0 acres

Soil type (% slope): Canton stony fine sandy loam, 8 to 15 percent slopes and Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes

Forest Soil Group: IB, IIA

Sampling: Date: September 21, 2021; ***Protocol:*** 6"+ DBH & by Crown Class; ***Method:*** Point, 20 BAF; ***#***: 6 (1/ 2.0 ac.)

Stand History: Evidence of prior harvesting; 30+ years ago

Health issues: Canker in the northern red oak, black oak, white oak and scarlet oak, Hemlock Wooly Adelgid and Elongated Hemlock Scale observed.

Invasive Plants: Scattered and limited throughout, heavy along the utility easement; glossy buckthorn, autumn olive, multiflora rose, burning bush, Japanese's barberry.

Species Composition (% overstory BA): White Pine 42%, Red Oak 14%, Black Oak 14%, White Oak 14%, Pignut Hickory 10%, Scarlet Oak 2%, Red Maple 2% and Quaking Aspen 2%

Structure: Even; two-aged ***Stocking:*** Adequate ***AGS*** 56 sq. ft. ***UGS*** 64 sq. ft. ***Total*** 120 sq. ft. ***MSD:*** 13.6"

Stand Description: This stand is located in the western corner of the property extending along the southern boundary line. The terrain is rolling and slopes to the south and west. Soils are excessively well-drained with inclusions of poorly drained soils in depressions and along drainages. A small seasonal wetland is located in the northeastern corner of the stand adjacent to Stand 3. Soils are poorly drained and tend to be saturated during the spring and fall months. Red maple, swamp white oak, white ash and pignut hickory (8-14" at dbh) are more common here and tend to be of good quality and form. For the majority of the stand, white pine (14-20" at dbh) seem suited best to the site, representing 76% of the AGS. White pine distribution is patchy throughout the stand while northern red oak, black oak, white oak and scarlet oak (10-16" at dbh) are more uniformly distributed throughout. The mixed oaks along with pignut hickory and red maple are predominately UGS. Only 20% of the northern red oak, 30% of the white oak, and 50% of the pignut hickory is considered AGS. 53% of the stand is considered UGS. UGS often contain defects, poor growth form and lack vigor. This can be attributed to the excessively well-drained soils, soils shallow to ledge, prior harvesting methods and land use history.

Total stocking is just above the "B" line for mixedwood stocking guides. AGS stocking is below the "C" Line for mixedwood stocking guides. The stocking levels are a result of the stands condition based on growth since prior harvesting. Stand structure suggest prior harvesting 30+ years ago was heavy, reducing the total stocking. Regeneration is inadequate to marginal; white pine, northern red oak, white oak, black oak, red maple, white ash and hemlock poles (2-4" at dbh) and saplings with scattered distribution. Varying degrees of stagnation and mortality were observed within the white pine and hardwood saplings. Hardwood seedlings are sparse and displaying signs of heavy browse. Access is good to the adjacent stands. The gas line easement will need to be crossed for timber management activities. Hiking trails are present in the stand and should be protected during timber management activities.

Silvicultural objective: Even-aged management; favor site-suited white pine and northern red oak

Diam. Objectives: White pine 20-22" at dbh; hardwoods 16-18" at dbh

Estimated current age: 80-90+ years

Cut Cycle: 10-20 yrs; based on growing conditions

Silvicultural Prescription: With AGS stocking below the "C" line, there is not enough critical mass of AGS to continue to carry the stand. As a result, this stand can be regenerated utilizing the shelterwood method. The shelterwood method of regeneration involves the gradual removal of the entire stand in a series of partial cuttings that extend over a fraction of the rotation. These cuttings resemble heavy thinnings, and under management, logically follow a series of thinnings. Low density and variable density methods may be employed reducing the residual overstory or creating a less uniform overstory based on the current stand conditions. Regeneration is initiated under the protection (or shelter) of the older stand and is subsequently released to provide the new crop with full use of the site and growing space. The establishment of a new crop prior to the end of the preceding rotation is a fundamental characteristic of the shelterwood method. Regardless of the number of cuttings, retaining the largest, most vigorous and best-formed trees of desirable species until the final cutting is a key principle of the shelterwood method. Retain good quality white pine and northern red oak. To a lesser degree, retain well-formed pignut hickory, white oak or additional unique tree species for biodiversity. Conduct the harvest during bare ground conditions and ideally during a white pine seed year. The timing of second entry for this method will be determined by the resulting regeneration from the first entry, known as the preparatory or establishment cutting. Review the stand 1-2 years after the harvest for invasive plant populations, determining control measures as necessary.

Stand # 5 Eastern White Pine/ Northern Red Oak/ Red Maple (SAF #20) Acreage: 25.5 acres

Soil type (% slope): Chatfield-Hollis-Rock outcrop complex, 8 to 35 percent slopes and Leicester-Walpole complex stony, 0 to 3 percent slopes

Forest Soil Group: IB, IIA, IIB

Sampling: Date: September 21, 2021; ***Protocol:*** 6"+ DBH & by Crown Class; ***Method:*** Point, 20 BAF; ***#***: 10 (1/ 2.5 ac.)

Stand History: Evidence of prior harvesting; 30+ years ago. Excavation/ heavy ground disturbance in the eastern portion of the stand.

Health issues: Canker in the northern red oak, black oak, white oak and scarlet oak, Hemlock Wooly Adelgid and Elongated Hemlock Scale observed.

Invasive Plants: Scattered and limited throughout, heavy along the utility easements and the eastern half of the stand; glossy buckthorn, autumn olive, multiflora rose, burning bush, Japanese's barberry, oriental bittersweet.

Species Composition (% overstory BA): White Pine 49%, Black Oak 17%, Red Oak 10%, White Oak 8%, Pignut Hickory 5%, Scarlet Oak 3%, White Ash 3%, Red Maple 3% and Quaking Aspen 2%

Structure: Even; two-aged ***Stocking:*** Adequate ***AGS*** 64 sq. ft. ***UGS*** 54 sq. ft. ***Total*** 118 sq. ft. ***MSD:*** 13.6"

Stand Description: This is the largest stand encompassing the eastern half of the property. This stand shares many similarities with Stand 2 and Stand 4, containing the same forest type and general composition. The terrain gradually slopes to the south becoming steeper along a drainage found on the western boundary of this stand. Soils are well drained throughout the stand with portions of excessively well-drained soils in the northern and central portions of the stand and areas of poorly drained soils in the eastern and western edges of the stand. The eastern portion of the stand displays evidence of prior land use such as construction or excavation. Large piles of material were noted along with heavy ground disturbance. This area may have been excavated and/ or used as a staging area for construction and development by a prior landowner. The forest has since reclaimed these areas through the natural process of succession. An old road bed appears to connect Barretts Hill Road to Pheasant Run Drive, now being used as a hiking trail. A utility easement exists in the western portion of the property and is being used as a hiking trail. Additional hiking trails can be found in the stand radiating from this main trail. A sewer easement also exists in the eastern corner of the stand.

Similar to other stands in this property, white pine (14-24" at dbh) seem suited best to the site, representing 64% of the AGS. White pine distribution is more uniform throughout the stand with patchy groups in the southern portion of the stand. White pine becomes coarse, displaying open grown characteristic in the easternmost area of the stand. Northern red oak, black oak, white oak and scarlet oak (10-16" at dbh) are distributed throughout. Mixed oaks along with pignut hickory and

red maple are predominately UGS. Unlike Stand 4, these same species represent 25% AGS by species. It should be noted 54% of the stand is considered AGS. UGS often contain defects, poor growth form and lack vigor. This can be attributed to the excessively well-drained soils, soils shallow to ledge, prior harvesting methods and land use history. Where soils are seasonally saturated and poorly drained, quaking aspen, red maple, white ash and pignut hickory (8-14" at dbh) are more common and tend to vary in quality and form. White birch, yellow birch, sweet birch and sugar maple (10-18" at dbh) were observed in the stand displaying good quality and for although absent from sample points.

Total stocking is just above the "B" line for mixedwood stocking guides. AGS stocking is below the "C" Line for mixedwood stocking guides. The stocking levels are a result of the stands condition based on growth since prior harvesting. Stand structure suggest prior harvesting 30+ years ago was heavy reducing the total stocking. Regeneration is considered advance and is inadequate to marginal; white pine, northern red oak, white oak, black oak, red maple, white ash and hemlock (2-4" at dbh) with scattered distribution. Varying degrees of stagnation and mortality were observed within the white pine and hardwood saplings. Hardwood seedlings are sparse and displaying signs of heavy browse. Access is good to this stand from adjacent stands and direct access to Ranger Drive and Barretts Hill Road. The utility easements will need to be crossed for forest management activities. Hiking trails are present in the stand and should be protected during forest management activities.

Silvicultural objective: Even-aged management; favor site-suited white pine and northern red oak

Diam. Objectives: White pine 20-22" at dbh; hardwoods 16-18" at dbh

Estimated current age: 80-90+ years

Cut Cycle: 10-20 yrs; based on growing conditions

Silvicultural Prescription: With AGS stocking below the "C" line, there is not enough critical mass of AGS to continue to carry the stand. As a result, this stand can be regenerated utilizing the shelterwood method. The shelterwood method of regeneration involves the gradual removal of the entire stand in a series of partial cuttings that extend over a fraction of the rotation. These cuttings resemble heavy thinnings, and under management, logically follow a series of thinnings. Low density and variable density methods may be employed reducing the residual overstory or creating a less uniform overstory based on the current stand conditions and desired future conditions. Regeneration is initiated under the protection (or shelter) of the older stand and is subsequently released to provide the new crop with full use of the site and growing space. The establishment of a new crop prior to the end of the preceding rotation is a fundamental characteristic of the shelterwood method. Regardless of the number of cuttings, retaining the largest, most vigorous and best-formed trees of desirable species until the final cutting is a key principle of the shelterwood method. Retain good quality white pine and northern red oak. To a lesser degree, retain well-formed pignut hickory, white oak or additional unique tree species for biodiversity. Conduct the harvest during bare ground conditions and ideally during a white pine seed year. The timing of second entry for this method will be determined by the resulting regeneration from the first entry, known as the preparatory or establishment cutting. Review the stand 1-2 years after the harvest for invasive plant populations, determining control measures as necessary. The treatment of invasive plant species is recommended for this stand. Populations are heavier within this stand and will rapidly spread during and after timber harvesting activities.

Stand 6: Open/Abandoned Field *Acreage: 0.6 Acres*

Soil type(s): Chatfield-Hollis complex, 8 to 15 percent slopes

Forest Soil Group: IB

Farmland of Local Importance: No

Sampling: Date: September 21, 2021; ***Protocol:*** No samples taken; ocular exam

Stand History: Dumped fill from development of the surrounding area in the 1980's.

Health Issues: Invasive plant species, snow/ ice damage

Invasive Plants: Moderate to high populations; oriental bittersweet, autumn olive, multiflora rose, Japanese barberry, glossy buckthorn, burning bush.

Description: This stand type consists of land where excess fill and debris was dumped and leveled off in the late 1980's. Soils appear to be well drain. Through the natural process of succession this area is slowly reverting back to forestland. White birch, grey birch, aspen, pin cherry and white pine (2-4"+ at dbh) have become established. Signs of periodic clearing and additional dumping over the past 30 years were observed. Invasive plants have become established throughout this stand type. Oriental bittersweet, autumn olive, Japanese's barberry, glossy buckthorn and burning bush are the most prominent. Damage from snow and ice loads combined with invasive plant populations make traversing the stand very difficult.

Management objective: Management opportunity for this stand is limited. At a minimum the control of invasive plant species is recommended. Due to the dense condition of the vegetation within this stand and the high density of invasive plant species, mowing or clearing of the entire stand is recommended before the treatment of invasive plant species. This will reduce the population of invasive plant species and improve the access opportunity for the stand. This stand also lends itself as a good location for a landing area for forest management activities. This area would be cleared as part of its preparation as a landing area. The stands direct access to Rangers Drive makes this area highly desirable for a landing location. With additional work the landing area could be modified to support a trailhead parking area.

Management Cycle: Treat invasive plans species every 1-5 yrs depending on growing conditions and desired results.

V. SUMMARY

Forests are diverse and continually changing. They are influenced by underlying bedrock, soils, drainage, slope, position on the slope, climate, weather and human use. Rangers Town Forest is typical of the region; the current conditions are directly attributable to the land use practices of yesterday. Undoubtedly, human influence, natural succession and disturbance, along with the unknown influences of climate change and invasive plants and insects, will continue to shape the character of this forest.

Properties such as this pose a variety of management challenges. Forest management cannot be measured in years but in decades and beyond. It can take a lifetime to experience the results of sound forest management practices. As previously mentioned in this management plan, forests are resilient and can withstand a variety of challenges. One of the biggest challenges to this property is the presence of invasive plant species. Invasive plant species are often opportunistic and out-compete native vegetation. This can eventually lead to a shift in the ecosystem and loss of habitat types. This property is on the verge of a total infestation of invasive plant species if left untreated. Stand 5 contains the highest populations of invasive plant species. If left unmanaged, the chance for successful control will become limited especially after forest management activities. Treatment of invasive plant species is costly in both time and money. It is easier to treat smaller populations rather than large well established populations. Invasive plant species will never be totally eradicated; only controlled enough to allow for native vegetation to have a competitive edge. The current populations on this property did not become established overnight. Years of slow and steady spread have contributed to the current populations displayed during this forest management plan.

White Pine/ Northern Red Oak/ Red Maple is the dominant forest type of this property. Upon abandonment of open land, white pine forest types became established. Through weather events and forest management activities, northern red oak and red maple became more established to fill the gaps white pine once occupied. Underlying bedrock, soils and human use have allow for black oak, white oak, scarlet oak and pignut hickory to become more established. Prior forest management focused on harvesting white pine which aided in promoting these species over time. Although these species regularly occur in other forest types they tend to be considered "off site" when growing in White Pine/ Northern Red Oak/ Red Maple forest types. Examination of the forest data further supports these species are generally off site as they compose the majority of the UGS on the property. Future forest management of this property will focus on removing UGS and promoting white pine and northern red oak through regeneration based harvesting. AGS of the mixed oak species and pignut hickory is encouraged to promote resiliency as these species are projected to continue to thrive through climate change. Carrying out the recommendations within this management plan will result in sound management of the forest stands.

The recommendations proposed in this 10-year management plan can 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. These recommendations are silviculturally and operationally sound and will result in meeting the landowner's objectives for their property. Implementing these recommendations will help ensure this forestland is being managed with long-term sustainability in mind.

Respectfully Submitted,

Eric V. Radlof, Consulting Forester
Full Circle Forestry, LLC
N. H. License #447

Management Schedule

See Silvicultural Objective and Silvicultural Prescription in each stand for additional information.

