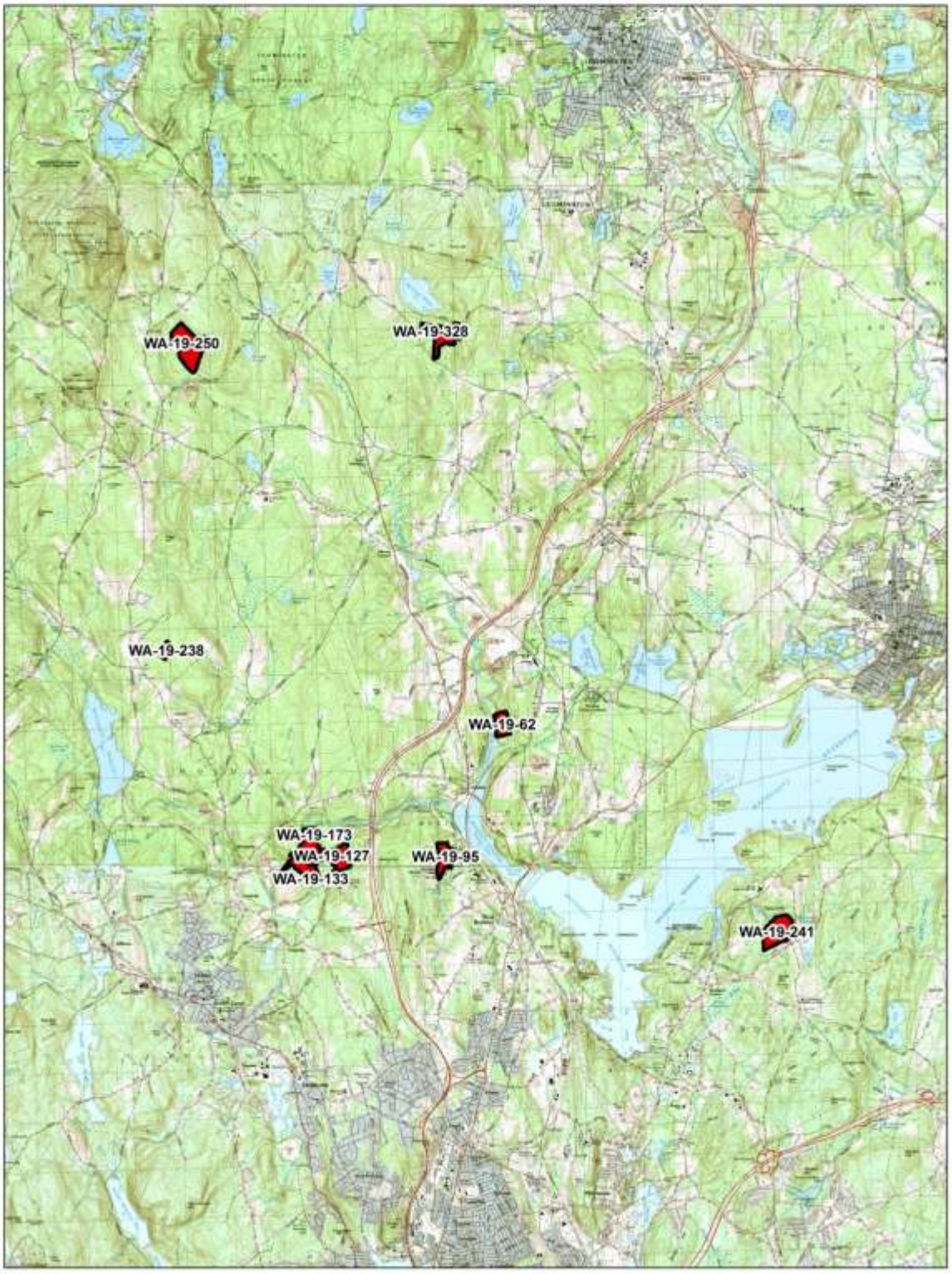
Department of Conservation and Recreation
Division of Water Supply Protection
Office of Watershed Management
Wachusett Reservoir

Proposed Forest Management
Fiscal Year 2019

DCR - Wachusett Reservoir

Proposed Timber Sales FY 2019

Locus Map (Scale 1:72,000 - 1 inch =6,000 feet)



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Proposal Number: WA-19-62

Site Information

Watershed: Wachusett	**Town(s)**: Sterling
Acres: 29.9	**Nearest Road:** Prescott Street
Natural Heritage Atlas overlap?: Yes	**Public Drinking Water Supply Watershed?:** Yes
Forest Types: Mixed oak; Oak/hardwood; White pine/oak	
Soils: Primarily Hinckley sandy loam along with some Paxton fine sandy loam, very stony.	
Wetland Resources: The Stillwater Basin of the Wachusett Reservoir forms the western border of this proposed sale area.	
Vernal Pools: There are no known vernal pools.	

NARRATIVES

General Description/Forest Composition/History:

The overstory is a fairly standard dry-site mix of black, red and white oaks along with white pine and the occassional hickory and red maple. There is more white pine in the lower elevations, especially in the southwestern quadrant of this area. A fire several decades ago, probably caused by a fisherman on the Stillwater Basin shoreline, spread most of the way up this west-facing slope. There are many trees with fire-scars that persist to the present day. There is decent advance regeneration especially in the southern half of the area. The regeneration is comprised of white pine, red oak, white oak, black oak, red maple, hickory and eastern hophornbeam. The understory also has native shrubs such as maple-leaved viburnum (showing signs of deer browse), huckleberry, lowbush blueberry and mountain laurel. There is also witch-hazel at lower elevations. The mountain laurel is scattered in much of the area but reaches a density that interferes with the ability of young trees to become established in the northwest quadrant from about mid-slope down to the bottom of the hill at the Stillwater Basin. Sampling found that there is adequate advance regeneration on 51% of the plots with marginal regeneration on 21% of the plots. Mountain laurel was at interferring levels on 21% of the plots. Oak regeneration was found on 67% of the plots.

The age structure of this area is as follows; 0% 0-20 years old, 5% 21-40 years, 0% 41-60 years, 61% 61-80 years, 7% 81-100 years and 27% >100 years old. The oldest stands originated in about 1900 making them 118 years old.

Site Selection:

The ideal watershed protection forest is one which best serves the function of the land as a producer of high quality drinking water in both short- and long-term. This forest must be vigorous and diverse in tree species and ages, be actively accumulating biomass and actively regenerating. Such a forest will be ideally suited to be resilient to and quickly recover from small- and large-scale disturbances such as diseases, insect infestations, ice storms and hurricanes.

This area was selected for management because of the lack of age diversity both in these 29.9 acres as well as in the 600 DCR-owned acres from which water flows into the Stillwater Basin of the Wachusett Reservoir. There is no young forest with 5% of the forest 21-40 years old, 61% 61-80 years old, 7% 81-100 years old and 27% more than 100 years old. This harvest will contribute as much as 10 acres or 33% of young forest towards the ideal protection forest which would have at least 3 distinct age classes of trees distributed throughout this sale area.

Silvicultural Objectives:

The goal will be to establish young forest on up to 10 acres in this area by the removal of the overstory in

patches. These will be as well distributed throughout the area as possible taking advantage of the advance regeneration. Some thinning may occur between the openings primarily aimed at removing the trees of poorest health. These are likely to be some of the badly fire-scarred trees.

Cultural Resources:

This area will be assessed by the DCR Archeologist for both known sites of cultural or archeological importance as well as for potential use by pre-Contact Native Americans.

Wildlife/Rare or Endangered Species:

All DWSP Best Management Practices for wildlife management such as the protection and enhancement of wildlife habitat features will be an integral part of the silviculture and job layout. Diverse hard and soft mast species will be retained and the healthiest trees will be released to improve seed production, which will promote tree seedlings and food for wildlife. Large snags, den trees, logs and nest trees will be retained whenever possible as valuable habitat. No stick nests were observed, but if they are identified in the further steps of this process they will be protected. Where they occur; streams, wetlands, seeps and vernal pools will be protected for water quality and wildlife habitat.