Treatment Year	Stand#	Management Activity
2021-2030	NA	Blaze and paint boundary lines.
2022-2025	NA	Improve access into property and create landing area(s).
2022-2025	All	Conduct harvest based on stand recommendations.
2022-2025	All	Conduct invasive plant control.
2021-2030	All	Improve hiking trails throughout the property.
2025-2030	All	Continue to Explore Management Opportunities
2030	All	Reevaluate the Property for Updated Management Plan
		NOTES

APPENDIX

TRACT SUMMARY

September 21, 2021

TRACT INFO

5 STANDS

ACRES 54.0

24 PTS

STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS
Average	153.3	191.9	12.1	12.78	19.38
Sampling Error	12.6%	18.1%		17.9%	24.3%
Probable Lower Limit	134.0	157.2		10.48	14.88
Probable Upper Limit	172.7	226.6		15.07	24.43

SPECIES COMPOSITION

	BA		TPA		DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS	TOTAL TRACT VOLUME MBF	TOTAL TRACT VOLUME TONS
	153.3		191.9		12.1	12.78	19.38	689.95	1,046.64
white pine	58.3	38.0%	57.1	29.8%	13.7	7.05	5.11	380.59	275.81
black oak	31.7	20.7%	40.6	21.2%	12.0	1.84	5.90	99.19	318.75
red oak	15.0	9.8%	12.8	6.7%	14.7	1.38	1.20	74.36	65.02
hemlock	11.7	7.6%	13.6	7.1%	12.5	0.65	0.65	34.93	34.88
white oak	10.0	6.5%	17.2	9.0%	10.3	0.52	1.84	28.10	99.41
pignut hickory	10.0	6.5%	22.8	11.9%	9.0	0.40	1.10	21.73	59.52
scarlet oak	6.7	4.3%	9.4	4.9%	11.4	0.40	1.32	21.71	71.45
red maple	4.2	2.7%	10.2	5.3%	8.7	0.16	0.35	8.67	18.98
white ash	3.3	2.2%	5.2	2.7%	10.9	0.11	1.33	5.80	71.81
quaking aspen	1.7	1.1%	2.3	1.2%	11.5	0.07	0.57	4.02	31.01
other hardwood 2	0.8	0.5%	0.6	0.3%	16.0	0.20		10.86	

STAND SUMMARY

September 21, 2021

STAND 1 Wp **BA 160.0** **TPA 158.5** **Sampling Method: Variable Radius Plots**

ACRES 3.5 **MBF 18.00** **TONS 14.89** **Basal Area Factor: 20.00** **1 PTS**

STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS
Average	160.0	158.5	13.6	18.00	14.89
Sampling Error					
Probable Lower Limit					
Probable Upper Limit					

SPECIES COMPOSITION

	BA		TPA		AVG DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS	TOTAL STAND VOLUME MBF	TOTAL STAND VOLUME TONS
	160.0		158.5		13.6	18.00	14.89	63.00	52.10
white pine	100.0	62.5%	70.8	44.7%	16.1	14.90		52.14	
black oak	40.0	25.0%	73.3	46.3%	10.0		14.89		52.10
other hardwood 2	20.0	12.5%	14.3	9.0%	16.0	3.10		10.86	

STAND SUMMARY

September 21, 2021

STAND 2 **Wp/ro/rm** **BA 172.0** **TPA 219.2** **Sampling Method: Variable Radius Plots**

ACRES 10.5 **MBF 13.21** **TONS 21.46** **Basal Area Factor: 20.00** **5 PTS**

STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS
Average	172.0	219.2	12.0	13.21	21.46
Sampling Error	23.0%	33.4%		34.8%	52.7%
Probable Lower Limit	132.5	145.9		8.61	10.15
Probable Upper Limit	211.5	292.4		17.81	32.77

SPECIES COMPOSITION

	BA		TPA		AVG DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS	TOTAL STAND VOLUME MBF	TOTAL STAND VOLUME TONS
	172.0		219.2		12.0	13.21	21.46	138.69	225.33
black oak	84.0	48.8%	108.5	49.5%	11.9	5.13	15.01	53.84	157.61
white pine	40.0	23.3%	51.8	23.6%	11.9	4.60	3.06	48.28	32.10
red oak	28.0	16.3%	23.4	10.7%	14.8	2.89		30.37	
scarlet oak	8.0	4.7%	8.8	4.0%	12.9	0.59	0.64	6.20	6.73
hemlock	8.0	4.7%	15.2	6.9%	9.8		1.26		13.25
white oak	4.0	2.3%	11.5	5.2%	8.0		1.49		15.63

STAND SUMMARY

September 21, 2021

STAND 3 Hemlock **BA 170.0** **TPA 149.0** **Sampling Method: Variable Radius Plots**

ACRES 2.5 **MBF 18.38** **TONS 12.05** **Basal Area Factor: 20.00** **2 PTS**

STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS
Average	170.0	149.0	14.5	18.38	12.05
Sampling Error	185.7%	358.7%		270.8%	631.4%
Probable Lower Limit					
Probable Upper Limit	485.7	683.6		68.16	88.10

SPECIES COMPOSITION

	BA		TPA		AVG DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS	TOTAL STAND VOLUME MBF	TOTAL STAND VOLUME TONS
	170.0		149.0		14.5	18.38	12.05	45.95	30.11
hemlock	110.0	64.7%	118.3	79.4%	13.1	12.40	8.65	30.99	21.63
white pine	50.0	29.4%	21.4	14.3%	20.7	5.65	1.28	14.13	3.19
pignut hickory	10.0	5.9%	9.4	6.3%	14.0	0.33	2.12	0.83	5.30

STAND SUMMARY

September 21, 2021

STAND 4 **WP/ro/rm** **BA 150.0** **TPA 229.4** **Sampling Method: Variable Radius Plots**

ACRES 12.0 **MBF 10.63** **TONS 27.57** **Basal Area Factor: 20.00** **6 PTS**

STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS
Average	150.0	229.4	11.0	10.63	27.57
Sampling Error	49.4%	53.7%		70.8%	61.2%
Probable Lower Limit	75.9	106.3		3.11	10.70
Probable Upper Limit	224.1	352.4		18.16	44.43

SPECIES COMPOSITION

	BA		TPA		AVG DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS	TOTAL STAND VOLUME MBF	TOTAL STAND VOLUME TONS
	150.0		229.4		11.0	10.63	27.57	127.58	330.83
white pine	56.7	37.8%	67.1	29.3%	12.4	6.25	7.56	75.01	90.70
white oak	23.3	15.6%	49.6	21.6%	9.3	0.61	6.98	7.33	83.78
pignut hickory	20.0	13.3%	53.5	23.3%	8.3	0.95	2.04	11.42	24.44
red oak	16.7	11.1%	17.5	7.6%	13.2	0.97	3.29	11.68	39.50
black oak	16.7	11.1%	17.1	7.5%	13.4	1.22	2.39	14.65	28.65
scarlet oak	10.0	6.7%	16.5	7.2%	10.6	0.25	3.28	2.98	39.33
red maple	3.3	2.2%	1.9	0.8%	18.0	0.37		4.49	
quaking aspen	3.3	2.2%	6.1	2.7%	10.0		2.04		24.44

STAND SUMMARY

September 21, 2021

STAND 5 **WP/ro/rm** **BA 142.0** **TPA 167.6** **Sampling Method: Variable Radius Plots**

ACRES 25.5 **MBF 12.34** **TONS 16.01** **Basal Area Factor: 20.00** **10 PTS**

STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS
Average	142.0	167.6	12.5	12.34	16.01
Sampling Error	16.1%	26.7%		23.8%	31.2%
Probable Lower Limit	119.2	122.9		9.40	11.02
Probable Upper Limit	164.8	212.4		15.28	21.00

SPECIES COMPOSITION

	BA		TPA		AVG DBH	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS	TOTAL STAND VOLUME MBF	TOTAL STAND VOLUME TONS
	142.0		167.6		12.5	12.34	16.01	314.73	408.26
white pine	66.0	46.5%	59.5	35.5%	14.3	7.49	5.88	191.03	149.82
black oak	20.0	14.1%	25.7	15.3%	12.0	1.20	3.15	30.70	80.38
red oak	12.0	8.5%	8.5	5.1%	16.1	1.27	1.00	32.30	25.52
pignut hickory	10.0	7.0%	20.8	12.4%	9.4	0.37	1.17	9.49	29.78
white ash	8.0	5.6%	12.4	7.4%	10.9	0.23	2.82	5.80	71.81
red maple	8.0	5.6%	23.2	13.9%	7.9	0.16	0.74	4.17	18.98
white oak	8.0	5.6%	5.9	3.5%	15.8	0.81		20.76	
scarlet oak	6.0	4.2%	8.3	4.9%	11.5	0.49	1.00	12.52	25.39
hemlock	2.0	1.4%	1.4	0.9%	16.0	0.15		3.94	
quaking aspen	2.0	1.4%	1.9	1.1%	14.0	0.16	0.26	4.02	6.57

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 1 Wp **BA 160.0** **TPA 158.5** **Sampling Method: Variable Radius Plots**

ACRES 3.5 **MBF 18.00** **TONS 14.89** **Basal Area Factor: 20.00** **1 PTS**

	AGS			UGS			TOTAL		
	BA	TPA	MSD	BA	TPA	MSD	BA	TPA	MSD
Main Crown	**100.0**	**66.5**	16.6	**20.0**	**18.7**	14.0	**120.0**	**85.2**	16.1
Dominant	100.0	66.5	16.6				100.0	66.5	16.6
Intermediate				20.0	18.7	14.0	20.0	18.7	14.0
Suppressed				**40.0**	**73.3**	10.0	**40.0**	**73.3**	10.0
Suppressed				40.0	73.3	10.0	40.0	73.3	10.0
STAND TOTAL	**100.0**	**66.5**	16.6	**60.0**	**92.0**	16.6	**160.0**	**158.5**	13.6

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 2 **Wp/ro/rm** **BA 172.0** **TPA 219.2** **Sampling Method: Variable Radius Plots**

ACRES 10.5 **MBF 13.21** **TONS 21.46** **Basal Area Factor: 20.00** **5 PTS**

	AGS			UGS			TOTAL		
	BA	**TPA**	**MSD**	**BA**	**TPA**	**MSD**	**BA**	**TPA**	**MSD**
Main Crown	**80.0**	**66.3**	14.9	**48.0**	**52.6**	13.0	**128.0**	**118.9**	14.1
Dominant	44.0	34.3	15.4	24.0	24.8	13.4	68.0	59.0	14.6
Intermediate	28.0	26.3	14.2	24.0	27.9	12.6	52.0	54.1	13.3
Super Dominant	8.0	5.7	16.0				8.0	5.7	16.0
Suppressed				**44.0**	**100.3**	9.4	**44.0**	**100.3**	9.4
Suppressed				44.0	100.3	9.4	44.0	100.3	9.4
STAND TOTAL	**80.0**	**66.3**	14.9	**92.0**	**152.9**	14.9	**172.0**	**219.2**	12.0

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 3 **Hemlock** **BA 170.0** **TPA 149.0** **Sampling Method: Variable Radius Plots**

ACRES 2.5 **MBF 18.38** **TONS 12.05** **Basal Area Factor: 20.00** **2 PTS**

	AGS			UGS			TOTAL		
	BA	**TPA**	**MSD**	**BA**	**TPA**	**MSD**	**BA**	**TPA**	**MSD**
Main Crown	**110.0**	**61.2**	18.9	**40.0**	**24.1**	18.7	**150.0**	**85.4**	18.3
Dominant	90.0	49.5	18.9	20.0	12.1	21.7	110.0	61.6	18.7
Intermediate	10.0	9.4	14.0	10.0	9.4	14.0	20.0	18.7	14.0
Super Dominant	10.0	2.3	28.0	10.0	2.7	26.0	20.0	5.1	26.9
Suppressed	**10.0**	**12.7**	12.0	**10.0**	**50.9**	6.0	**20.0**	**63.7**	7.6
Suppressed	10.0	12.7	12.0	10.0	50.9	6.0	20.0	63.7	7.6
STAND TOTAL	**120.0**	**74.0**	18.1	**50.0**	**75.1**	18.1	**170.0**	**149.0**	14.5

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 4 **WP/ro/rm** **BA 150.0** **TPA 229.4** **Sampling Method: Variable Radius Plots**

ACRES 12.0 **MBF 10.63** **TONS 27.57** **Basal Area Factor: 20.00** **6 PTS**

	AGS			UGS			TOTAL		
	BA	**TPA**	**MSD**	**BA**	**TPA**	**MSD**	**BA**	**TPA**	**MSD**
Main Crown	**56.7**	**44.2**	15.4	**63.3**	**81.7**	12.3	**120.0**	**125.9**	13.6
Dominant	50.0	35.7	16.2	40.0	46.3	13.0	90.0	82.1	14.7
Intermediate	6.7	8.5	13.0	23.3	35.3	11.1	30.0	43.8	11.4
Suppressed				**30.0**	**103.5**	7.8	**30.0**	**103.5**	7.8
Suppressed				30.0	103.5	7.8	30.0	103.5	7.8
STAND TOTAL	**56.7**	**44.2**	15.4	**93.3**	**185.1**	15.4	**150.0**	**229.4**	11.0

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 5 **WP/ro/rm** **BA 142.0** **TPA 167.6** **Sampling Method: Variable Radius Plots**

ACRES 25.5 **MBF 12.34** **TONS 16.01** **Basal Area Factor: 20.00** **10 PTS**

	AGS			UGS			TOTAL		
	BA	**TPA**	**MSD**	**BA**	**TPA**	**MSD**	**BA**	**TPA**	**MSD**
Main Crown	**64.0**	**46.0**	16.0	**54.0**	**74.8**	12.9	**118.0**	**120.8**	14.4
Dominant	54.0	35.3	16.8	20.0	12.1	17.8	74.0	47.3	17.0
Intermediate	10.0	10.7	13.1	34.0	62.8	10.9	44.0	73.5	11.3
Suppressed	**6.0**	**7.6**	12.7	**18.0**	**39.2**	10.4	**24.0**	**46.8**	10.8
Suppressed	6.0	7.6	12.7	18.0	39.2	10.4	24.0	46.8	10.8
STAND TOTAL	**70.0**	**53.6**	15.7	**72.0**	**114.0**	15.7	**142.0**	**167.6**	12.5

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 1 Wp **BA 160.0** **TPA 158.5** **Sampling Method: Variable Radius Plots**

ACRES 3.5 **MBF 18.00** **TONS 14.89** **Basal Area Factor: 20.00** **1 PTS**

	AGS			UGS			TOTAL		
	BA	TPA	MSD	BA	TPA	MSD	BA	TPA	MSD
black oak									
Suppressed				40.0	73.3	10.0	40.0	73.3	10.0
Suppressed				40.0	73.3	10.0	40.0	73.3	10.0
Species TOTAL				40.0	73.3	10.0	40.0	73.3	10.0
other hardwood 2									
Main Crown	20.0	14.3	16.0				20.0	14.3	16.0
Dominant	20.0	14.3	16.0				20.0	14.3	16.0
Species TOTAL	20.0	14.3	16.0				20.0	14.3	16.0
white pine									
Main Crown	80.0	52.1	16.8	20.0	18.7	14.0	100.0	70.8	16.1
Dominant	80.0	52.1	16.8				80.0	52.1	16.8
Intermediate				20.0	18.7	14.0	20.0	18.7	14.0
Species TOTAL	80.0	52.1	16.8	20.0	18.7	14.0	100.0	70.8	16.1
STAND TOTAL	100.0	66.5	16.6	60.0	92.0	16.6	160.0	158.5	13.6

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 2 **Wp/ro/rm** **BA 172.0** **TPA 219.2** **Sampling Method: Variable Radius Plots**

ACRES 10.5 **MBF 13.21** **TONS 21.46** **Basal Area Factor: 20.00** **5 PTS**

	AGS			UGS			TOTAL		
	BA	**TPA**	**MSD**	**BA**	**TPA**	**MSD**	**BA**	**TPA**	**MSD**
black oak									
Main Crown	**24.0**	**20.3**	14.7	**36.0**	**40.0**	12.8	**60.0**	**60.3**	13.5
Dominant	16.0	14.6	14.2	16.0	15.9	13.6	32.0	30.5	13.9
Intermediate	8.0	5.7	16.0	20.0	24.1	12.3	28.0	29.9	13.1
Suppressed				**24.0**	**48.1**	9.6	**24.0**	**48.1**	9.6
Suppressed				24.0	48.1	9.6	24.0	48.1	9.6
Species TOTAL	**24.0**	**20.3**	14.7	**60.0**	**88.2**	11.2	**84.0**	**108.5**	11.9
hemlock									
Suppressed				**8.0**	**15.2**	9.8	**8.0**	**15.2**	9.8
Suppressed				8.0	15.2	9.8	8.0	15.2	9.8
Species TOTAL				**8.0**	**15.2**	9.8	**8.0**	**15.2**	9.8
red oak									
Main Crown	**24.0**	**18.3**	15.5	**4.0**	**5.1**	12.0	**28.0**	**23.4**	14.8
Dominant	16.0	11.7	15.8	4.0	5.1	12.0	20.0	16.8	14.8
Intermediate	8.0	6.6	14.9				8.0	6.6	14.9
Species TOTAL	**24.0**	**18.3**	15.5	**4.0**	**5.1**	12.0	**28.0**	**23.4**	14.8
scarlet oak									
Main Crown				**4.0**	**3.7**	14.0	**4.0**	**3.7**	14.0
Dominant				4.0	3.7	14.0	4.0	3.7	14.0
Suppressed				**4.0**	**5.1**	12.0	**4.0**	**5.1**	12.0
Suppressed				4.0	5.1	12.0	4.0	5.1	12.0
Species TOTAL				**8.0**	**8.8**	12.9	**8.0**	**8.8**	12.9
white oak									
Suppressed				**4.0**	**11.5**	8.0	**4.0**	**11.5**	8.0
Suppressed				4.0	11.5	8.0	4.0	11.5	8.0
Species TOTAL				**4.0**	**11.5**	8.0	**4.0**	**11.5**	8.0
white pine									
Main Crown	**32.0**	**27.7**	14.6	**4.0**	**3.7**	14.0	**36.0**	**31.4**	14.5
Dominant	12.0	8.0	16.3				12.0	8.0	16.3
Intermediate	12.0	13.9	12.6	4.0	3.7	14.0	16.0	17.7	12.9
Super Dominant	8.0	5.7	16.0				8.0	5.7	16.0