The Natural Heritage and Endangered Species Program have determined that certain state-listed sensitive species or habitats may exist within the lot proposal area. To protect them from unnecessary disturbance, detailed information regarding affected species and their locations is not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

DCR - Wachusett Reservoir
Timber Lot Proposal WA-19-62

Massachusetts Department of Conservation and Recreation

Division of Water Supply Protection, Office of Watershed Management

Forest Management Project Proposal Summary

DWSP Proposal Number: WA-19-95

Site Information

Watershed: Wachusett	**Town(s)**: West Boylston
Acres: 39	**Nearest Road:** Malden Street
Natural Heritage Atlas overlap?: No	**Public Drinking Water Supply Watershed?:** Yes
Forest Types: Oak hardwoods, white pine	
Soils: Hinckley and Merrimac excessively drained soils	
Wetland Resources: Malden brook flows through near the eastern bound of the working unit. In the northern section is a classic seep.	
Vernal Pools: There is one very large vernal pool with a stadium like topography surrounding it.	

NARRATIVES

General Description/Forest Composition/History:

This working unit was part of the original takings and most of it was previously owned by Aaron Goodale and George Newton. All of it was mapped as woodland in 1900 with exception to one small chunk of pasture in the northern section. The northern section was planted and planted-improved to white pine in 1905. The eastern half of the northern section was planted again to white pine in the spring of 1907 in a 6' x 6' layout. The western half was a chestnut and oak stand which was thinned in 1909. The 1938 Hurricane assessment map shows scattering damage in the northern section and along the southern portion of Malden Brook with no subsequent removals. The property was covertyped in 1951 to white pine in the northern section and a little section along the southern portion of Malden Brook was covertyped as mixed. There has only been one timber sale on this working unit which occurred in 1983 in the northern section and was a part of a sale to the north. The total impact was a thinning in the white pine stand covering only 8 acres. The result of that work shows a good hardwood regeneration mix of black birch, red maple, sugar maple and hickory. There is crown damage on the oaks, possibly ice storm damage and the crowns are rebuilding. Red oak and white pine are of good quality along with some white oak. White ash seems of good vigor. Beech scale was found in this working unit. Witchhazel in the lower elevations of this working unit are a minor issue, while the higher elevations have good regen.

Regeneration sampling found good regeneration is present on 32% of 63 plots taken and those were fairly well spread out in the working unit. Marginal regeneration is present on an additional 18% of the plots and no regeneration was identified on 21% of the plots taken although more than half the marginal plots and just under half the no regeneration plots have oak regeneration present. Regeneration is lacking in 10% of the plots due to native interferring plants (witchhazel) and they were found primarily in the little valley in the center of the working unit. The regeneration is made up of white pine, american beech, white oak, sugar maple, black birch, bigtooth aspen, red oak, white ash and red maple.

Site Selection:

The ideal watershed protection forest is one which best serves the function of the land as a producer of high quality drinking water in both short- and long-term. This forest must be vigorous and diverse in tree species and ages, be actively accumulating biomass and actively regenerating. Such a forest will be ideally suited to be resilient to and quickly recover from small- and large-scale disturbances such as

diseases, insect infestations, ice storms and hurricanes. This site was selected because of the lack of age diversity both in these 39 acres as well as in the 481 DCR-owned acres from which water flows into Malden Brook and ultimately into the Wachusett Reservoir. This harvest will contribute as much as 13 acres or 33% of young forest towards the ideal protection forest which would have at least 3 distinct age classes of trees distributed throughout this sale area.

Silvicultural Objectives:

Because there is good advanced regeneration spread throughout this working unit, openings will be made accordingly in order to release the advance regeneration. Given that ~80% of the working unit is at a mature age class and none of the working unit is under twenty years old, 13 acres of openings will occur. After the harvest is complete, the result will be closer to the watersheds ultimate goal of having three distinct age cohorts within each working unit. The species composition will be different in the white pine stand where hardwoods are regenerating, but similar in the other white pine/hardwood stands. Care will be taken to avoid unnecessary release or encouragement of the American beech which is located in small pockets in the working unit. The operation will focus on creating openings where they are suitable to the topography and have good regeneration.

Cultural Resources:

This area will be assessed by the DCR Archeologist for both known sites of cultural or archeological importance as well as for potential use by pre-Contact Native Americans.

Wildlife/Rare or Endangered Species:

All DWSP Best Management Practices for wildlife management such as the protection and enhancement of wildlife habitat features will be an integral part of the silviculture and job layout. Diverse hard and soft mast species will be retained and the healthiest trees will be released to improve seed production, which will promote tree seedlings and food for wildlife. Large snags, den trees, logs and nest trees will be retained whenever possible as valuable habitat. No stick nests were observed, but if they are identified in the further steps of this process they will be protected. Where they occur; streams, wetlands, seeps and vernal pools will be protected for water quality and wildlife habitat.

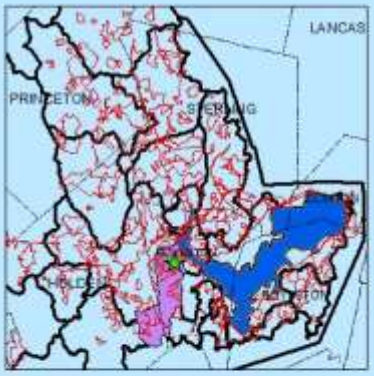
All vernal pools, whether verified or potential, will be protected using the appropriate Best Management Practices.

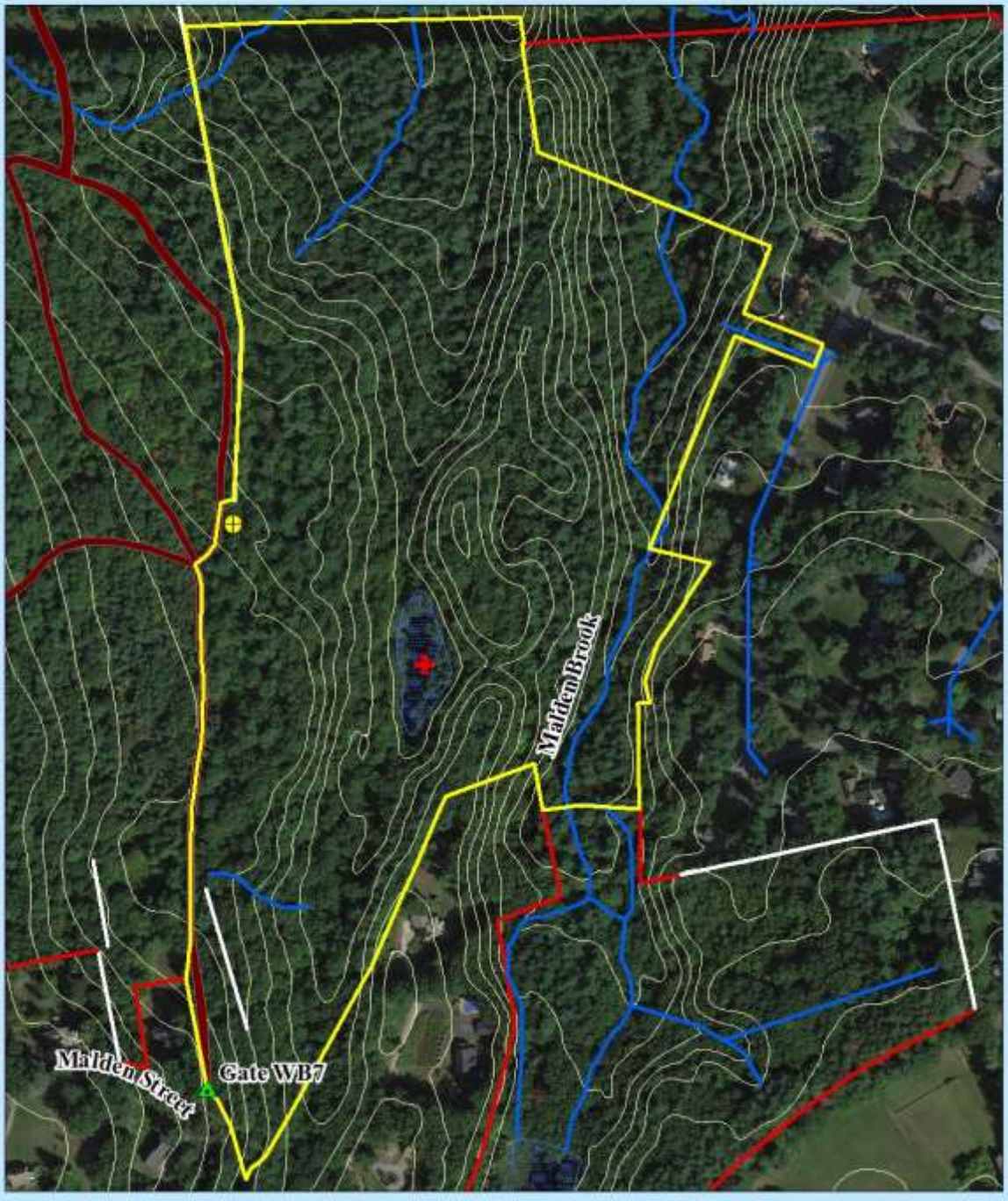
DCR - Wachusett Reservoir
Timber Lot Proposal WA-19-95