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

Suppressed				**4.0**	**20.4**	6.0	**4.0**	**20.4**	6.0
Suppressed				4.0	20.4	6.0	4.0	20.4	6.0
Species TOTAL	**32.0**	**27.7**	14.6	**8.0**	**24.1**	7.8	**40.0**	**51.8**	11.9
STAND TOTAL	**80.0**	**66.3**	14.9	**92.0**	**152.9**	14.9	**172.0**	**219.2**	12.0

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 3 Hemlock **BA 170.0** **TPA 149.0** **Sampling Method: Variable Radius Plots**

ACRES 2.5 **MBF 18.38** **TONS 12.05** **Basal Area Factor: 20.00** **2 PTS**

	AGS			UGS			TOTAL		
	BA	TPA	MSD	BA	TPA	MSD	BA	TPA	MSD
hemlock									
Main Crown	80.0	51.9	16.8	10.0	2.7	26.0	90.0	54.6	17.4
Dominant	70.0	42.6	17.4	10.0	2.7	26.0	80.0	45.3	18.0
Intermediate	10.0	9.4	14.0				10.0	9.4	14.0
Suppressed	10.0	12.7	12.0	10.0	50.9	6.0	20.0	63.7	7.6
Suppressed	10.0	12.7	12.0	10.0	50.9	6.0	20.0	63.7	7.6
Species TOTAL	90.0	64.7	16.0	20.0	53.6	8.3	110.0	118.3	13.1
pignut hickory									
Main Crown				10.0	9.4	14.0	10.0	9.4	14.0
Intermediate				10.0	9.4	14.0	10.0	9.4	14.0
Species TOTAL				10.0	9.4	14.0	10.0	9.4	14.0
white pine									
Main Crown	30.0	9.3	24.3	20.0	12.1	17.4	50.0	21.4	20.7
Dominant	20.0	7.0	24.3	10.0	9.4	17.4	30.0	16.3	20.7
Super Dominant	10.0	2.3	28.0	10.0	2.7	26.0	20.0	5.1	26.9
Species TOTAL	30.0	9.3	24.3	20.0	12.1	17.4	50.0	21.4	20.7
STAND TOTAL	120.0	74.0	18.1	50.0	75.1	18.1	170.0	149.0	14.5

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 4 **WP/ro/rm** **BA 150.0** **TPA 229.4** **Sampling Method: Variable Radius Plots**

ACRES 12.0 **MBF 10.63** **TONS 27.57** **Basal Area Factor: 20.00** **6 PTS**

	AGS			UGS			TOTAL		
	BA	**TPA**	**MSD**	**BA**	**TPA**	**MSD**	**BA**	**TPA**	**MSD**
black oak									
Main Crown				**16.7**	**17.1**	13.4	**16.7**	**17.1**	13.4
Dominant				16.7	17.1	13.4	16.7	17.1	13.4
Species TOTAL				**16.7**	**17.1**	13.4	**16.7**	**17.1**	13.4
pignut hickory									
Main Crown	**6.7**	**7.4**	12.9	**6.7**	**12.2**	10.0	**13.3**	**19.6**	11.2
Dominant	6.7	7.4	12.9	3.3	6.1	10.0	10.0	13.5	11.7
Intermediate				3.3	6.1	10.0	3.3	6.1	10.0
Suppressed				**6.7**	**34.0**	6.0	**6.7**	**34.0**	6.0
Suppressed				6.7	34.0	6.0	6.7	34.0	6.0
Species TOTAL	**6.7**	**7.4**	12.9	**13.3**	**46.2**	7.3	**20.0**	**53.5**	8.3
quaking aspen									
Main Crown				**3.3**	**6.1**	10.0	**3.3**	**6.1**	10.0
Intermediate				3.3	6.1	10.0	3.3	6.1	10.0
Species TOTAL				**3.3**	**6.1**	10.0	**3.3**	**6.1**	10.0
red maple									
Main Crown				**3.3**	**1.9**	18.0	**3.3**	**1.9**	18.0
Dominant				3.3	1.9	18.0	3.3	1.9	18.0
Species TOTAL				**3.3**	**1.9**	18.0	**3.3**	**1.9**	18.0
red oak									
Main Crown	**3.3**	**2.4**	16.0	**13.3**	**15.1**	12.7	**16.7**	**17.5**	13.2
Dominant				10.0	10.9	13.0	10.0	10.9	13.0
Intermediate	3.3	2.4	16.0	3.3	4.2	12.0	6.7	6.6	13.6
Species TOTAL	**3.3**	**2.4**	16.0	**13.3**	**15.1**	12.7	**16.7**	**17.5**	13.2
scarlet oak									
Main Crown				**3.3**	**6.1**	10.0	**3.3**	**6.1**	10.0
Dominant				3.3	6.1	10.0	3.3	6.1	10.0
Suppressed				**6.7**	**10.4**	10.9	**6.7**	**10.4**	10.9
Suppressed				6.7	10.4	10.9	6.7	10.4	10.9
Species TOTAL				**10.0**	**16.5**	10.6	**10.0**	**16.5**	10.6
white oak									

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

Main Crown	**3.3**	**2.4**	16.0	**10.0**	**14.6**	11.2	**13.3**	**17.0**	12.0
Dominant	**3.3**	**2.4**	16.0	**3.3**	**4.2**	12.0	**6.7**	**6.6**	13.6
Intermediate				**6.7**	**10.4**	10.9	**6.7**	**10.4**	10.9
Suppressed				**10.0**	**32.6**	7.5	**10.0**	**32.6**	7.5
Suppressed				**10.0**	**32.6**	7.5	**10.0**	**32.6**	7.5
Species TOTAL	**3.3**	**2.4**	16.0	**20.0**	**47.2**	8.8	**23.3**	**49.6**	9.3
white pine									
Main Crown	**43.3**	**32.1**	15.7	**6.7**	**8.5**	12.0	**50.0**	**40.6**	15.0
Dominant	**40.0**	**26.0**	16.8				**40.0**	**26.0**	16.8
Intermediate	**3.3**	**6.1**	10.0	**6.7**	**8.5**	12.0	**10.0**	**14.6**	11.2
Suppressed				**6.7**	**26.5**	6.8	**6.7**	**26.5**	6.8
Suppressed				**6.7**	**26.5**	6.8	**6.7**	**26.5**	6.8
Species TOTAL	**43.3**	**32.1**	15.7	**13.3**	**35.0**	8.4	**56.7**	**67.1**	12.4
STAND TOTAL	**56.7**	**44.2**	15.4	**93.3**	**185.1**	15.4	**150.0**	**229.4**	11.0

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

STAND 5 **WP/ro/rm** **BA 142.0** **TPA 167.6** **Sampling Method: Variable Radius Plots**

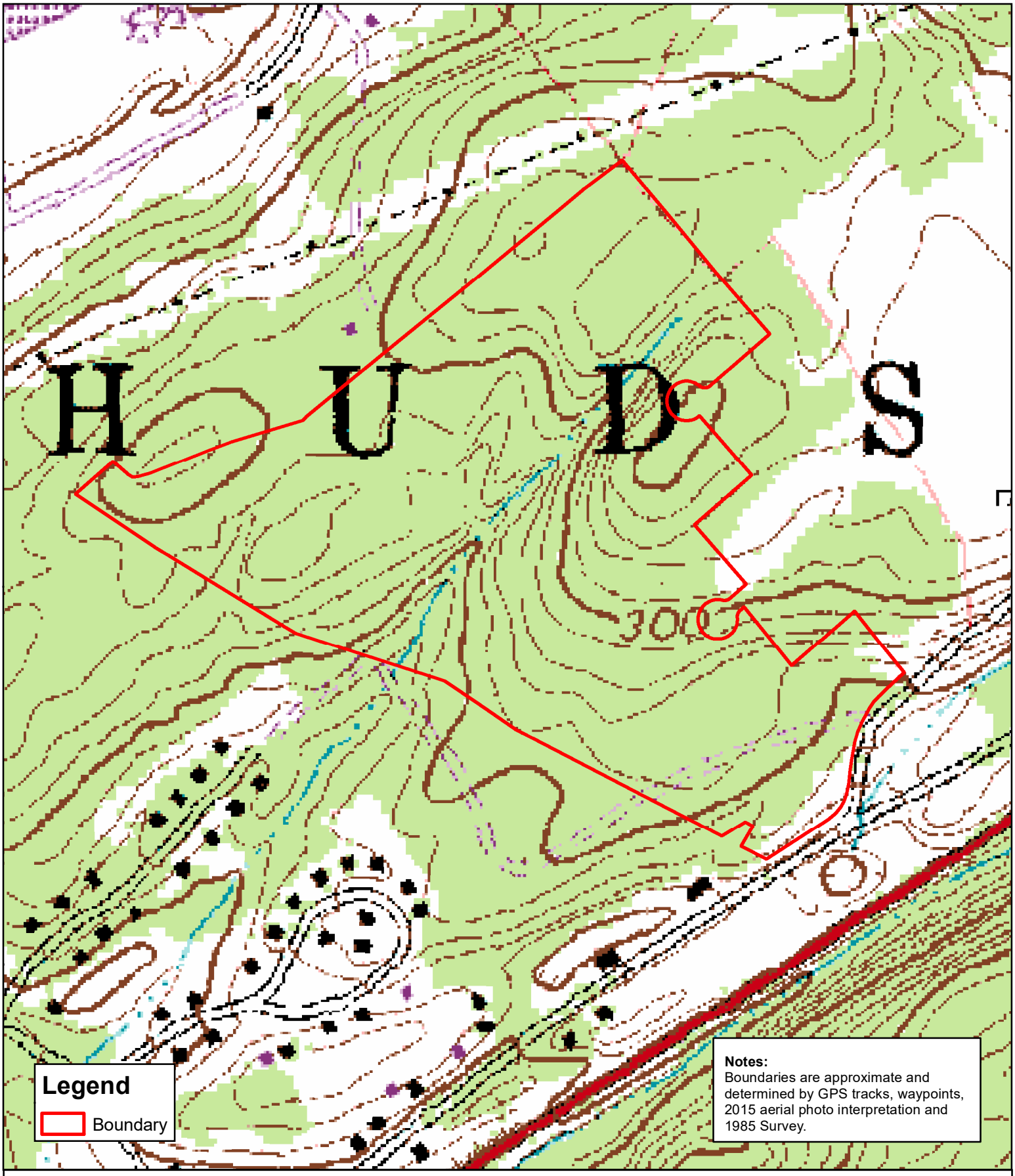
ACRES 25.5 **MBF 12.34** **TONS 16.01** **Basal Area Factor: 20.00** **10 PTS**

	AGS			UGS			TOTAL		
	BA	**TPA**	**MSD**	**BA**	**TPA**	**MSD**	**BA**	**TPA**	**MSD**
black oak									
Main Crown	**4.0**	**3.0**	15.6	**16.0**	**22.6**	11.4	**20.0**	**25.7**	12.0
Dominant	4.0	3.0	15.6	2.0	1.9	14.0	6.0	4.9	15.0
Intermediate				14.0	20.8	11.1	14.0	20.8	11.1
Species TOTAL	**4.0**	**3.0**	15.6	**16.0**	**22.6**	11.4	**20.0**	**25.7**	12.0
hemlock									
Suppressed	**2.0**	**1.4**	16.0				**2.0**	**1.4**	16.0
Suppressed	2.0	1.4	16.0				2.0	1.4	16.0
Species TOTAL	**2.0**	**1.4**	16.0				**2.0**	**1.4**	16.0
pignut hickory									
Main Crown	**2.0**	**1.9**	14.0	**4.0**	**5.1**	12.0	**6.0**	**7.0**	12.6
Dominant				2.0	1.4	16.0	2.0	1.4	16.0
Intermediate	2.0	1.9	14.0	2.0	3.7	10.0	4.0	5.5	11.5
Suppressed	**2.0**	**3.7**	10.0	**2.0**	**10.2**	6.0	**4.0**	**13.9**	7.3
Suppressed	2.0	3.7	10.0	2.0	10.2	6.0	4.0	13.9	7.3
Species TOTAL	**4.0**	**5.5**	11.5	**6.0**	**15.3**	8.5	**10.0**	**20.8**	9.4
quaking aspen									
Main Crown	**2.0**	**1.9**	14.0				**2.0**	**1.9**	14.0
Dominant	2.0	1.9	14.0				2.0	1.9	14.0
Species TOTAL	**2.0**	**1.9**	14.0				**2.0**	**1.9**	14.0
red maple									
Main Crown				**4.0**	**20.4**	6.0	**4.0**	**20.4**	6.0
Intermediate				4.0	20.4	6.0	4.0	20.4	6.0
Suppressed				**4.0**	**2.9**	16.0	**4.0**	**2.9**	16.0
Suppressed				4.0	2.9	16.0	4.0	2.9	16.0
Species TOTAL				**8.0**	**23.2**	7.9	**8.0**	**23.2**	7.9
red oak									
Main Crown	**10.0**	**6.0**	17.5	**2.0**	**2.5**	12.0	**12.0**	**8.5**	16.1
Dominant	10.0	6.0	17.5				10.0	6.0	17.5
Intermediate				2.0	2.5	12.0	2.0	2.5	12.0
Species TOTAL	**10.0**	**6.0**	17.5	**2.0**	**2.5**	12.0	**12.0**	**8.5**	16.1

CROWN CLASS & GROWING STOCK CATEGORY

September 21, 2021

scarlet oak									
Main Crown				**4.0**	**2.6**	16.9	**4.0**	**2.6**	16.9
Dominant				4.0	2.6	16.9	4.0	2.6	16.9
Suppressed				**2.0**	**5.7**	8.0	**2.0**	**5.7**	8.0
Suppressed				2.0	5.7	8.0	2.0	5.7	8.0
Species TOTAL				**6.0**	**8.3**	11.5	**6.0**	**8.3**	11.5
white ash									
Main Crown	**2.0**	**1.4**	16.0	**2.0**	**3.7**	10.0	**4.0**	**5.1**	12.0
Dominant	2.0	1.4	16.0				2.0	1.4	16.0
Intermediate				2.0	3.7	10.0	2.0	3.7	10.0
Suppressed				**4.0**	**7.3**	10.0	**4.0**	**7.3**	10.0
Suppressed				4.0	7.3	10.0	4.0	7.3	10.0
Species TOTAL	**2.0**	**1.4**	16.0	**6.0**	**11.0**	10.0	**8.0**	**12.4**	10.9
white oak									
Main Crown	**2.0**	**1.4**	16.0	**6.0**	**4.4**	15.7	**8.0**	**5.9**	15.8
Dominant	2.0	1.4	16.0	4.0	2.6	16.9	6.0	4.0	16.6
Intermediate				2.0	1.9	14.0	2.0	1.9	14.0
Species TOTAL	**2.0**	**1.4**	16.0	**6.0**	**4.4**	15.7	**8.0**	**5.9**	15.8
white pine									
Main Crown	**42.0**	**30.4**	15.9	**16.0**	**13.5**	14.7	**58.0**	**43.9**	15.6
Dominant	34.0	21.6	17.0	8.0	3.6	20.1	42.0	25.2	17.5
Intermediate	8.0	8.8	12.9	8.0	9.9	12.2	16.0	18.7	12.5
Suppressed	**2.0**	**2.5**	12.0	**6.0**	**13.1**	9.2	**8.0**	**15.6**	9.7
Suppressed	2.0	2.5	12.0	6.0	13.1	9.2	8.0	15.6	9.7
Species TOTAL	**44.0**	**32.9**	15.6	**22.0**	**26.6**	12.3	**66.0**	**59.5**	14.3
STAND TOTAL	**70.0**	**53.6**	15.7	**72.0**	**114.0**	15.7	**142.0**	**167.6**	12.5



TOPOGRAPHIC MAP

RANGERS TOWN FOREST

Roy and Rangers Drive
Hudson, Hillsborough County, NH
Map 160/ Lot 48 (56.6 Acres)

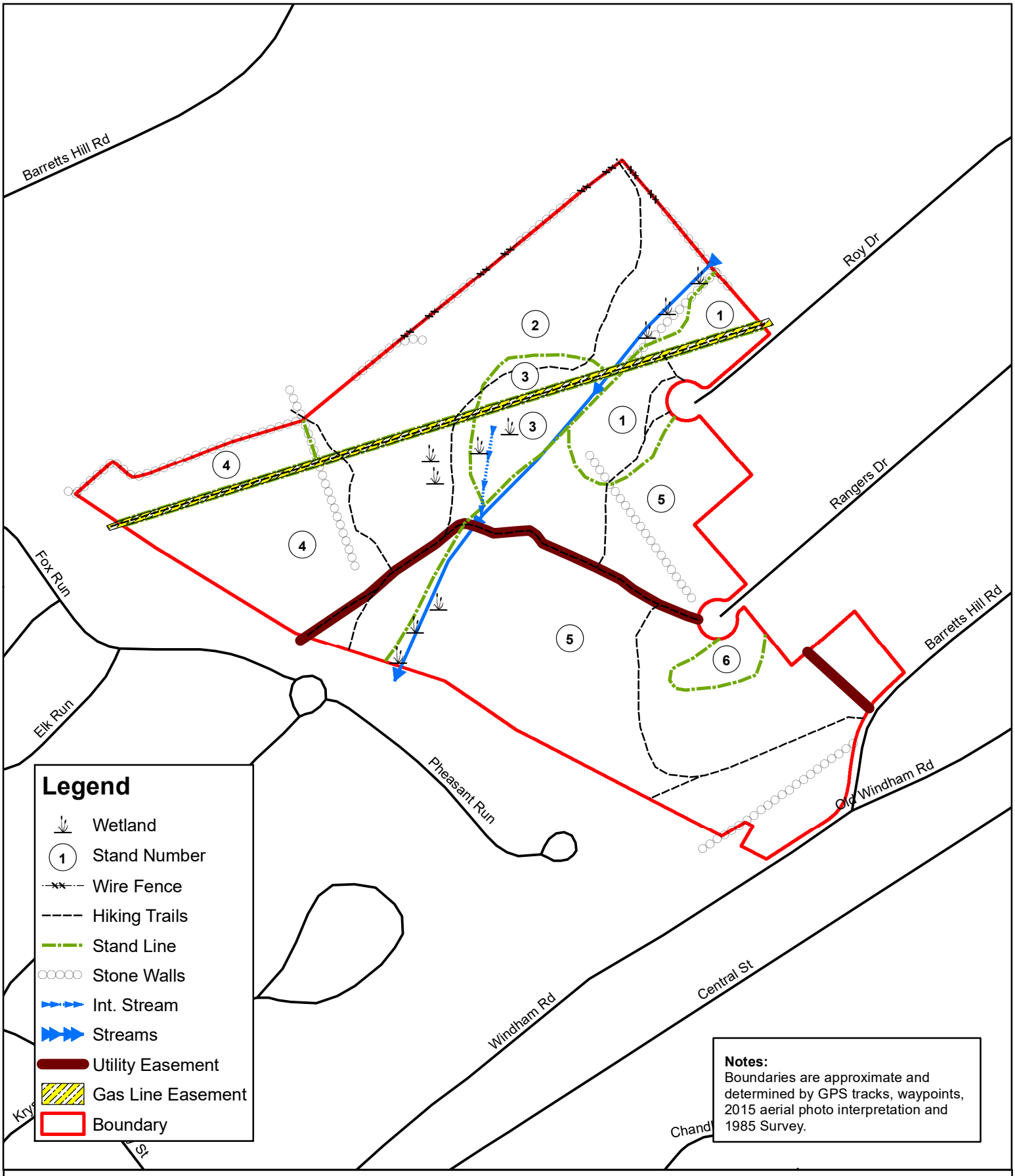
Feet
0 100 200 400

1:4,800

N

Notes:
Drafted and prepared by: E. Radlof, NHLPF #447
GIS mapping by: E. Radlof, NHLPF #447
Full Circle Forestry, LLC
Date: October 25, 2021

FULL CIRCLE FORESTRY, LLC



PROPERTY STAND MAP

RANGERS TOWN FOREST

Roy and Rangers Drive
Hudson, Hillsborough County, NH
Map 160/ Lot 48 (56.6 Acres)

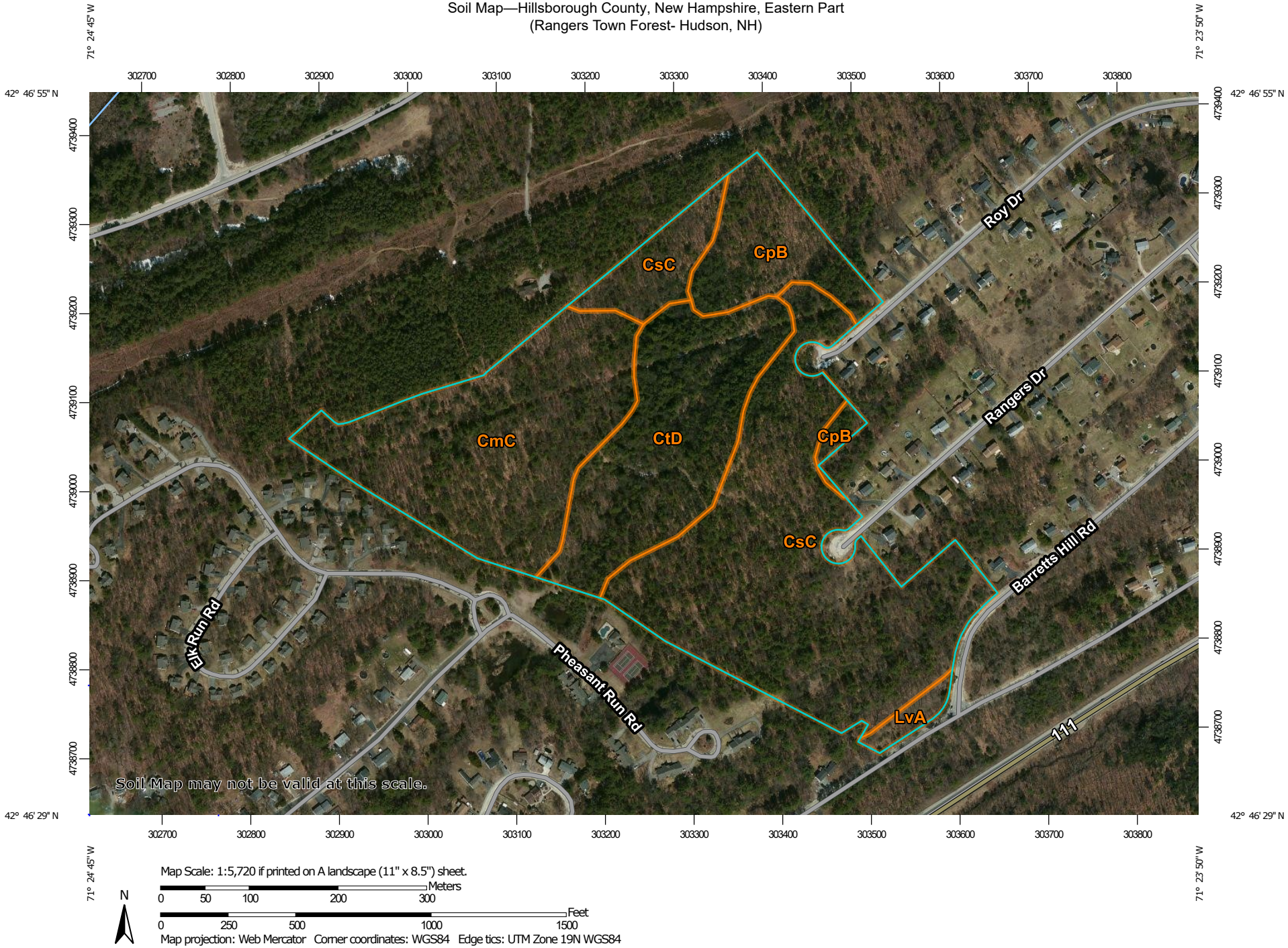
Feet
0 100 200 400
1:4,800

N

Notes:
Drafted and prepared by: E. Radlof, NHLPF #447
GIS mapping by: E. Radlof, NHLPF #447
Full Circle Forestry, LLC
Date: October 25, 2021

FULL CIRCLE FORESTRY, LLC

Soil Map—Hillsborough County, New Hampshire, Eastern Part
(Rangers Town Forest- Hudson, NH)



Map Scale: 1:5,720 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hillsborough County, New Hampshire, Eastern Part
Survey Area Data: Version 24, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 8, 2011—Apr 9, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CmC	Canton fine sandy loam, 8 to 15 percent slopes, very stony	14.7	26.0%
CpB	Chatfield-Hollis-Canton complex, 3 to 8 percent slopes	5.5	9.7%
CsC	Chatfield-Hollis complex, 8 to 15 percent slopes, rocky	24.6	43.4%
CtD	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	11.1	19.6%
LvA	Leicester-Walpole complex stony, 0 to 3 percent slopes	0.8	1.3%
Totals for Area of Interest		**56.6**	**100.0%**

Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, provide information on the composition of map units and properties of their components.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief, Generated)

Hillsborough County, New Hampshire, Eastern Part

Map Unit: CmC—Canton fine sandy loam, 8 to 15 percent slopes, very stony

Component: Canton, very stony (85%)

The Canton, very stony component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on hills on uplands. The parent material consists of coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist. Depth to a root restrictive layer, strongly contrasting textural stratification, is 19 to 39 inches (depth from the mineral surface is 18 to 34 inches). The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 8 percent. This component is in the F144AY034CT Well Drained Till Uplands ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Montauk, very stony (6%)

Generated brief soil descriptions are created for major soil components. The Montauk, very stony soil is a minor component.

Component: Scituate, very stony (5%)

Generated brief soil descriptions are created for major soil components. The Scituate, very stony soil is a minor component.

Component: Chatfield, very stony (3%)

Generated brief soil descriptions are created for major soil components. The Chatfield, very stony soil is a minor component.

Component: Swansea (1%)

Generated brief soil descriptions are created for major soil components. The Swansea soil is a minor component.

Map Unit: CpB—Chatfield-Hollis-Canton complex, 3 to 8 percent slopes

Component: Chatfield (35%)

The Chatfield component makes up 35 percent of the map unit. Slopes are 3 to 8 percent. This component is on bedrock-controlled ridges on glaciated uplands. The parent material consists of coarse-loamy melt-out till derived from granite, gneiss, and/or schist. Depth to a root restrictive layer, bedrock, lithic, is 20 to 41 inches (depth from the mineral surface is 20 to 35 inches). The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY034CT Well Drained Till Uplands ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Component: Hollis (30%)

The Hollis component makes up 30 percent of the map unit. Slopes are 3 to 8 percent. This component is on bedrock-controlled ridges on glaciated uplands. The parent material consists of coarse-loamy melt-out till derived from granite, gneiss, and/or schist. Depth to a root restrictive layer, bedrock, lithic, is 8 to 23 inches (depth from the mineral surface is 8 to 18 inches). The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY033MA Shallow Dry Till Uplands ecological site. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

Component: Canton (25%)

The Canton component makes up 25 percent of the map unit. Slopes are 3 to 8 percent. This component is on hills on glaciated uplands. The parent material consists of coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist. Depth to a root restrictive layer, strongly contrasting textural stratification, is 19 to 39 inches (depth from the mineral surface is 18 to 34 inches). The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 8 percent. This component is in the F144AY034CT Well Drained Till Uplands ecological site. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

Component: Paxton (5%)

Generated brief soil descriptions are created for major soil components. The Paxton soil is a minor component.

Component: Leicester (5%)

Generated brief soil descriptions are created for major soil components. The Leicester soil is a minor component.

Map Unit: CsC—Chatfield-Hollis complex, 8 to 15 percent slopes, rocky

Component: Chatfield, very stony (55%)

The Chatfield, very stony component makes up 55 percent of the map unit. Slopes are 8 to 15 percent. This component is on bedrock-controlled ridges on glaciated uplands. The parent material consists of coarse-loamy melt-out till derived from granite, gneiss, and/or schist. Depth to a root restrictive layer, bedrock, lithic, is 20 to 41 inches (depth from the mineral surface is 20 to 35 inches). The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY034CT Well Drained Till Uplands ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Hollis, very stony (30%)

The Hollis, very stony component makes up 30 percent of the map unit. Slopes are 8 to 15 percent. This component is on bedrock-controlled ridges on glaciated uplands. The parent material consists of coarse-loamy melt-out till derived from granite, gneiss, and/or schist. Depth to a root restrictive layer, bedrock, lithic, is 8 to 23 inches (depth from the mineral surface is 8 to 18 inches). The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY033MA Shallow Dry Till Uplands ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Charlton, very stony (8%)

Generated brief soil descriptions are created for major soil components. The Charlton, very stony soil is a minor component.

Component: Paxton, very stony (4%)

Generated brief soil descriptions are created for major soil components. The Paxton soil is a minor component.

Component: Leicester, very stony (2%)

Generated brief soil descriptions are created for major soil components. The Leicester, very stony soil is a minor component.

Component: Rock outcrop (1%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop soil is a minor component.

Map Unit: CtD—Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes

Component: Chatfield, extremely stony (35%)

The Chatfield, extremely stony component makes up 35 percent of the map unit. Slopes are 15 to 35 percent. This component is on bedrock-controlled ridges on glaciated uplands. The parent material consists of coarse-loamy melt-out till derived from granite, gneiss, and/or schist. Depth to a root restrictive layer, bedrock, lithic, is 20 to 41 inches (depth from the mineral surface is 20 to 35 inches). The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY034CT Well Drained Till Uplands ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Hollis, extremely stony (30%)

The Hollis, extremely stony component makes up 30 percent of the map unit. Slopes are 15 to 35 percent. This component is on bedrock-controlled ridges on glaciated uplands. The parent material consists of coarse-loamy melt-out till derived from granite, gneiss, and/or schist. Depth to a root restrictive layer, bedrock, lithic, is 8 to 23 inches (depth from the mineral surface is 8 to 18 inches). The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY033MA Shallow Dry Till Uplands ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Rock outcrop (20%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Charlton, extremely stony (7%)

Generated brief soil descriptions are created for major soil components. The Charlton, extremely stony soil is a minor component.

Component: Leicester, extremely stony (4%)

Generated brief soil descriptions are created for major soil components. The Leicester, extremely stony soil is a minor component.

Component: Sutton, extremely stony (2%)

Generated brief soil descriptions are created for major soil components. The Sutton, extremely stony soil is a minor component.

Component: Paxton, extremely stony (2%)

Generated brief soil descriptions are created for major soil components. The Paxton soil is a minor component.

Map Unit: LvA—Leicester-Walpole complex stony, 0 to 3 percent slopes

Component: Leicester (40%)

The Leicester component makes up 40 percent of the map unit. Slopes are 0 to 3 percent. This component is on ground moraines. The parent material consists of ablation till derived from granite and gneiss and/or ablation till derived from mica schist. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 6 percent. This component is in the F144AY009CT Wet Till Depressions ecological site. Nonirrigated land capability classification is 7s. This soil meets hydric criteria.

Component: Walpole (35%)

The Walpole component makes up 35 percent of the map unit. Slopes are 0 to 3 percent. This component is on ground moraines. The parent material consists of glaciofluvial deposits derived from granite and gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 5 percent. This component is in the F144AY028MA Wet Outwash ecological site. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

Component: Ridgebury (7%)

Generated brief soil descriptions are created for major soil components. The Ridgebury soil is a minor component.

Component: Saugatuck (6%)

Generated brief soil descriptions are created for major soil components. The Saugatuck soil is a minor component.

Component: Pipestone (6%)

Generated brief soil descriptions are created for major soil components. The Pipestone soil is a minor component.

Component: Scarboro (6%)

Generated brief soil descriptions are created for major soil components. The Scarboro soil is a minor component.

Data Source Information

Soil Survey Area: Hillsborough County, New Hampshire, Eastern Part
Survey Area Data: Version 24, Aug 31, 2021

Forestland Productivity

This table can help forestland owners or managers plan the use of soils for wood crops. It shows the potential productivity of the soils for wood crops.

Potential productivity of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forestland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National Forestry Manual.