1 inch = 200 feet

Outline of Proposed Area (Working Unit)
DCR Property Lines w/wo walls
Stone walls
Streams
Wetlands
Vernal Pools-Verified
Vernal Pools-Potential
Landing/s
NHESP Priority Habitats (semi-transparent)
DCR Gate/s

0 120 240 480 Feet





Massachusetts Department of Conservation and Recreation

Division of Water Supply Protection, Office of Watershed Management

Forest Management Project Proposal Summary

DWSP Proposal Number: WA-19-127

Site Information

Watershed: Wachusett	**Town(s)**: Holden
Acres: 43	**Nearest Road:** River Street
Natural Heritage Atlas overlap?: Yes	**Public Drinking Water Supply Watershed?:** Yes
Forest Types: Oak, mixed – dry site, white pine/oak	
Soils: The manageable area for this site is made up of excessively drained Windsor, Hinckley and Merrimac soils.	
Wetland Resources: The Quinapoxet River flows along the western bound of the working unit and has a good sized wetland along a portion of it.	
Vernal Pools: There is a vernal pool just north of the road that crosses the northeast part of the property.	

NARRATIVES

General Description/Forest Composition/History:

This working unit was part of the original takings and was previously owned by the Linus M. Harris Manufacturing Company. Linus ran a cotton mill and then later on it turned into a shoddy mill which was demolished in 1902. The 1938 hurricane survey showed "scattering damage" on this parcel. This lot was first cover typed in 1951 as hardwoods. Interestingly, this land was mapped by surveyors in 1830 as woodland and thus it has the potential to be a primary woodland. This property is characterized by its highly variable topography and its steep slopes along the Quinapoxet River. Several timber sales have occurred over the years that have resulted in good regeneration and a small component of young forest. The first work was conducted in 1983 in the central area of the working unit targeting low quality oaks in the over story. At that time it was noted that while some white pine regeneration is present - it is of inadequate quantities and should be planted. In 1997 a small area of cordwood was cut in the western section. The most recent activity was in 2007 focusing on the eastern section where three openings were made and one thinned area. The working unit has a decent quality mix of oaks and the white pine is of a better health and vigor. An ice storm has damaged the oaks which are still in the process of rebuilding their crowns. The understory is a nice mix of hardwood and softwood regeneration with patches and veins of mountain laurel and/or low bush blueberry.

There is good advanced regeneration throughout the working unit and is comprised of white pine, red maple, white oak, red oak, hemlock, American chestnut, blue beech, and black oak. 50% of the plots taken on this site are regenerated and 12% of the plots show marginal regeneration. Oak is present on 40 percent of the plots taken.

Site Selection:

The ideal watershed protection forest is one which best serves the function of the land as a producer of high quality drinking water in both short- and long-term. This forest must be vigorous and diverse in tree species and ages, be actively accumulating biomass and actively regenerating. Such a forest will be ideally suited to be resilient to and quickly recover from small- and large-scale disturbances such as diseases, insect infestations, ice storms and hurricanes. This area was selected for management because of the lack of age diversity both in these 43 acres as well as in the 2,462 DCR-owned acres from which water flows into the Quinapoxet River and ultimately into the Wachusett Reservoir. This harvest will

contribute as much as 14 acres or 33% of young forest towards the ideal protection forest which would have at least 3 distinct age classes of trees distributed throughout this sale area.

Silvicultural Objectives:

Because there is good advanced regeneration spread throughout this working unit, openings will be made accordingly in order to release the advance regeneration. Given that ~93% of the working unit is at a mature age class and ~6% of the working unit is under twenty years old, about 14 acres of openings will occur. After the harvest is complete, the result will be closer to the watersheds ultimate goal of having three distinct age cohorts within each working unit. The operation will focus on creating openings where they are suitable to the topography and have good regeneration. Active den/nest trees and exceptional individuals of all species present will be retained for habitat and/or diversity.

Cultural Resources:

This area will be assessed by the DCR Archeologist for both known sites of cultural or archeological importance as well as for potential use by pre-Contact Native Americans.

Wildlife/Rare or Endangered Species:

All DWSP Best Management Practices for wildlife management such as the protection and enhancement of wildlife habitat features will be an integral part of the silviculture and job layout. Diverse hard and soft mast species will be retained and the healthiest trees will be released to improve seed production, which will promote tree seedlings and food for wildlife. Large snags, den trees, logs and nest trees will be retained whenever possible as valuable habitat. No stick nests were observed, but if they are identified in the further steps of this process they will be protected. Where they occur; streams, wetlands, seeps and vernal pools will be protected for water quality and wildlife habitat. All vernal pools, whether verified or potential, will be protected using the appropriate Best Management Practices.

The Natural Heritage and Endangered Species Program have determined that certain state-listed sensitive species or habitats may exist within the lot proposal area associated with the Quinapoxet River. To protect them from unnecessary disturbance, detailed information regarding affected species and their locations is not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

DCR - Wachusett Reservoir
Timber Lot Proposal WA-19-127

1 inch = 200 feet

Outline of Proposed Area (Working Unit)