Report—Forestland Productivity

Forestland Productivity–Hillsborough County, New Hampshire, Eastern Part				
Map unit symbol and soil name	**Potential productivity**			**Trees to manage**
	Common trees	**Site Index**	**Volume of wood fiber**	
			Cu ft/ac/yr	
CmC—Canton fine sandy loam, 8 to 15 percent slopes, very stony				
Canton, very stony	Eastern hemlock	—	—	Beech, Bitternut hickory, Black oak, Eastern hemlock, Eastern white pine, Gray birch, Mockernut hickory, Northern red oak, Pignut hickory, Red maple, Shagbark hickory, Sugar maple, White ash, White oak, Yellow birch
	Eastern white pine	58	100.00	
	Northern red oak	52	29.00	
	Red maple	55	29.00	
	Shagbark hickory	—	0.00	
	Sugar maple	55	29.00	
	White oak	—	—	

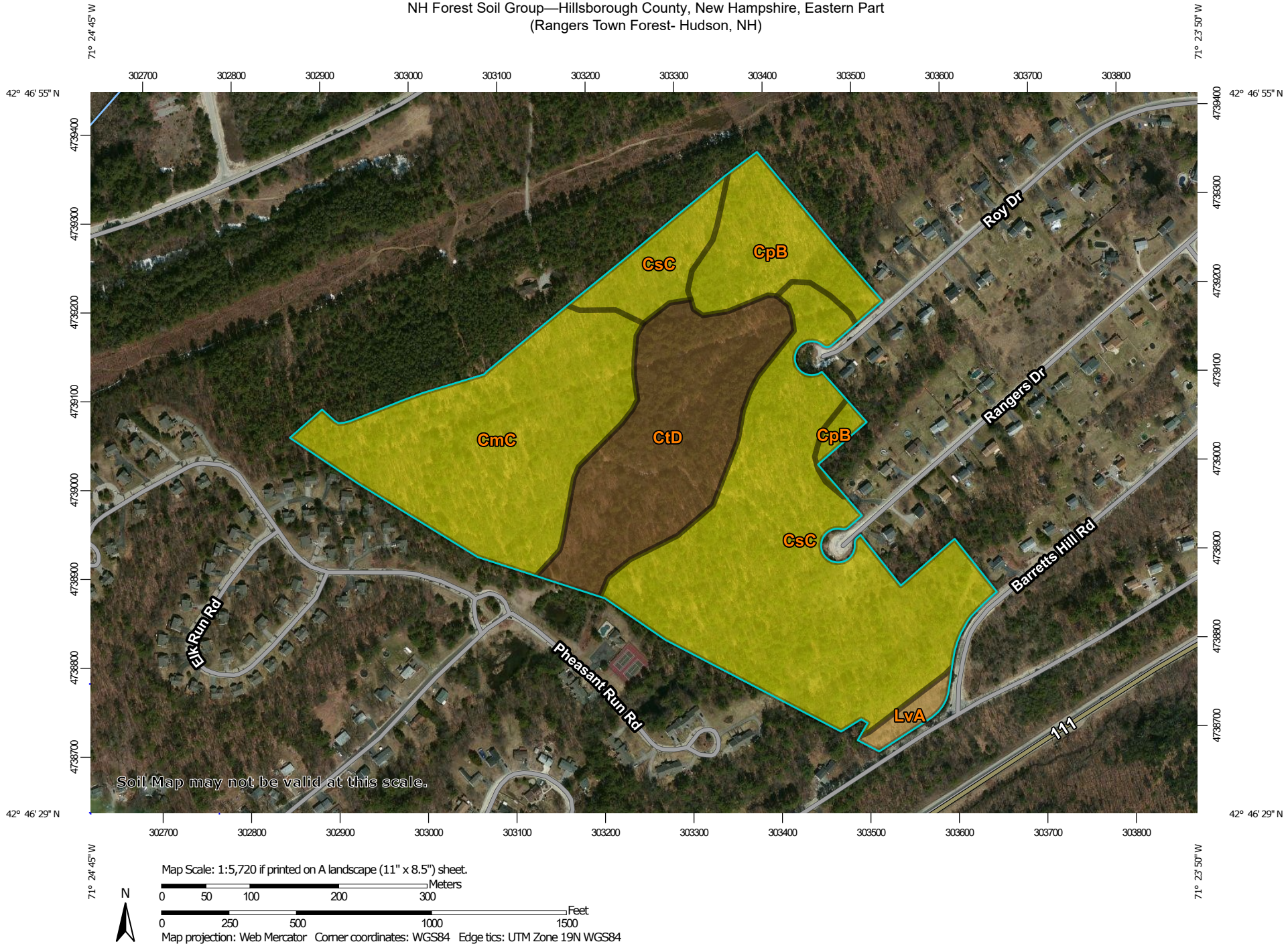
Forestland Productivity–Hillsborough County, New Hampshire, Eastern Part				
Map unit symbol and soil name	**Potential productivity**			**Trees to manage**
	Common trees	**Site Index**	**Volume of wood fiber**	
			Cu ft/ac/yr	
CpB—Chatfield-Hollis-Canton complex, 3 to 8 percent slopes				
Chatfield	Northern red oak	70	57.00	Eastern white pine, European larch, Norway spruce, Red pine
	Sugar maple	65	43.00	
	White ash	75	43.00	
Hollis	Eastern white pine	55	86.00	Eastern white pine
	Northern red oak	47	29.00	
	Sugar maple	56	29.00	
Canton	Eastern white pine	58	100.00	Eastern white pine, White spruce
	Northern red oak	52	29.00	
CsC—Chatfield-Hollis complex, 8 to 15 percent slopes, rocky				
Chatfield, very stony	Eastern hemlock	—	—	Eastern hemlock, Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, White oak
	Northern red oak	70	57.00	
	Sugar maple	65	43.00	
	White ash	75	43.00	
	White oak	—	—	
Hollis, very stony	Chestnut oak	—	—	Chestnut oak, Eastern white pine
	Eastern hemlock	—	—	
	Eastern white pine	55	86.00	
	Northern red oak	47	29.00	
	Sugar maple	56	29.00	

Forestland Productivity–Hillsborough County, New Hampshire, Eastern Part				
Map unit symbol and soil name	**Potential productivity**			**Trees to manage**
	Common trees	**Site Index**	**Volume of wood fiber**	
			Cu ft/ac/yr	
CtD—Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes				
Chatfield, extremely stony	Eastern hemlock	—	—	Eastern hemlock, Eastern white pine, European larch, Northern red oak, Norway spruce, Red pine, White oak
	Northern red oak	70	57.00	
	Sugar maple	65	43.00	
	White ash	75	43.00	
	White oak	—	—	
Hollis, extremely stony	Chestnut oak	—	—	Chestnut oak, Eastern white pine
	Eastern hemlock	—	—	
	Eastern white pine	55	86.00	
	Northern red oak	47	29.00	
	Sugar maple	56	29.00	
Rock outcrop	—	—	—	—
LvA—Leicester-Walpole complex stony, 0 to 3 percent slopes				
Leicester	Eastern white pine	69	129.00	Eastern hemlock, Eastern white pine, White spruce
	Northern red oak	56	43.00	
	Red maple	70	43.00	
Walpole	Eastern hemlock	54	114.00	Eastern white cedar, Eastern white pine, Norway spruce, White spruce
	Eastern white pine	68	114.00	
	Red maple	75	43.00	
	White ash	61	43.00	

Data Source Information

Soil Survey Area: Hillsborough County, New Hampshire, Eastern Part
Survey Area Data: Version 24, Aug 31, 2021

NH Forest Soil Group—Hillsborough County, New Hampshire, Eastern Part
(Rangers Town Forest- Hudson, NH)



Map Scale: 1:5,720 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Group IA
- Group IB
- Group IC
- Group IIA
- Group IIB
- NC
- Not rated or not available

Soil Rating Lines
- Group IA
- Group IB
- Group IC
- Group IIA
- Group IIB
- NC
- Not rated or not available

Soil Rating Points
- Group IA
- Group IB
- Group IC
- Group IIA
- Group IIB
- NC
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hillsborough County, New Hampshire, Eastern Part
Survey Area Data: Version 24, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 8, 2011—Apr 9, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

NH Forest Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CmC	Canton fine sandy loam, 8 to 15 percent slopes, very stony	Group IB	14.7	26.0%
CpB	Chatfield-Hollis-Canton complex, 3 to 8 percent slopes	Group IB	5.5	9.7%
CsC	Chatfield-Hollis complex, 8 to 15 percent slopes, rocky	Group IB	24.6	43.4%
CtD	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	Group IIA	11.1	19.6%
LvA	Leicester-Walpole complex stony, 0 to 3 percent slopes	Group IIB	0.8	1.3%
Totals for Area of Interest			**56.6**	**100.0%**

Description

NH Forest Soil Groups (NHFSGs) consist of map units that are similar in their potential for commercial forest products, their suitability for native tree growth, and their use and management. Considered in grouping the map units are depth to bedrock, texture, saturated hydraulic conductivity, available water capacity, drainage class, and slope. The grouping applies only to soils in the State of New Hampshire.

The NHFSGs have been developed to help land users and managers in New Hampshire evaluate the relative productivity of soils and to better understand patterns of plant succession and how soil and site interactions influence management decisions. The soils are assigned to one of five groups (IA, IB, IC, IIA, and IIB). Several map units in New Hampshire either vary so greatly or have such a limited potential for commercial forest products that they have not been assigned to an NHFSG (NC). Examples of NC map units are very poorly drained soils and soils at high elevations. The kinds of tree species generally growing in climax stands in each of the five NHFSGs vary from county to county. This information is available through local NRCS field offices.

IA—This group consists of very deep, loamy, moderately well drained or well drained soils. Generally, these soils are more fertile than other soils and have the most favorable soil moisture relationships.

IB—The soils in this group are generally sandy or loamy over sandy material and are slightly less fertile than group IA soils. Group IB soils are moderately well drained or well drained. Their soil moisture is adequate for good tree growth, but it may not be quite as abundant as that in group IA soils.

IC—The soils in this group are in areas of outwash sand and gravel. They are moderately well to excessively drained. Their soil moisture is adequate for good softwood growth but is limited for hardwoods.

IIA—This diverse group includes many of the same soils as those in groups IA and IB. The soils are separated into a unique group, however, because they have physical limitations that make forest management more difficult and costly, i.e., steep slopes, bedrock outcrops, erosive textures, surface boulders, and extreme rockiness.

IIB—The soils in this group are poorly drained. The seasonal high water table is generally within 12 inches of the surface. Productivity is generally less than that of soils in the other groups.

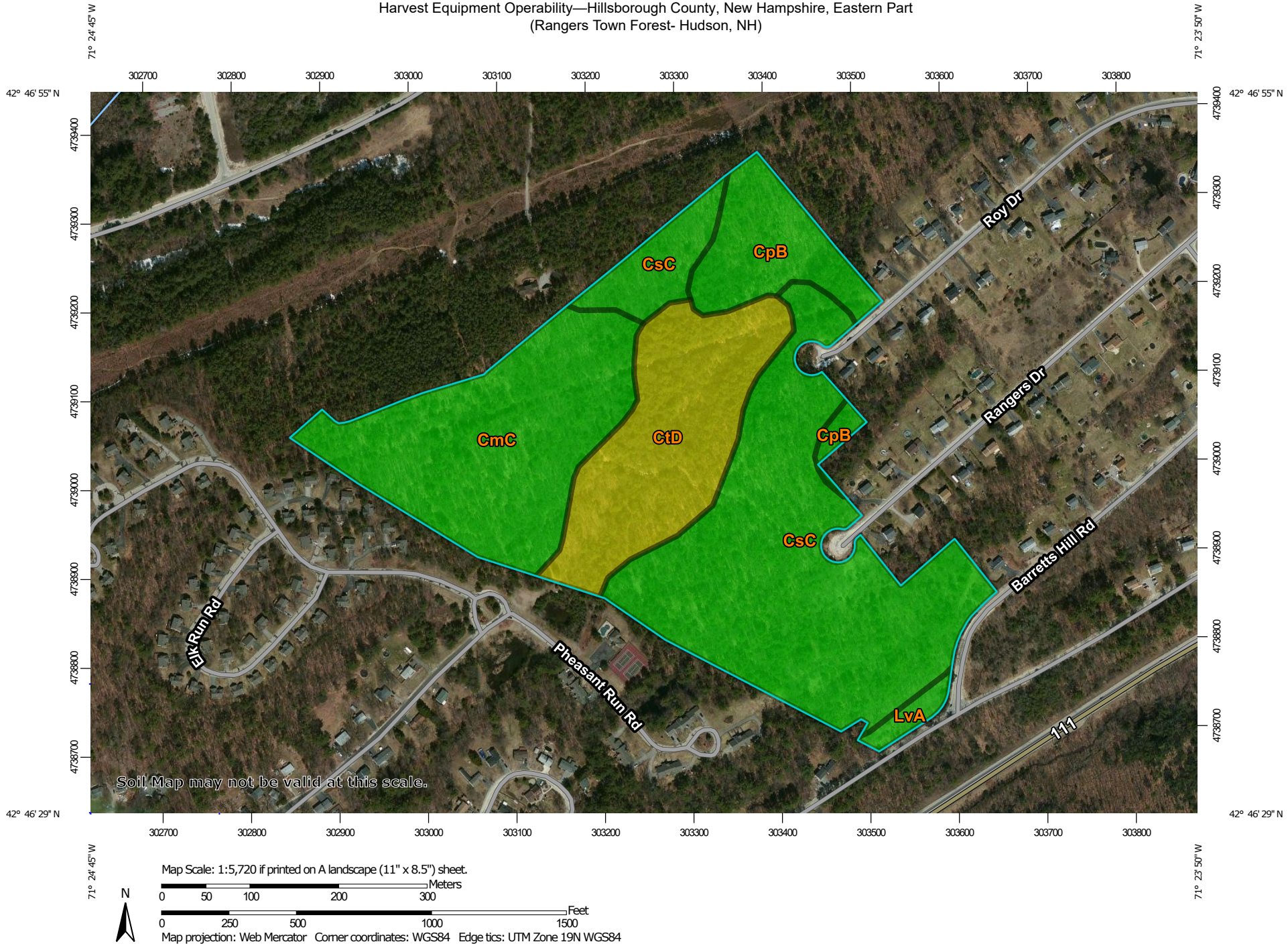
NC—The map units in this category either vary so greatly or have such a limited potential for commercial forest products that they have not been assigned to an NHFSG. Commonly, onsite visit would be required to evaluate the situation.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Harvest Equipment Operability—Hillsborough County, New Hampshire, Eastern Part
(Rangers Town Forest- Hudson, NH)



Map Scale: 1:5,720 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Poorly suited
- Moderately suited
- Well suited
- Not rated or not available

Soil Rating Lines
- Poorly suited
- Moderately suited
- Well suited
- Not rated or not available

Soil Rating Points
- Poorly suited
- Moderately suited
- Well suited
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hillsborough County, New Hampshire, Eastern Part
Survey Area Data: Version 24, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 8, 2011—Apr 9, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Harvest Equipment Operability

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
CmC	Canton fine sandy loam, 8 to 15 percent slopes, very stony	Well suited	Canton, very stony (85%)	Dusty (0.00)	14.7	26.0%
			Montauk, very stony (6%)	Dusty (0.00)		
			Scituate, very stony (5%)	Dusty (0.00)		
CpB	Chatfield-Hollis-Canton complex, 3 to 8 percent slopes	Well suited	Chatfield (35%)	Dusty (0.00)	5.5	9.7%
			Hollis (30%)	Dusty (0.00)		
			Canton (25%)	Dusty (0.00)		
			Leicester (5%)	Dusty (0.00)		
			Paxton (5%)	Dusty (0.00)		
CsC	Chatfield-Hollis complex, 8 to 15 percent slopes, rocky	Well suited	Chatfield, very stony (55%)	Dusty (0.00)	24.6	43.4%
			Hollis, very stony (30%)	Dusty (0.00)		
			Charlton, very stony (8%)	Dusty (0.00)		
			Paxton, very stony (4%)	Dusty (0.00)		
			Leicester, very stony (2%)	Dusty (0.00)		
CtD	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	Moderately suited	Chatfield, extremely stony (35%)	Rock fragments (0.50)	11.1	19.6%
				Slope (0.50)		
				Dusty (0.00)		
			Hollis, extremely stony (30%)	Rock fragments (0.50)		
				Slope (0.50)		
				Dusty (0.00)		
			Charlton, extremely stony (7%)	Rock fragments (0.50)		
				Slope (0.50)		
				Dusty (0.00)		
			Leicester, extremely stony (4%)	Rock fragments (0.50)		
				Dusty (0.00)		
			Sutton, extremely stony (2%)	Rock fragments (0.50)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Dusty (0.00)		
			Paxton, extremely stony (2%)	Rock fragments (0.50)		
				Slope (0.50)		
				Dusty (0.00)		
LvA	Leicester-Walpole complex stony, 0 to 3 percent slopes	Well suited	Leicester (40%)	Dusty (0.00)	0.8	1.3%
			Walpole (35%)			
			Ridgebury (7%)	Dusty (0.13)		
			Saugatuck (6%)			
Totals for Area of Interest					**56.6**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Well suited	45.5	80.4%
Moderately suited	11.1	19.6%
Totals for Area of Interest	**56.6**	**100.0%**

Description

Ratings for this interpretation indicate the suitability for use of forestland harvesting equipment. The ratings are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification of the soil, depth to a water table, and ponding. Standard rubber-tire skidders and bulldozers are assumed to be used for ground-based harvesting and transport.