DCR Property Lines w/wo walls

Stone walls

Streams

Wetlands

Vernal Pools-Verified

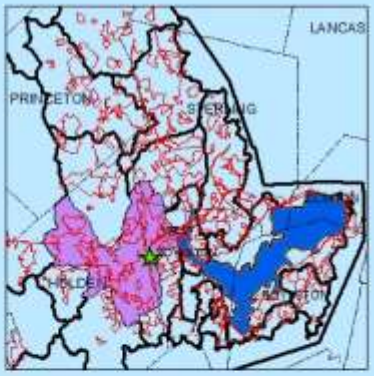
Vernal Pools-Potential

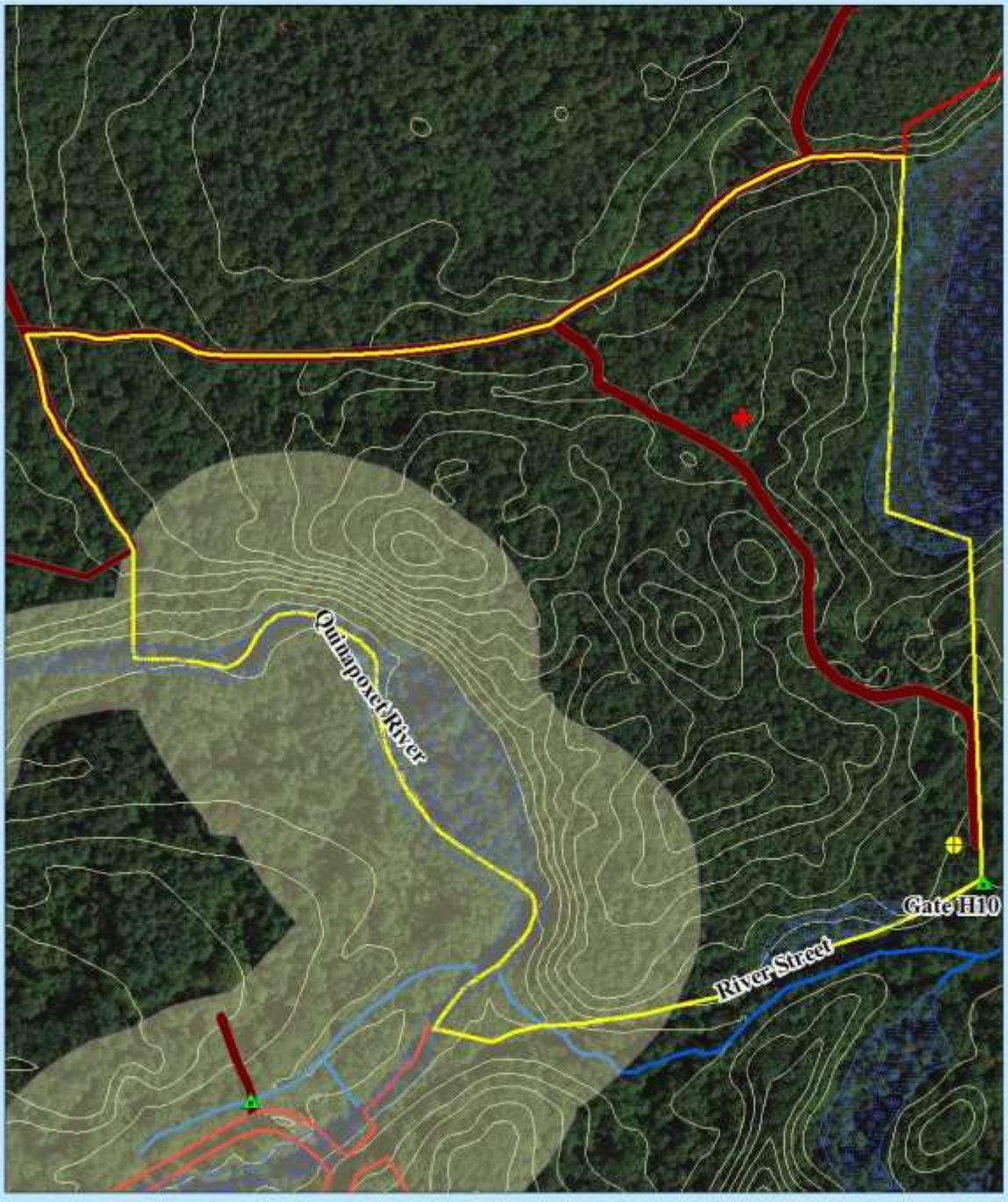
Landing/s

NHESP Priority Habitats (semi-transparent)

DCR Gate/s

0 120 240 480 Feet





Massachusetts Department of Conservation and Recreation

Division of Water Supply Protection, Office of Watershed Management

Forest Management Project Proposal Summary

DWSP Proposal Number: WA-19-133

Site Information

Watershed: Wachusett	**Town(s)**: Holden
Acres: 44.1	**Nearest Road:** River Street
Natural Heritage Atlas overlap?: Yes	**Public Drinking Water Supply Watershed?:** Yes
Forest Types: White pine/oak, Northern Red oak, Mixed hardwoods	
Soils: Primarily Hinckley and Merrimac sandy loams with a little poorly drained Limerick silt loam near the river.	
Wetland Resources: There's a wetland in the north end of this area at the toe of a steep slope.	
Vernal Pools: There are no known vernal pools.	

NARRATIVES

General Description/Forest Composition/History:

The overstory is primarily comprised of red oak, white pine, white oak, black oak, red maple. There is also some hemlock scattered throughout with more on the slopes nearer to the Quinapoxet River. The hemlock is infested with the hemlock wooly adelgid and there is some mortality as a result. Most of this area was previously harvested in 1996 with the goal of encouraging the establishment of young trees. This was largely successful. A regeneration survey shows that there is adequate regeneration in 52% of the plots along with marginal regeneration on another 22%. This advance regeneration is comprised primarily of white pine, red oak and black birch along with hemlock and red maple. Interferring levels of mountain laurel and witch-hazel were found in 7% of the plots.

The age structure of this working unit is as follows: 0% 0-20 years old, 0% 21-40 years, 0% 41-60 years, 11% 61-80 years, 28% 81-100 years and 61% >100 years old. The oldest stands originated in about 1892 making them 126 years old.

Site Selection:

The ideal watershed protection forest is one which best serves the function of the land as a producer of high quality drinking water in both short- and long-term. This forest must be vigorous and diverse in tree species and ages, be actively accumulating biomass and actively regenerating. Such a forest will be ideally suited to be resilient to and quickly recover from small- and large-scale disturbances such as diseases, insect infestations, ice storms and hurricanes.

This area was selected for management because of the lack of age diversity both in these 44 acres as well as in the 2,462 DCR-owned acres from which water flows into the Quinapoxet River and ultimately into the Wachusett Reservoir. There is no young forest with 11% 61-80 years old, 28% 81-100 years old and 61% more than 100 years old. The oldest stands originated in about 1892 making them about 126 years old.

This harvest will contribute as much as 15 acres or 33% of young forest towards the ideal protection forest which would have at least 3 distinct age classes of trees distributed throughout this sale area.

Silvicultural Objectives:

Openings in the overstory will be made in order to release the advance regeneration. Given that the advance regeneration is well distributed throughout this area, so will the openings be well distributed. Opportunities will be sought where good regeneration coincides with hemlock that is infested with hemlock wooly adlegid. Otherwise, no extra effort will be made to remove hemlock other than the typical removal of trees of poor vigor in the up to 15 acres of intermediate cutting.

Cultural Resources:

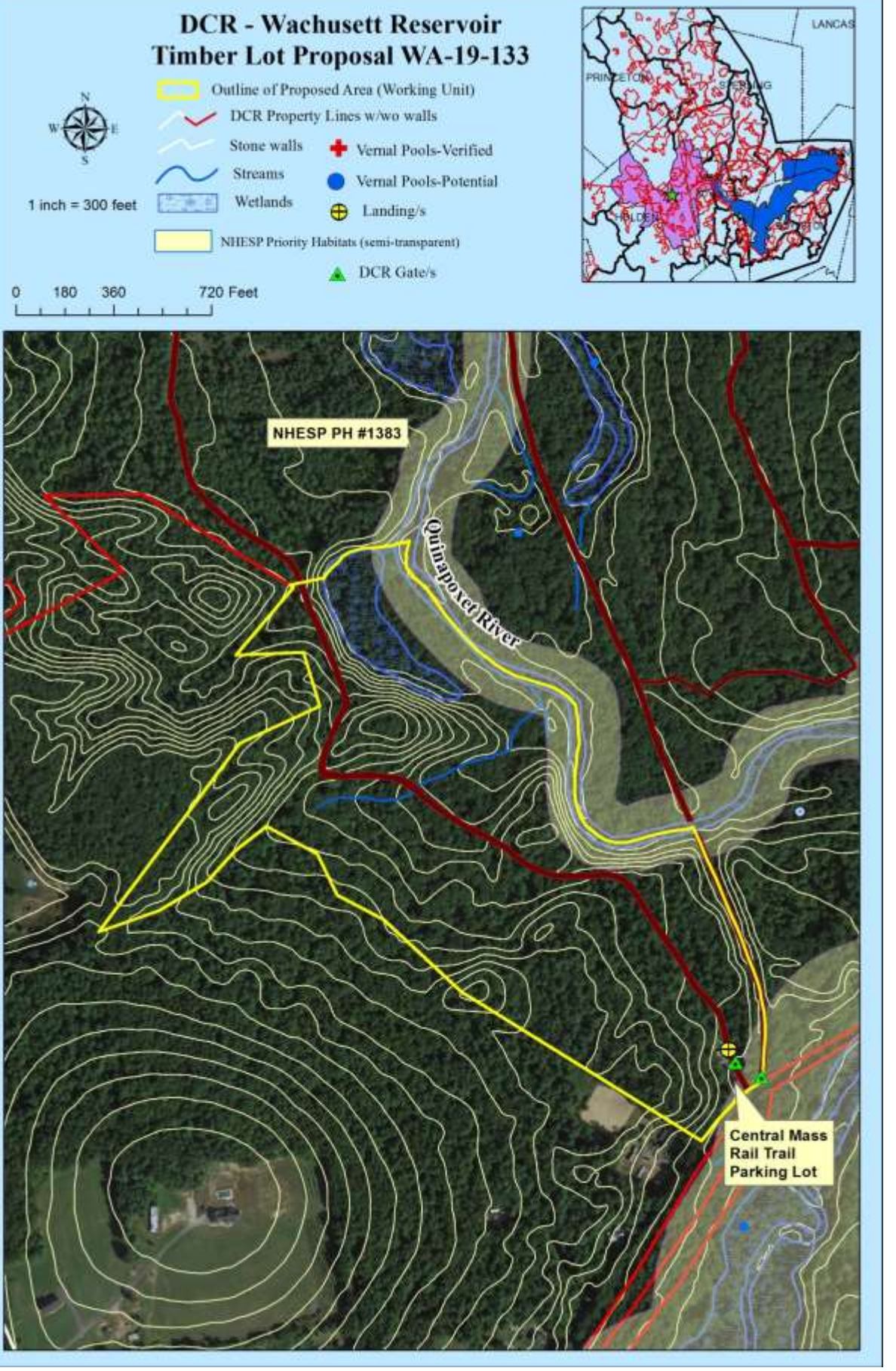
This area will be assessed by the DCR Archeologist for both known sites of cultural or archeological importance as well as for potential use by pre-Contact Native Americans.

Wildlife/Rare or Endangered Species:

All DWSP Best Management Practices for wildlife management such as the protection and enhancement of wildlife habitat features will be an integral part of the silviculture and job layout. Diverse hard and soft mast species will be retained and the healthiest trees will be released to improve seed production, which will promote tree seedlings and food for wildlife. Large snags, den trees, logs and nest trees will be retained whenever possible as valuable habitat. No stick nests were observed, but if they are identified in the further steps of this process they will be protected. Where they occur; streams, wetlands, seeps and vernal pools will be protected for water quality and wildlife habitat.

The Natural Heritage and Endangered Species Program have determined that certain state-listed sensitive species or habitats may exist within the lot proposal area associated with the Quinapoxet River. To protect them from unnecessary disturbance, detailed information regarding affected species and their locations is not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

DCR - Wachusett Reservoir
Timber Lot Proposal WA-19-133



Massachusetts Department of Conservation and Recreation

Division of Water Supply Protection, Office of Watershed Management

Forest Management Project Proposal Summary

DWSP Proposal Number: WA-19-173

Site Information

Watershed: Wachusett	**Town(s)**: Holden
Acres: 51.1	**Nearest Road:** River Street
Natural Heritage Atlas overlap?: Yes	**Public Drinking Water Supply Watershed?:** Yes
Forest Types: Mixed oak; Mixed hardwoods; Oak/hardwood	
Soils: Primarily Hinckley and Merrimac sandy loams along with Winooski very fine sandy loam.	
Wetland Resources: There's a wetland associated with the southern end of the oxbow pond on the east side of the Rail Trail	
Vernal Pools: The oxbow pond on the east side of the Rail Trail is a functioning vernal pool and there is a cluster of small vernal pools on the west side of the Rail Trail.	

NARRATIVES

General Description/Forest Composition/History:

The majority of the forest in this proposed sale area is a mixed oak stand with an overstory of red oak, black oak, white oak, white pine, red maple and scattered black cherry. The understory is dominated by advance regeneration comprised of white pine, oaks, red maple, hemlock, black cherry, sassafrass and eastern hophornbeam. Shrubs are primarily lowbush blueberry, witchhazel, mountain laurel, shadbush and sheep laurel. Most of this stand east of the rail-trail was thinned in 1998 which has allowed the continued development of this understory.

West of the rail-trail is a mixed oak stand similar to that on the east side although with higher overstory stocking due to a lack of past logging. It too has an excellent understory of advance regeneration. North of this stand on the west side of the rail-trail is an area characterized by old meanderings of the Quinapoxet River. The mixed hardwood stands in this area are comprised of red oak, black cherry, red maple, white pine and white ash. The understory is dominated by American hornbeam. There is an oxbow pond on the east side of the rail-trail that was cut off from the Quinapoxet River by the construction of the railroad bed sometime in the 1800's.

A regeneration survey found adequate regeneration present in 58% of the plots with marginal regeneration present in an additional 17%. Only 3% of the plots had interferring levels of native shrubs, in this case, mountain laurel.

Site Selection:

The ideal watershed protection forest is one which best serves the function of the land as a producer of high quality drinking water in both short- and long-term. This forest must be vigorous and diverse in tree species and ages, be actively accumulating biomass and actively regenerating. Such a forest will be ideally suited to be resilient to and quickly recover from small- and large-scale disturbances such as diseases, insect infestations, ice storms and hurricanes.

This area was selected for management because of the lack of age diversity both in these 51 acres as well as in the 2,462 DCR-owned acres from which water flows into the Quinapoxet River and ultimately into the Wachusett Reservoir. There is no young forest with 3% of the forest 41-60 years old, 27% 61-80 years

old, 6% 81-100 years old and 63% more than 100 years old. The oldest stands are west of the rail-trail and originated in the 1890s make them about 120 years old.

This harvest will contribute as much as 17 acres or 33% of young forest towards the ideal protection forest which would have at least 3 distinct age classes of trees distributed throughout this sale area.

Silvicultural Objectives:

Given the excellent understory of advance regeneration, it should not be difficult to achieve the goal of creating a new age class on 1/3rd of this area. This will be accomplished by the removal of the overstory in patches that average about 1 acre with a maximum size of about 2 acres. These will be well distributed throughout the proposed area taking advantage of where the advance regeneration is best. Some partial cutting may occur between the openings on up to 1/3rd of the area focusing on the removal of trees of the poorest quality while maintaining species diversity.

Cultural Resources:

This area will be assessed by the DCR Archeologist for both known sites of cultural or archeological importance as well as for potential use by pre-Contact Native Americans.

Wildlife/Rare or Endangered Species:

All DWSP Best Management Practices for wildlife management such as the protection and enhancement of wildlife habitat features will be an integral part of the silviculture and job layout. Diverse hard and soft mast species will be retained and the healthiest trees will be released to improve seed production, which will promote tree seedlings and food for wildlife. Large snags, den trees, logs and nest trees will be retained whenever possible as valuable habitat. No stick nests were observed, but if they are identified in the further steps of this process they will be protected. Where they occur; streams, wetlands, seeps and vernal pools will be protected for water quality and wildlife habitat.