The ratings are both verbal and numerical. Rating class terms indicate the degree to which the soils are suited to this aspect of forestland management. "Well suited" indicates that the soil has features that are favorable for the specified management aspect and has no limitations. Good performance can be expected, and little or no maintenance is needed. "Moderately suited" indicates that the soil has features that are moderately favorable for the specified management aspect. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. "Poorly suited" indicates that the soil has one or more properties that are unfavorable for the specified management aspect. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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In addition to the Works Cited, various forest managment plans encountered throughout this foresters career have lent inspiration and helped shape the format and content of this forest management plan.

GLOSSARY

ACCEPTABLE GROWING STOCK (AGS): A crop tree managed to meet any given landowners' objective. Use Value Appraisal guidelines define AGS as commercial tree species containing one 12-foot log or two non-contiguous 8- foot logs, or that have the potential to produce these products in the future.

ACCEPTABLE MANAGEMENT PRACTICES (AMPs): Standards for protecting water quality on logging jobs developed by the Department of Forests, Parks and Recreation and outlined in the booklet titled *Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont*.

ACRE: A standard unit of area measure. One acre equals: 43,560 square feet, 10 square chains or an area that is 209' X 209'.

ADVANCED REGENERATION: Natural regeneration that was established and has advanced beyond the seedling stage to saplings and/or small poles.

ALL-AGED (UNEVEN-AGED): Age class category; applied to a stand of trees in which, theoretically, trees of all ages are found; a stand occupied by three or more age classes.

ANCIENT FOREST (OLD GROWTH FOREST): Forest in late successional stages; the older seral stages of natural forests.

ANNUAL RING: Tthe growth layer of one year, as viewed on the cross-section of a stem, branch or root.

ASPECT: The direction of a slope.

BASAL AREA: The cross-sectional area of a tree computed from DBH measurements, expressed in square feet; the sum of the basal areas of all trees on an acre, expressed as basal area/acre, is an objective measure of density and is useful for making forest management decisions.

BIODIVERSITY: The variety of life and its processes including living organisms, genetic differences among them, the ecosystems in which they occur and the ecological and evolutionary processes that maintain their functions.

BIOMASS: The total above ground volume of a tree, stand or forest, usually expressed in tons/acre. This term is also used to describe a whole tree or chip harvest.

BOARD FOOT: A unit of measurement to determine volume of lumber; one board foot equals a board 12" x 12" x 1". Also a measure of standing or logs.

BROWSE: Buds, leaves, and twigs of tree seedlings and saplings, shrubs and herbaceous plants that are utilized for food by wildlife.

CANOPY: The combined forest cover formed by individual overstory tree crowns.

CHAIN: A unit of measure 66 feet or 4 rods in length; ten square chains equals one acre; 80 chains equals one mile.

CLEANING: A pre-commercial cutting made in a stand that is not past the sapling stage to release desirable trees from undesirable trees of the same age that overtop them or are expected to do so.

CLEAR-CUT: A method of harvesting that removes all the trees in an area for the purpose of regenerating a new stand; results in even-aged stands. Variations include patch cuts and strip cuts.

CLIMAX: The theoretical culminating stage in plant succession for a given site; vegetation is self-reproducing; the

resulting community has reached stability under a particular set of environmental conditions through time.

CODOMINANT TREE: A crown classification; trees with crowns forming the general level of the forest canopy and receiving full sunlight from above but little from the sides. (See crown class.)

COHORT: An aggregation of trees that starts as a result of a single disturbance; a generation of trees.
CORD: A unit of roundwood volume equal to 128 cubic feet of wood, air and bark; a pile of four' long round or split wood piled four' high and eight' long; traditional measure of pulpwood and fuelwood, now commonly replaced by weight measurement. A cord generally contains 80 to 90 cubic feet of solid wood. One cord equals 500 board feet.

CROP TREE: A tree selected in a stand or plantation based on growth rate, crown position or stem quality which will be grown to maturity; growth of crop trees is the object of frequent thinnings or other improvement cuttings.

CROWN: The upper part of a tree including the branches and foliage.
CROWN CLASS: Classification of trees based on the relative position of their crowns.

CULL TREE: A tree of little or no economic value due to poor form, excessive limbs, rot or other defect. Culls frequently have wildlife, aesthetic or other values.

CUITING CYCLE: Frequency of logging operations on the same area, expressed as years.

CURRENT USE TAXATION: Assessed values for property tax purposes that are based on the current use of the land, not on fair market value. Such programs are found in many states: New Hampshire Current Land Use and Vermont Use Value Appraisal are examples.

DAYLIGHTING: Clearing vegetation along roads and trails to provide light and air drainage, to maintain herbaceous plants and to exclude woody plants from occupying the site; a maintenance and wildlife habitat enhancement practice.

DEN TREE: A tree possessing a cavity large enough to serve as a shelter for birds and mammals, or as a site to give birth and raise young. Den trees generally must be 15" DBH or" larger and have a cavity opening of 4" diameter or more.

DBH (Diameter Breast Height): Diameter measured outside the bark of a tree at 41/ 2 feet above the ground, expressed in inches.

DOMINANT TREE: A crown classification; trees with large crowns extending above the general level of the forest canopy and receiving full light from above and partial light from the sides.

ECOSYSTEM: A dynamic complex of plant, animal, fungal and microorganism communities and their associated non-living environment interacting as an ecological unit.

ECOSYSTEM APPROACH: A strategy or plan to manage ecosystems to provide for all associated native organisms in an ecosystem, as opposed to managing for individual species.

ECOTONE: The border between two habitat types that is composed of a mixture of species from neighboring habitats, creating a unique and often very rich habitat.

EDGE: The ecological changes that occur at the boundaries of ecosystems or habitats; the interface between different vegetation types. These changes may include species composition, size class, gradients of moisture, sunlight, soil and air temperature, soil type, wind speed...; edge effects can have both positive and negative impacts for wildlife.

ELDER TREE(S): An old and often (but not always) large diameter tree(s); occurring singly or in small groups; these are older and/or larger than the majority of the surrounding trees and often possess unique characteristics; often remnants from past harvests; when occupying larger areas or stands these may constitute old growth or ancient forests.

EROSION: Usually destructive movement of soil particles, often associated with logging operations and access roads.

EVEN-AGED: Age class category; a stand in which a small age differences exist between individual trees; the maximum difference in age permitted in an even-aged stand is usually 10 to 20 years, or 10% of rotation age.

EVEN-AGED MANAGEMENT: Any treatment system that establishes or maintains one age class, more than one even-aged stand can occupy a site. Even-age silvicultural systems include clearcut, seed-tree and shelterwood harvests.

FOREST STAND or FOREST TYPE or VEGETATIVE COVER TYPE: a group of trees occupying a specific area and similar characteristics of composition, species, age, arrangement, condition and ecological development which is distinguishable from other groups of stands. Forest types are typically defined by one or more of the dominant trees species in the type.

FOREST STAND IMPROVEMENT (FSI): Pre-commercial treatments designed to improve stand conditions without producing revenue, including cleaning, weeding, thinning, pruning, or cull removal. Also known as Timber Stand Improvement (TSI).

GIRDLING: A method used in FSI to eliminate unwanted trees; also used to create snags and future ROM. Blocking the flow of carbohydrates (food) from the leaves to the roots by cutting, usually with a chainsaw, a ring around the tree that penetrates past the inner bark, ultimately killing the tree; herbicides and hatchet frill can also be used to cut or kill the ring.

GROUP SELECTION: A method harvest method where groups of trees are removed to create openings that are designed to promote regeneration; results in an uneven-aged stand.

GROWING STOCK: A tree or trees that currently provides a desired product or service, usually quantified as sawlog production, or trees that are currently too small to contain a log, but that possess the necessary characteristics to produce a future sawlog; potential sawlog trees.

GROWTH RATE: Measurement of annual rings in the outer radial inch of a tree; indicates the rate of growth of a tree; expressed as rings/radial inch.

HABITAT: The environment in which an organism lives; also the organisms and physical environment in a particular place.

HARVEST: The removal of a crop or stand of financially or physically mature trees as a with the objective of establishing or releasing regeneration.

HARVESTING TRAIL: Small trails laid out in the woods over which logs are pulled (skidded) or carried (forwarded) from the stump to the landing.

HIGH-GRADING: A cut that extracts only the best quality trees or high value timber; made without regard to the future composition or quality of a stand or forest; degrades the forest ecosystem.

IMPROVEMENT CUT: An intermediate cutting made to regulate species composition and quality; called releasing in young stands.

INTERMEDIATE CUT: Various cuttings made during development of the stand from the reproduction stage to maturity; generally for the purposes of improving stand quality and composition for timber production.

INTERMEDIATE TREE: A crown classification; trees with small crowns crowded into the general level of the forest canopy, receiving some light from above but none from the sides.

INTOLERANT SPECIES: Trees unable to regenerate, grow and develop in the shade of other species; for example paper birch and quaking and big-tooth aspen.

LANDING: A place where logs are from the forest and accumulated for loading and transportation to market..

LEGACIES: Ancestors; residual organisms and structures handed down from a pre-disturbance ecosystem, including live trees, dead trees and wood, seeds, surviving roots, basal buds, mycorrhizal fungi, other soil microbes, invertebrates, mammals, and soil chemistry and structure. Legacies influence recovery, composition, structure and function of post-disturbance (including harvesting) ecosystems.

LIQUIDATION HARVEST: The removal of all, or the majority, of the merchantable products from the forest strictly for short term economic gain; creates a non-performing asset; frequently precedes the sale (liquidation) of the land.

MAST: Fruits or nuts produced by woody plants (including trees) which are utilized by wildlife for food; usually divided into hard mast (e.g.: acorns, beech nuts) or soft mast (e.g.: black cherry, apple).

MATURITY: 1. Financial maturity; occurs when a tree has reached financial value; frequently based on carrying costs and assumed or expected interest rates of return; reached long before biological maturity; 2. Biological maturity; the point where energy costs exceed the energy input from photosynthesis.

MBF: Abbreviation for thousand board feet; the standard unit of measure for logs.

MEAN STAND DIAMETER (MSD): The arithmetic mean diameter of the stand measured at DBH.

MERCHANTABLE TIMBER: Trees that are currently salable.
MULTIPLE USE: Managing the same area of forestland for several uses simultaneously, i.e., recreation, wildlife, water, timber production....

MYCORRHIZAL FUNGI: A fungus living in a mutualistic association with plants; facilitates nutrient and water uptake.

NATIVE SPECIES: Plants, animals, fungi and microorganisms which naturally occur in an area or region.

NATURAL COMMUNITY: An interacting assemblage of plants and animals, their physical environment, and the natural processes that affect them; typically describing an expected or potential condition in the late successional stage of forests.

OPTIMUM GROWTH: The greatest growth achievable on a given site, usually in reference to timber volume.

OVERMATURE: That period in the life cycle of trees and stands when growth or value declines rapidly; frequently defined from a forest products or timber harvesting perspective; frequently a myth perpetuated to encourage timber harvesting.

OVERSTOCKED: A stand where the growing space is occupied leaving no or little room for future stand development or continued growth.

OVERSTORY: The upper crown canopy of the forest; the larger diameter and/or taller trees in the stand.

PIONEER SPECIES: Shade intolerant species that are the first trees to develop in an area after or the abandonment of a field or after a disturbance that covers a fairly large area. Pioneer species include aspen and paper birch.

PIT and MOUND: The micro-topography created on the forest floor when trees fall, resulting in the mound of the root mass and the pit, or depression, in the soil where the tree formally stood.

POLES: A size class; trees that are 4" DBH to 10" DBH.

PRE-COMMERCIAL TREATMENTS: treatments in young or unmerchantable
stands that do not, or can not, economically extract merchantable forest products; e.g.: FSI; cleaning, weeding, thinning and release.

PRODUCTION POTENTIAL: Mean Annual Increment (MAI); average growth of the stand over the rotation under optimum stocking conditions; expressed as volume/acre/year.

PRUNING: The practice of removing tree limbs so that a bole free of knots will develop over time; after pruning, the resulting wound heals and clear wood (knot free) is produced. Pruning is a component of FSI.

PULP TREES: Trees that can yield at least two 8-foot bolts with a minimum 4" top diameter inside the bark and which are unsuitable for sawtimber because of size, crook, rot or other defect; used for manufacturing paper products; these trees frequently represent a negative value on private non-industrial forests in this area.
REGENERATION: New growth obtained by natural seeding or sprouts.

RELEASE OPERATIONS: Free young stands of desirable trees, not past the sapling stage, from competition of undesirable trees that are or will suppress them; cleanings and liberation cutting.

REPRODUCTION: New growth artificially obtained by planting or direct seeding.

RETAINED ORGANIC MATERIAL (ROM): Woody material that lies on or near the forest floor; also known as down woody material or down woody debris; provides essential ecosystem functions such as adding organic material to the soil, increasing moisture retention and creating habitat for animals and plants; the larger the diameter and the longer the piece, the greater the ecological value; This material is a stand legacy.

ROTATION: The period of years required to reproduce, grow and harvest a crop of timber; applies only to even-aged management.

SAPLING: A size class; trees less than 4" DBH and 4 1/2 to 10 feet tall.

SAWTIMBER: A product category: usually trees that are greater than 10" DBH for softwoods and 12" DBH for hardwoods and that are reasonably straight, free of defects and otherwise suitable for lumber or veneer production.

SEEDLING: A size class; trees up to 4 1/2 feet tall.

SHADE TOLERANCE: The ability of trees to reproduce and grow in the shade of other trees.

SILVICULTURE: The art and science of tending a forest; the application of the knowledge of silvics in the treatment of a forest; the theory and practice of controlling forest establishment, composition and growth.

SINGLE TREE SELECTION: A method of final harvest in which single trees are removed and the vacancies created promote new growth; results in uneven-aged stands.

SITE: An area considered in terms of its environment (including climate, slope, soil, temperature and moisture); particularly as a determiner of vegetation type and quality supported by an area.

SITE CLASS: A broad category of soil productivity; usually rated site I, TI, Ill, IV, from highest to lowest productivity.

SITE INDEX: A measure of the productivity of the site using the relationship of tree height to tree age; in the East 50 years is the basis: e.g.: a tree 60 feet tall and 50 years old indicates a site index of 60.

SITE POTENTIAL TREE HEIGHT: The average height of trees that have attained the maximum height possible on a given site.

SIZE CLASS: A classification of trees based on predominate tree size (diameter and/or height) within a stand or type.

SLASH: The tops, branches and defective parts of trees that are left on the ground after a logging job; these provide carbon which in the decomposition process produces calcium which is essential for cell formation.

SNAG: A standing dead or partially dead tree at least 6" DBH and 10' in height. Large diameter snags meet the needs of more wildlife species than do small diameter snags, and are more persistent.

STAGNATION: A condition that occurs when too many trees are growing on a site; growth is minimal and vigor declines.

STAND: See "forest stand or forest type" above.

STANDARD: A size class; usually trees over 10" DBH for softwood and 12" DBH for hardwood and up to 24" DBH.

STOCKING LEVEL: A qualitative expression comparing existing number of trees and square feet of basal area in a stand to the amount desired for optimum growth of diameter and volume. Stocking guides are based on the relationship of the number of trees/acre, the square feet of basal area/acre and the mean stand diameter. Stocking levels are expressed as A, B or C lines. Stands near or above the A line are overstocked. Trees are crowded and growth is slow. Stands between the A and B line are fully stocked. Stands at the B line are at an optimum stocking level. Diameter growth is rapid and volume growth is high. Stands between the B and C lines should be fully stocked within 10 years. Diameter growth remains rapid, but volume growth diminishes. Stands below the C line are understocked. Stocking guides are developed for optimum timber production.

STUMPAGE: The value of standing timber dependent upon market conditions, quality of timber, accessibility and other factors.

STRUCTURAL DIVERSITY: The diversity in a community resulting from the occurrence of many horizontal or vertical physical elements, e.g., layers or tiers of the canopy; an increase in layering increases structural diversity.

SUCCESSION: A process of physical and chemical change which takes place on a site over time, resulting in a progression of forest types; The orderly and predictable replacement of one plant community by another over time in the absence of disturbance.

SUPPRESSED TREES: A crown classification; trees with small crowns that are entirely below the general level of the canopy, receiving no direct light from above or from the sides; also called overtopped.

THINNING: An intermediate silvicultural treatment that regulates stand density, composition and quality.

TOLERANT SPECIES: Trees that are able to reproduce and grow satisfactorily in their own shade or the shade of other trees. Tolerant species include sugar maple, beech, red spruce and hemlock.

UNACCEPTABLE GROWING STOCK (UGS): A tree not capable of producing a desired product or service, typically quantified by ability to produce sawlogs; also see growing stock.

UNDERSTORY: Trees growing below the main crown canopy, usually advanced natural regeneration.

UNEVEN-AGED: A stand that contains trees of many different ages and sizes; all aged.

UNEVEN-AGED MANAGEMENT: Any treatment system that establishes or maintains a stand of all age/size classes, treatments are multi-purpose, designed to establish natural regeneration, thin, and achieve other cultural objectives simultaneously.

VIGOR: The health and vitality of a tree; generally assessed by observing crown characteristics such as foliage density and color, live crown ratio, crown depth and width.

WATERBAR: A diversion created by mechanical means to redirect the flow of water (to prevent erosion) on roads and skid trails.

WINDTHROW: Damage to trees caused by winds, usually of a severe nature; results in tip ups and stem breakage.

A TABLE OF MATURITIES AND/OR NORMAL EXPECTED AND MAXIMUM AGES
for
SELECTED TREES OF NORTHERN NEW ENGLAND

Species Common Name	**Scientific Name**	**Expected Normal Age**	**or**	**Maximum Age in years**
Eastern white pine	*Pinus strobus*	150-200		450+
Red pine	*Pinus resinosa*	150-200		300-400
Eastern larch	*Larix laricina*	100-200		335
Red spruce	*Picea rubens*	200		350-400
Black spruce	*Picea mariana*	100-150		250
Eastern hemlock	*Tsuga canadensis*	---		500-900
Balsam Fir	*Abies balsamea*	90-100		200+
Quaking Aspen	*Populus tremuloides*	60-70		150
Bitternut hickory	*Carya cordiformis*	---		175+
Yellow birch	*Betula alleghaniensis*	150		300
Sweet birch	*Betula lenta*	100		200-265
Paper birch	*Betula papyrifera*	60-75		140-200
American beech	*Fagus grandifolia*	---		300-400
White oak	*Quercus alba*	---		500-600
Northern red oak	*Quercus rubra*	---		200-300
American elm	*Ulmus americana*	150-200		300
Black cherry	*Prunus serotina*	150-200		
Sugar maple	*Acer saccharum*	---		200-400
Red maple	*Acer rubrum*	70-80		150
American basswood	*Tilia americana*	90-140		100-140
Black ash	*Fraxinus nigra*			135-150
White ash	*Fraxinus americana*			300

New Hampshire Natural Heritage Bureau

DNCR - Division of Forests & Lands
172 Pembroke Road, Concord, NH 03301
Phone: (603) 271-2214 Fax: (603) 271-6488

To: Eric Radlof
Full Circle Forestry, LLC
113 Old Pound Road
Antrim, NH 03440

From: NH Natural Heritage Bureau
Date: 2021-10-29
Re: Review by NH Natural Heritage Bureau of request dated 2021-10-25

NHB File ID: 3767
Project type: Landowner Request
Town: Hudson, NH
Location: Map 160 Lot 48; Town of Hudson, "Rangers"

We have searched our database for records of rare species and exemplary natural communities on the property(s) identified in your request. Our database includes known records for species officially listed as Threatened or Endangered by either the state of New Hampshire or the federal government, as well as species and natural communities judged by experts to be at risk in New Hampshire but not yet formally listed.

NHB records on the property(s): **None**

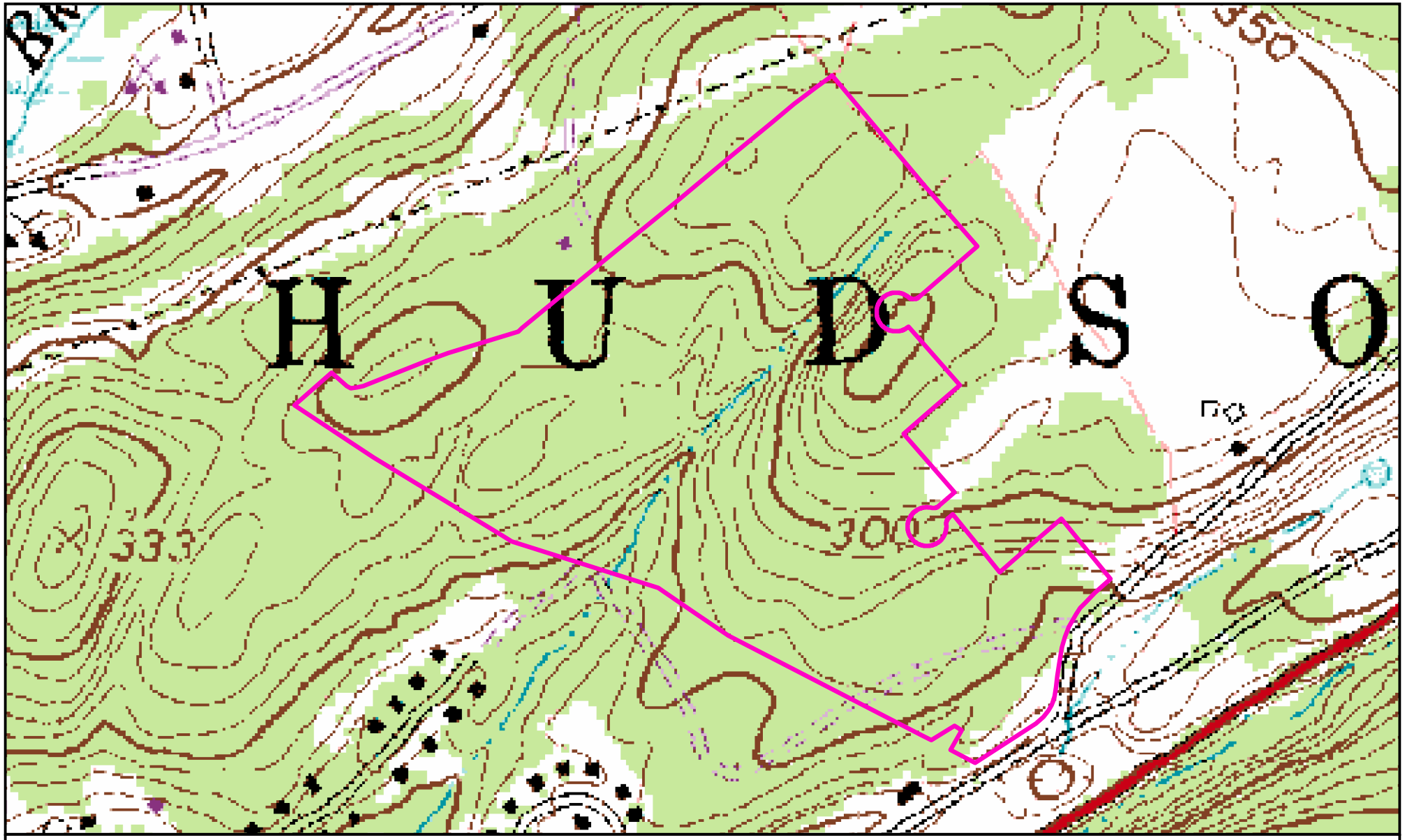
NHB records within one mile of the property(s):

	Last Reported	Listing Status		Conservation Rank	
Vertebrate Species		**Federal**	**NH**	**Global**	**State**
Spotted Turtle - *Clemmys guttata*	2013	--	T	G5	S2
Blanding's Turtle - *Emydoidea blandingii*	2017	--	E	G4	S1

Listing codes: T = Threatened, E = Endangered SC = Special Concern
Rank prefix: G = Global, S = State, T = Global or state rank for a sub-species or variety (taxon)
Rank suffix: 1-5 = Most (1) to least (5) imperiled. "--", U, NR = Not ranked, B = Breeding population, N = Non-breeding. H = Historical, X = Extirpated.

A negative result (no record in our database) does not mean that no rare species are present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

NOTE: This review *cannot* be used to satisfy a permit or other regulatory requirement to check for rare species or habitats that could be affected by a proposed project, since it provides detailed information only for records actually on the property.



Natural Heritage Bureau
Landowner Report

Project ID Number: 3767

NOTE: Any rare species and/or exemplary natural communities in this area are not shown unless they occur, at least in part, within the property bounds.

	# of Records
Property Bounds	
Plant Occurence:	*0*
Animal Occurence:	*0*
Natural Community:	*0*
Ecological System:	*0*

0 0.1 0.2 Mile

N W E S

DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT
NEW HAMPSHIRE
FORESTS & LANDS

Sep 23 01 AM '86

6912

FORM 404 N. H. QUIT CLAIM DEED

KNOW ALL MEN BY THESE PRESENTS, That It, Barretts Hill Partnership, a New Hampshire General Partnership, having a principal place of business at 400 Amherst Street, in Nashua, Hillsborough County, New Hampshire,

for consideration paid, grants to the Town of Hudson, a New Hampshire municipal corporation of Hillsborough County with offices at 12 School Street, Hudson, County of Hillsborough, State of New Hampshire

with **Quitclaim Covenants,**

See <u>EXHIBIT A</u> attached hereto and incorporated herein.

The premises conveyed is not homestead property.

Consideration is less than $4,000.00.

And it, the xxxxxxxxxxxxxxxxxx *said grantor, releases to said grantee all rights* xxxxxxxxx *and other interests therein.*

Witness Its hand and seal this 10th day of September 1986

Witness:

Lisa Lawrence

BARRETTS HILL PARTNERSHIP

By, Edward A. Frateschi
Edward A. Frateschi

Richard A. Cabral

Its authorized general partners.

State of New Hampshire

COUNTY OF HILLSBOROUGH, SS Sept. 10, A.D. 1986

Personally appeared Edward A. Frateschi and Richard A. Cabral, duly authorized general partners of Barretts Hill Partnership,

subscribed to the foregoing instrument and acknowledged that they *executed the same for the purposes therein contained*, on behalf of the partnership.

Justice of the Peace — Notary Public

EXHIBIT A

Barretts Hill Partnership

to

DESCRIPTION OF LAND
OF BARRETTS HILL PARTNERSHIP
TO BE DEEDED TO THE TOWN OF HUDSON
AT NO COST FOR THE RIGHT-OF-WAY

NASHUA-HUDSON CIRCUMFERENTIAL HIGHWAY
IN THE TOWN OF HUDSON, NEW HAMPSHIRE
HILLSBOROUGH COUNTY

All that piece or parcel of property situate in the Town of Hudson, County of Hillsborough, designated as land of Barretts Hill Partnership on a map entitled "Boundary and Concept Plan of Barretts Hill Estates, Phase II, Planned [illegible] Development," dated September 1985, prepared by Costello, Lomasney & deNapoli, Inc., said parcel further identified as "Circumferential Highway Right-of-Way," bounded and described as follows:

Beginning at a point on the northerly street line of Barretts Hill Road, said point being the northeastern corner of the parcel herein described and being on the division line between said parcel on the west and land now or [illegible] Phase I) on the east;

Thence, northwesterly along said Yorkshire Development land, on a bearing of North 35° 26' 56" West, a distance [illegible]

Thence, northwesterly crossing lands now or formerly of Barretts Hill Partnership on the following courses: North [illegible] West, a distance of 557.42 feet, North 62° [illegible] West, a distance of 256.74 feet, North 50° 23' 22" West, a distance of 791.37 feet, to a point on the division line between land of said Barretts Hill Partnership on the south and land now or formerly of John D. Grace and Norman [illegible] on the north;

Thence, southwesterly along said land of Grace and Pelletier on a bearing of South 50° 31' 34" West, a [illegible] between said Grace and Pelletier on the east and land now or formerly of Theodore Beza on the west;

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Thence, westerly along said land of Beza the following courses: South 72° 27' 07" West, a distance of 126.93 feet, South 73° 37' 50" West, a distance of 105.69 feet, [illegible] South 49' 05" West, a distance of 79.76 feet, South 76° 00' 36" West, a distance of 31.24 feet, North 86° 43' 38" West, a distance of [illegible] feet, North 60° 37' 1[illegible]" West, a distance [illegible] distance of 33.97 feet, South 48° 20' 48" West, a distance of 120.62 feet, South 47° 15' 46" West, a distance of 4.43 feet, to a point;

Thence, southeasterly crossing said land of Barretts Hill Partnership the following courses: South 56° 27' 03" East, a distance of 325.02 feet, South 58° 47' 56" East, a distance of 501.39 feet, South 72° 16' 59" East, a distance of 272.90 feet, to a point; South 62° 42' 51" East, a distance of 736.20 feet, to a point on the division line between said land of Barretts Hill Partnership on the north and land of Martha H. Bedard on the south;

Thence, northeasterly along said land of Martha H. Bedard, North 58° 23' 46" East, a distance of 87.76 feet, southeasterly along same land of Martha H. Bedard, South [illegible] West, a distance of 73.83 feet, to a point;

Thence, southeasterly crossing said land of Barretts [illegible] line of Windham Road; thence, northeasterly along said street line on a bearing of North 57° 00' 00" East, a distance of 228.10 feet to its intersection with the

Thence, northeasterly along said Barretts Hill Road on a curve to the left, with a radius of 150.00 feet, a distance of 129.59 feet to a point;

Thence, northeasterly further along the said street line the following courses: North 07° 29' 59" East, a distance of 106.34 feet, along a curve to the right with a

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[illegible] East, a distance of 37.04 feet to the point or place of beginning.

Being 1,197,434 square feet, (27.49 acres) more or

Said parcel being subject to the following easements:

A 30 foot wide sewer, utility, and walkway easement bounded and described as follows:

line between the parcel herein described and the remaining land of Barretts Hill Partnership, said point being 566.79 feet, on a bearing of South 50° 23' 22" East, from the division line between said Barretts Hill [illegible] on the north;

Thence, southwesterly crossing the parcel herein described on the following courses: South 53° 33' 03" West, a distance of [illegible] feet, South 44° 28' 45" West, a distance of 80.57 feet to a point on the division line between the parcel herein described on the north and the remaining land now or formerly of Barretts Hill Partnership

Thence, southeasterly along the aforementioned division line on a bearing of South 72° 16' 59" East, a distance of 33.60 feet, to a point;

Thence, northeasterly along the following courses: North 44° 28' 45" East, a distance of 62.73 feet, North 54° 49' 44" East, a distance of 234.91 feet, North 53° 33' 03" East, a distance of 245.38 feet to a point on the south and the remaining land now or formerly of Barretts Hill Partnership on the north;

Thence, northwesterly along the aforementioned division [illegible] 30.91 feet to the point or place of beginning.

BK 3674 PG 122 9012

03/20/86

The herein described parcel is subject to a Tennessee Gas Company Easement running in an east-west direction [illegible] section of the parcel. The Tennessee

1. No structures, trees or other obstructions are to be

2. No excavations, change of grade nor water impoundment within the rights-of-way and easements are to be made

3. No heavy equipment is to be moved across the rights-of-way and easements prior to notifying the district superintendent.