The Natural Heritage and Endangered Species Program have determined that certain state-listed sensitive species or habitats may exist within the lot proposal area associated with the Quinapoxet River. To protect them from unnecessary disturbance, detailed information regarding affected species and their locations is not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

DCR - Wachusett Reservoir
Timber Lot Proposal WA-19-173

1 inch = 300 feet

Outline of Proposed Area (Working Unit)

DCR Property Lines w/wo walls

Stone walls

Streams

Wetlands

Vernal Pools-Verified

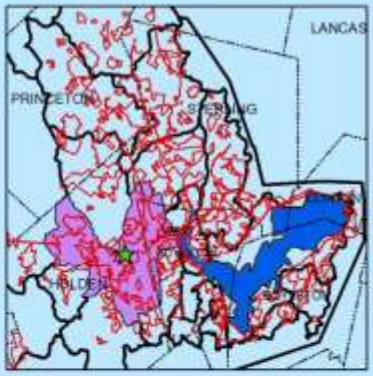
Vernal Pools-Potential

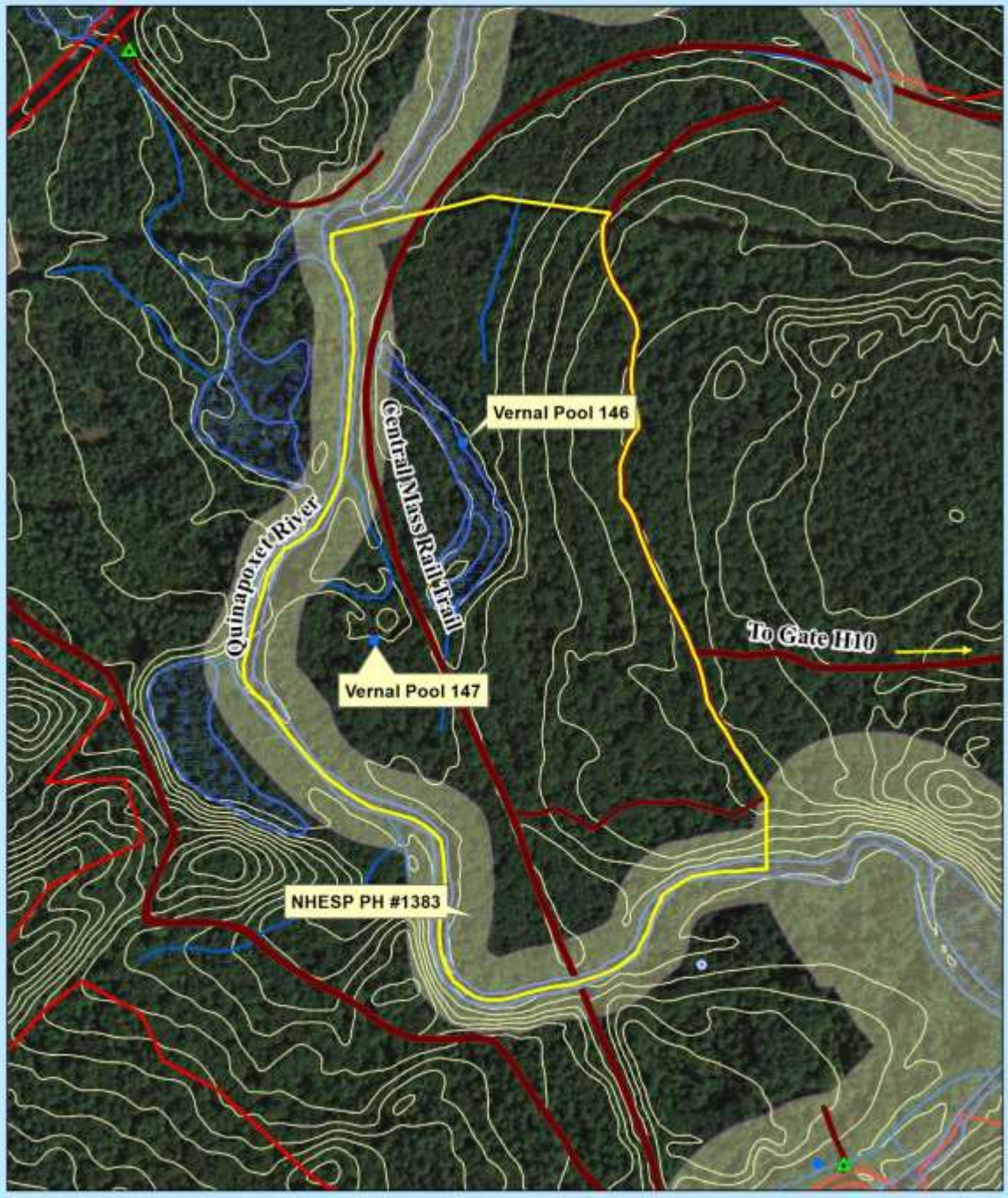
Landing/s

NHESP Priority Habitats (semi-transparent)

DCR Gate/s

0 180 360 720 Feet





Massachusetts Department of Conservation and Recreation

Division of Water Supply Protection, Office of Watershed Management

Forest Management Project Proposal Summary

DWSP Proposal Number: WA-19-238

Site Information

Watershed: Wachusett	**Town(s):** Princeton
Acres: 16.7	**Nearest Road:** Worcester Rd. (Rt 31)
Natural Heritage Atlas overlap?: No	**Public Drinking Water Supply Watershed?:** Yes
Forest Types: White pine\oak, Mixed oak	
Soils: Woodbridge-Paxton fine sandy loam, extremely stony. This is a thick, well-drained till soil.	
Wetland Resources: The bordering vegetated wetland of a small tributary to Cold Brook forms the southwestern border of this area.	
Vernal Pools: There's a potential vernal pool in the above mentioned wetland.	

NARRATIVES

General Description/Forest Composition/History:

This property was purchased by the MDC in 1996. This former pasture is dominated by white pine, red oak, white oak and black oak with lesser numbers of red maple, black birch, hickory, yellow birch and sassafrass. The white pine is of generally good quality with few of the multi-stemmed individuals common to abandoned pastures. The yellow birch is present almost exclusively on the flat area near the wetland and on the adjacent southwest facing slope. The understory is dominated by seedlings and saplings.

Regeneration sampling found adequate numbers and diversity of young trees present on 76% of the plots with marginal regeneration on the remaining 24% of the plots. This regeneration is comprised of white pine, white oak, red oak, black birch, red maple, black oak, yellow birch and sassafrass. What little there is of a shrub layer is comprised primarily of lowbush blueberry.

The age structure for this area is as follows; 0% 0-20 years old, 0% 21-40 years, 0% 41-60 years, 4% 61-80 years, 0% 81-100 years, 96% >100 years old.

Systematic sampling for terrestrial invasive species did not find any present in the proposed area. However, Japanese barberry is present in the adjacent wetland.

Site Selection:

The ideal watershed protection forest is one which best serves the function of the land as a producer of high quality drinking water in both short- and long-term. This forest must be vigorous and diverse in tree species and ages, be actively accumulating biomass and actively regenerating. Such a forest will be ideally suited to be resilient to and quickly recover from small- and large-scale disturbances such as diseases, insect infestations, ice storms and hurricanes.
This area was chosen because it is within the young forest focus area that was chosen for the Wachusett Watershed in the 2017 Comprehensive Land Management Plan (see the CLMP for a full discussion of this topic). This area was chosen because of the relatively large contiguous block of DCR land; the presence of DCR-maintained fields in the area and a timber sale that was conducted in 2006 that included a 12.6 acre early successional habitat overstory removal cut.

Silvicultural Objectives:

The majority of the overstory will be removed in this operation in order to provide regionally important early successional forested habitat. Some live trees will be retained in this area, however. The adjacent 12.6 acre cut serves as a good guide to the level of retention. Trees both singly and in small groups of a variety of species and sizes will be retained throughout the cut area.