4. The rights-of-way and easements may be crossed, under certain conditions, by roads, railroads, streets and utility lines; however, these facilities are not to be [illegible] the owner and/or developer is advised that in order to accommodate such facilities across the pipelines, or to accommodate any allowable change of grade, impoundment of water or excavation, the Company [illegible] regulations and Company requirements to alter or adjust its pipeline facilities. The Company will require that the owner and/or developer assume the financial obligation of any such required alterations

5. An engineer's plat of the subdivision or project, along with a profile of any streets that will cross the pipelines, must be furnished by the [illegible] determine what alterations will be required, if any, and will then furnish the developer an estimate of costs and a drawing shown in the necessary pipeline alterations.

Company Easement contact Mr. Walter Kaplan, District Superintendent at (617) 435-6812, or Mr. W.B. Arcese R.O.W. supervisor at (413) 786-2702.

BK 3714 PG 012

(Reference, Hillsborough County Registry of Deeds Plan No. 19753)

328455 93 JUN -8 PM 1:19

KNOW ALL MEN BY THESE PRESENTS

That I, Cecile Y. Nichols, Tax Collector for the Town of Hudson in the County of Hillsborough and State of New Hampshire, for the year 1989 by the authority vested in me by the laws of the State, and in consideration of $ 19,987.80 to be paid by the Town of Hudson Do hereby sell and convey to the said Town of Hudson successors/heirs and assigns, a certain tract or parcel of land situated in the Town of Hudson, New Hampshire aforesaid, Taxed by the Selectmen/Assessors in 1989 to Barretts Hill Partnership and described in the Invoice Books as:

Property Location	Village of Barretts Hill
Map & Lot	025-030
Account #	7920-7989
Book & Page	5187 1533-1543
Hillsborough County Registry of Deeds	

Description from HCRD #19753:

Beginning at a point on the northerly street line of Barretts Hill Road, said point being the southwestern corner of the parcel;

Thence, northwesterly on a bearing of North 35° 26′ 56" West a distance of 10.49 feet, to a point;

Thence, beginning on the following courses: North 88° 20′ 08" West, a distance of 557.42 feet, North 63° 28′ 41" West a distance of 517.15 feet, North 63° 28′41" West a distance of 517.15 feet, North 76° 38′04" West, a distance of 256.74 feet, North 50° 23′22" West a distance of 791.37 feet,

Thence, on the following courses: North 50° 31′34" East a distance of 377.17 feet, North 50° 55′57" East a distance of 270.59 feet, North 50° 09′50" East a distance of 228.27 feet, North 50° 33"31" East a distance 166.21 feet, North 50°13′07" East a distance of 95.00 feet, North 52° 57′16" East a distance 152.79 feet, South 40° 08′09" East a distance of 233.56 feet, South 39° 47′38" East a distance of 227.33 feet, South 41° 06′32" East a distance of 262.09 feet to a point on Roy Drive;

Thence, along Roy Drive South 48° 53′08" West a distance of 250.84 feet, along a curve in a clockwise rotation with a radius of 25.00 feet a distance of 35.69 feet, along a curve in a counter clockwise direction with a radius of 62.50 feet a distance of 285.57 feet;

Thence, South 41° 06′52" East a distance of 250.00 feet, South 48° 53′08" West a distance of 240.00 feet, South 41° 06′52" East a distance of 250.00 feet to a point on Rangers Drive;

Thence, along Rangers Drive South 48° 53′08" West a distance of 68.30 feet, along a curve in a clockwise direction with a radius of 25.00 feet a distance of 24.06 feet, along a curve in a counter clockwise direction with a radius of 62.50 feet a distance of 316.67 feet, along a curve in a clockwise direction with a radius of 25.00 feet a distance of 24.06 feet, North 48° 53′08" East a distance of 17.30 feet;

Thence, South 38° 47′30" East a distance of 290.20 feet, North 48° 58′13" East a distance of 264.68 feet, South 35° 26′56" East a distance of 241.28 feet to the point of beginning.

BK5441PG0055

Said area describes Barretts Hill Estates Phase III as referenced in HCRD #19753 having a total area of 29.10± acres, otherwise described as Map 025 Parcel 030 Lots 070-085,087,089,091,093,095,097,101-133,135,137,139,141,143,145,147,149,151,153,155,157,159,161,163

This deed is the result of the tax lien execution held in the Town of Hudson, New Hampshire, on the 16th of May 1990. To have and to hold the said Premises, with the appurtenances, to the said Town of Hudson successors/heirs and assigns forever. And I hereby covenant with the said Town of Hudson that in making this conveyance I have in all things complied with the law, and that I have good right, so far as that right may depend upon the regularity of my own proceedings, to sell and convey the same in the manner aforesaid.

In Witness Whereof, I have hereunto set my hand and seal, the 8th of June, in the year of our Lord one thousand nine hundred and ninety three.

Signed, Sealed, and Delivered in the presence of:

Barbara A. Locke

Paula A. Bradley

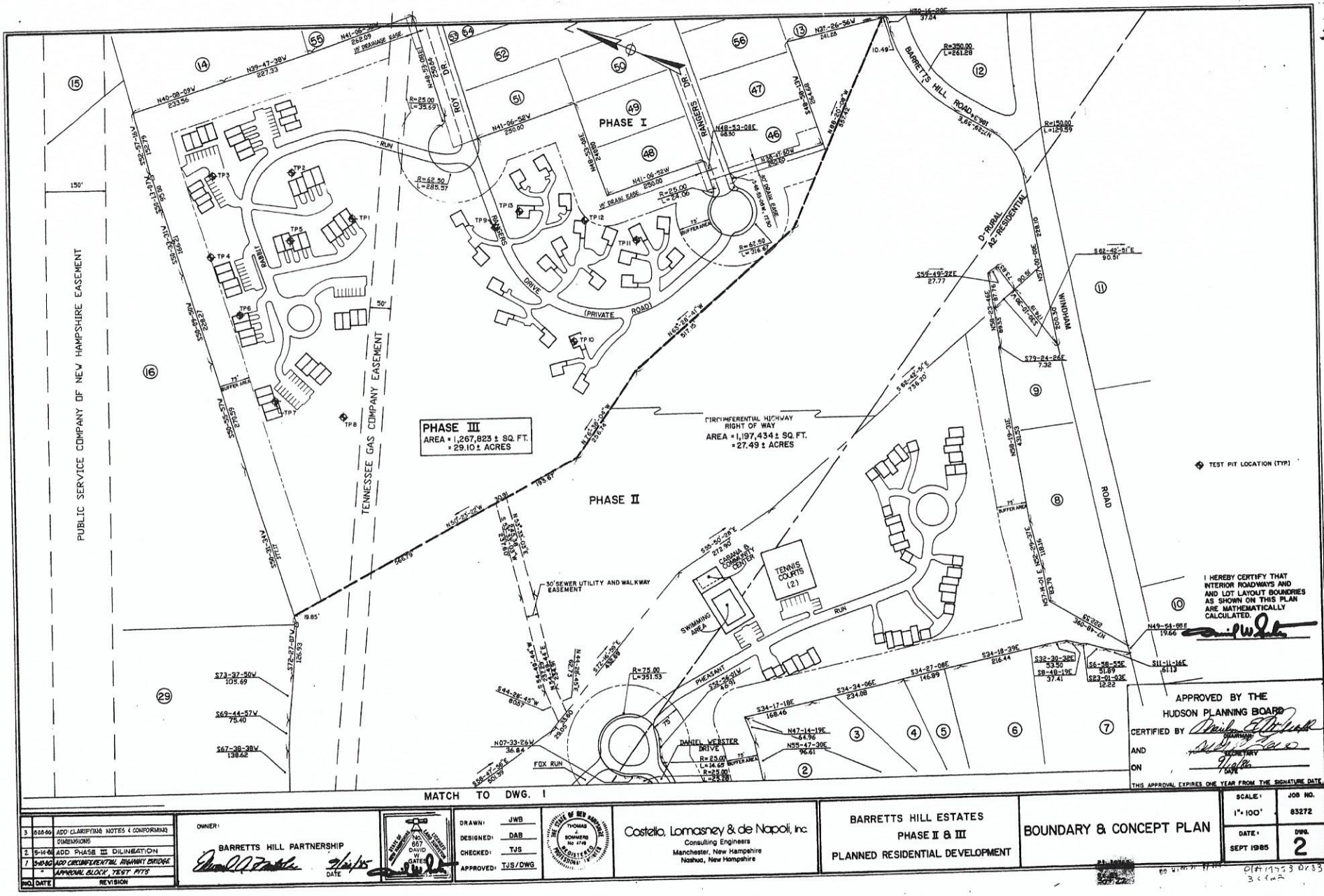
Joyce J. Williamson

Cecile Y. Nichols
Tax Collector

State of New Hampshire
Personally appearing Cecile Y. Nichols above named, and acknowledged the foregoing instrument to be ~~his~~ her voluntary act and deed.
Before me Lea Ake
Justice of the Peace

LEA A. AKE JUSTICE OF THE PEACE NEW HAMPSHIRE

BK5441PG0056



I HEREBY CERTIFY THAT INTERIOR ROADWAYS AND AND LOT LAYOUT BOUNDRIES AS SHOWN ON THIS PLAN ARE MATHEMATICALLY CALCULATED.

APPROVED BY THE HUDSON PLANNING BOARD
CERTIFIED BY _____ CHAIRMAN
AND _____ SECRETARY
ON _____ DATE
THIS APPROVAL EXPIRES ONE YEAR FROM THE SIGNATURE DATE.

NO.	DATE	REVISION
3	6-26-85	ADD CLARIFYING NOTES & CONFORMING DIMENSIONS
2	5-14-85	ADD PHASE III DILINEATION
1	5-10-85	ADD CIRCUMFERENTIAL HIGHWAY BRIDGE
-	-	APPROVAL BLOCK, TEST PITS

OWNER:
BARRETTS HILL PARTNERSHIP
DATE 5/21/85

DRAWN: JWB
DESIGNED: DAB
CHECKED: TJS
APPROVED: TJS/DWG

THOMAS J. SOMMERS No. 4749 REGISTERED LAND SURVEYOR

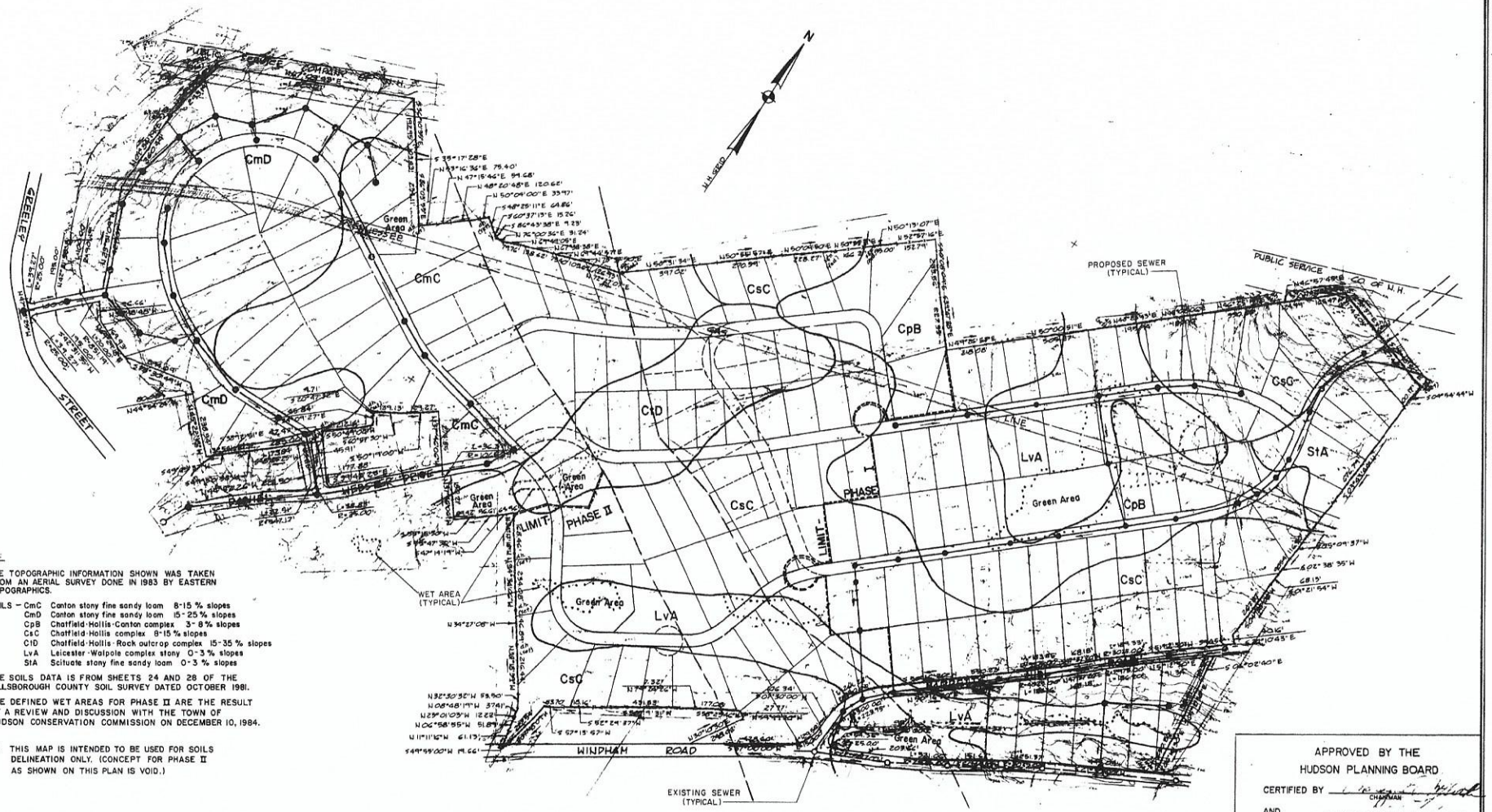
DAVID W. GATES No. 667 REGISTERED LAND SURVEYOR

Costello, Lomasney & de Napoli, Inc.
Consulting Engineers
Manchester, New Hampshire
Nashua, New Hampshire

BARRETTS HILL ESTATES
PHASE II & III
PLANNED RESIDENTIAL DEVELOPMENT

BOUNDARY & CONCEPT PLAN

SCALE: 1" = 100'
JOB NO. 83272
DATE: SEPT 1985
DWG. 2



NOTES:

1. THE TOPOGRAPHIC INFORMATION SHOWN WAS TAKEN FROM AN AERIAL SURVEY DONE IN 1983 BY EASTERN TOPOGRAPHICS.
2. SOILS – CmC Canton stony fine sandy loam 8-15 % slopes
   CmD Canton stony fine sandy loom 15-25 % slopes
   CpB Chatfield-Hollis-Canton complex 3-8 % slopes
   CsC Chatfield-Hollis complex 8-15 % slopes
   CtD Chatfield-Hollis-Rock outcrop complex 15-35 % slopes
   LvA Leicester-Walpole complex stony 0-3 % slopes
   StA Scituate stony fine sandy loam 0-3 % slopes
   THE SOILS DATA IS FROM SHEETS 24 AND 28 OF THE HILLSBOROUGH COUNTY SOIL SURVEY DATED OCTOBER 1981.
3. THE DEFINED WET AREAS FOR PHASE II ARE THE RESULT OF A REVIEW AND DISCUSSION WITH THE TOWN OF HUDSON CONSERVATION COMMISSION ON DECEMBER 10, 1984.

NOTE: THIS MAP IS INTENDED TO BE USED FOR SOILS DELINEATION ONLY. (CONCEPT FOR PHASE II AS SHOWN ON THIS PLAN IS VOID.)

APPROVED BY THE HUDSON PLANNING BOARD

CERTIFIED BY _____ CHAIRMAN

AND _____ SECRETARY

ON _____ DATE

THIS APPROVAL EXPIRES ONE YEAR FROM THE SIGNATURE DATE

NO.	DATE	REVISION
2	1-2-86	DEFINED PHASE II WET AREAS
1	12-19-85	PHASE II DATA ADDED

DRAWN: JWB
DESIGNED: DAB
CHECKED: TJS
APPROVED: TJS/DWG

Costello, Lomasney & de Napoli, Inc.
Consulting Engineers
Manchester, New Hampshire
Nashua, New Hampshire
©1984

PHASE II

BARRETTS HILL ESTATES

SOILS PLAN

PI. 19753

SCALE: 1" = 200'
JOB NO. 83272
DATE: SEPT 1985
DWG. 3

Dr. 03 Hof 22