Cultural Resources:

This area will be assessed by the DCR Archeologist for both known sites of cultural or archeological importance as well as for potential use by pre-Contact Native Americans.

Wildlife/Rare or Endangered Species:

All DWSP Best Management Practices for wildlife management such as the protection and enhancement of wildlife habitat features will be an integral part of the silviculture and job layout. Diverse hard and soft mast species will be retained and the healthiest trees will be released to improve seed production, which will promote tree seedlings and food for wildlife. Large snags, den trees, logs and nest trees will be retained whenever possible as valuable habitat. No stick nests were observed, but if they are identified in the further steps of this process they will be protected. Where they occur; streams, wetlands, seeps and vernal pools will be protected for water quality and wildlife habitat.

There is one vernal pool in the wetland to the south of this proposed area. It will be protected using the appropriate Best Management Practices.

DCR - Wachusett Reservoir
Timber Lot Proposal WA-19-238

1 inch = 300 feet

Outline of Proposed Area (Working Unit)

DCR Property Lines w/wo walls

Stone walls

Streams

Wetlands

Vernal Pools-Verified

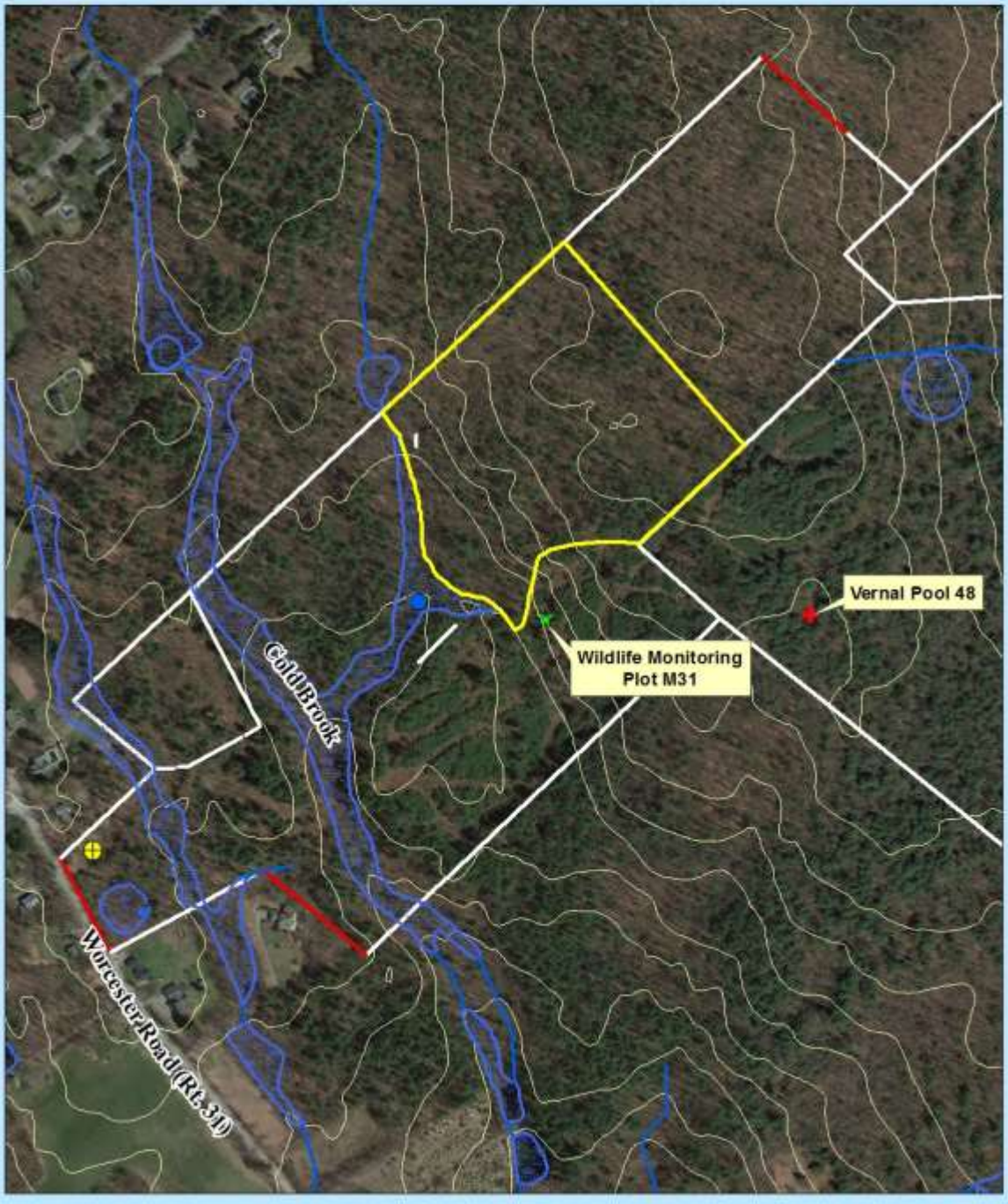
Vernal Pools-Potential

Landing/s

NHESP Priority Habitats (semi-transparent)

DCR Gate/s

0 180 360 720 Feet



Massachusetts Department of Conservation and Recreation

Division of Water Supply Protection, Office of Watershed Management

Forest Management Project Proposal Summary

DWSP Proposal Number: WA-19-241

Site Information

Watershed: Wachusett	**Town(s)**: Boylston
Acres: 68	**Nearest Road:** Cross Street
Natural Heritage Atlas overlap?: No	**Public Drinking Water Supply Watershed?:** Yes
Forest Types: white pine/hardwood, Oak, mixed – dry site	
Soils: Chatfield-Hollis-Rock thin soils, well drained thick Paxton and moderately well drained Woodbridge soils.	
Wetland Resources: French Brook bisects the lot flowing south to north. There is also a large wetland in the southwest corner of the lot.	
Vernal Pools: There is a newly confirmed vernal pool just north of the stonewall that crosses the property in the northern third of the working unit.	

NARRATIVES

General Description/Forest Composition/History:

This property was acquired in two separate chunks, once in 1991 and again in 1995. Unfortunately, prior to dcr ownership this property was a frequent dump site for vehicles, tv's and other household trash using the extensive trail network. The dominant species by far is white pine followed by red oak, black oak, white oak, sugar maple, red maple, pitch pine, gray birch, paper birch, black birch, bigtooth aspen, white ash, black cherry, hickory, blue beech, american beech, hemlock and eastern hophornbeam. The sugar maples are associated with French brook and appear to be old plantings. The oak is dominant in the higher elevations where rock is exposed in some locations with well drained soils. The oak is of average quality for the site. Fortunately, white pine is regenerating very well underneath this oak as the mature pines look of better health and vigor. In the lower elevations white pine is more prevalent, still with a mix of oak and other hardwoods. The white pine is of good quality and there is a greater abundance of hardwoods in the advanced regeneration on the moister soils. This is beneficial, as the oak and other hardwoods show better health on these lower slopes. Even though there are prevalent deer, the viburnum populations (indicator plant) are at good heights. There is heavy storm damage from 1989 along the southern bound and 2009 ice storm damage on the oaks which are still rebuilding their crowns. The property has been cut at different times prior to dcr ownership and are related to the different property owners. The southern area pine stand was thinned and has now resulted in hardwoods, mostly birches, maples, pine and some oaks. These trees are now 2-8" dbh and are starting to create a new age cohort. Unfortunately, the area of the thinning was not very defined and is spread out. The northern area has old signs of small firewood type harvesting and has aided in good pine regeneration.

Regeneration sampling shows that 39% of the plots have adequate regeneration and another 22% have at least marginally acceptable regeneration. This advanced regeneration is comprised of white pine, red oak, red maple, black birch, white ash, black cherry, hickory, blue beech, white oak, American beech, hemlock, eastern hophornbeam and sugar maple. Oak was present in 52% of all plots taken.

Site Selection:

The ideal watershed protection forest is one which best serves the function of the land as a producer of high quality drinking water in both short- and long-term. This forest must be vigorous and diverse in tree

species and ages, be actively accumulating biomass and actively regenerating. Such a forest will be ideally suited to be resilient to and quickly recover from small- and large-scale disturbances such as diseases, insect infestations, ice storms and hurricanes. This site was selected because of the lack of age diversity both in these 68 acres as well as in the 348 DCR-owned acres from which water flows into French Brook and ultimately into the Wachusett Reservoir. This harvest will contribute as much as 13 acres or 33% of young forest towards the ideal protection forest which would have at least 3 distinct age classes of trees distributed throughout this sale area.

Silvicultural Objectives:

Because there is good advanced regeneration spread throughout this working unit, openings will be made accordingly in order to release the advance regeneration. Given that ~75% of the working unit is at a mature age class and none of the working unit is under twenty years old, about 22 acres of openings will occur. After the harvest is complete, the result will be closer to the watersheds ultimate goal of having three distinct age cohorts within each working unit. The species composition will be different in both the white pine stand where hardwoods are regenerating and in the thinner soils where white pine is regenerating under the oaks. Care will be taken to avoid unnecessary release or encouragement of the bittersweet which is located in small areas around the wetlands of the working unit. The operation will focus on creating openings where they are suitable to the topography and have good regeneration.

Cultural Resources:

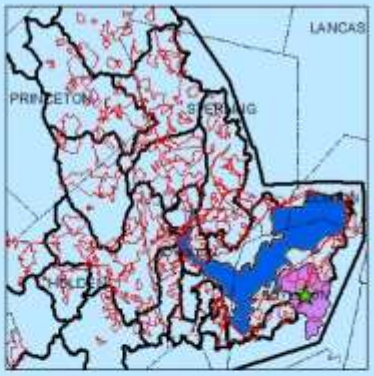
This area will be assessed by the DCR Archeologist for both known sites of cultural or archeological importance as well as for potential use by pre-Contact Native Americans.

Wildlife/Rare or Endangered Species:

All DWSP Best Management Practices for wildlife management such as the protection and enhancement of wildlife habitat features will be an integral part of the silviculture and job layout. Diverse hard and soft mast species will be retained and the healthiest trees will be released to improve seed production, which will promote tree seedlings and food for wildlife. Large snags, den trees, logs and nest trees will be retained whenever possible as valuable habitat. No stick nests were observed, but if they are identified in the further steps of this process they will be protected. Where they occur; streams, wetlands, seeps and vernal pools will be protected for water quality and wildlife habitat.

All vernal pools, whether verified or potential, will be protected using the appropriate Best Management Practices.

DCR - Wachusett Reservoir
Timber Lot Proposal WA-19-241



N
W E
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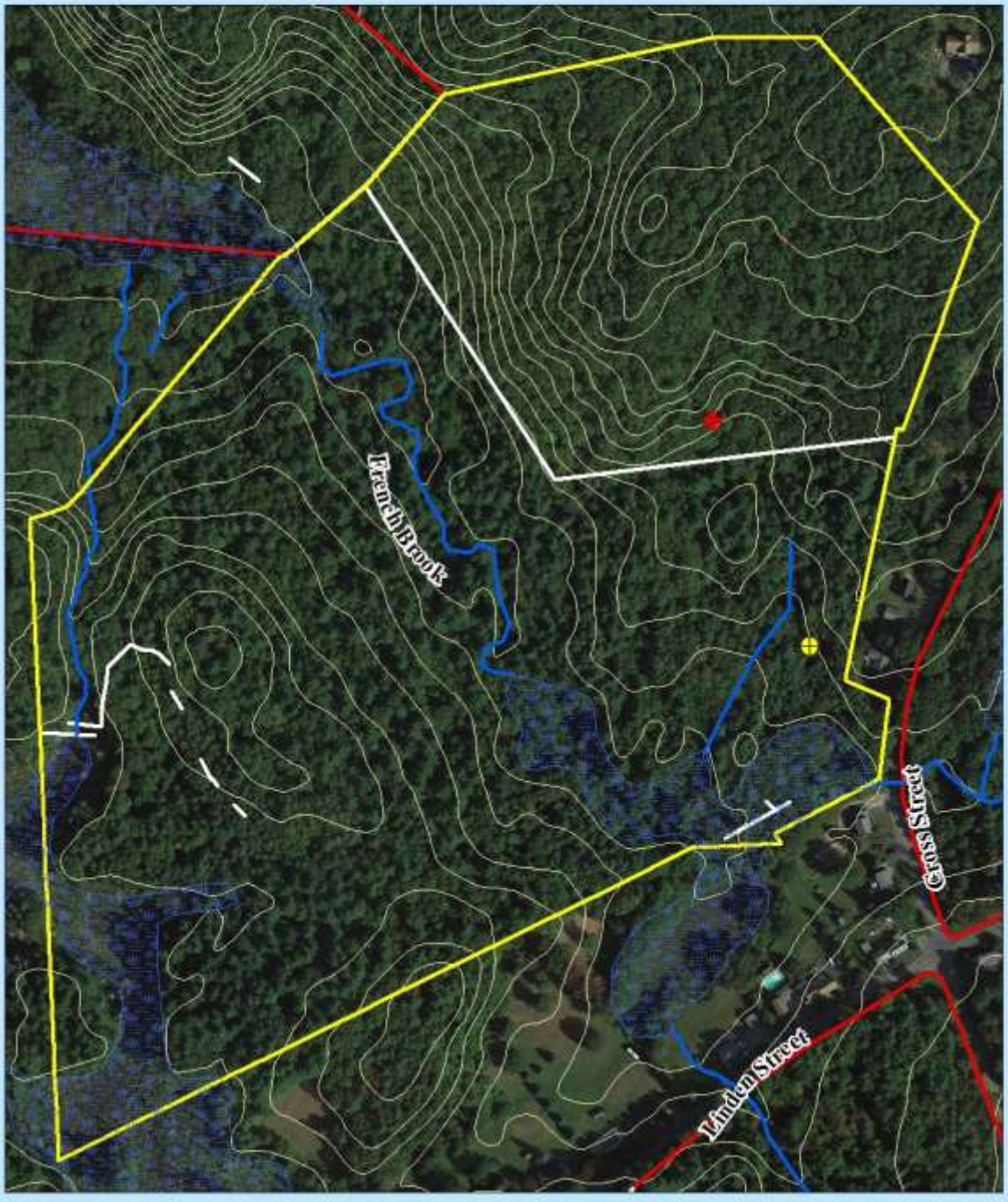
1 inch = 200 feet

Outline of Proposed Area (Working Unit)
DCR Property Lines w/wo walls
Stone walls
Streams
Wetlands
Vernal Pools-Verified
Vernal Pools-Potential
Landing/s
NHESP Priority Habitats (semi-transparent)
DCR Gate/s

0 120 240 480 Feet



Massachusetts Department of Conservation and Recreation

Division of Water Supply Protection, Office of Watershed Management

Forest Management Project Proposal Summary

DWSP Proposal Number: WA-19-250

Site Information

Watershed: Wachusett	**Town(s)**: Princeton
Acres: 88.4	**Nearest Road:** Beaman Road
Natural Heritage Atlas overlap?: No	**Public Drinking Water Supply Watershed?:** Yes
Forest Types: Mixed hardwoods, Oak/hardwoods, White pine/hardwoods	
Soils: Primarily Woodbridge and Paxton tills which are moderately well-drained soils. This is the "extremely stony" variant	
Wetland Resources: A tributary to East Wachusett Brook flows through the middle of this area emanating from a wetland in the north end.	
Vernal Pools: There are no known vernal pools.	

NARRATIVES

General Description/Forest Composition/History:

Most of this area is a mixed hardwood stand comprised of a wide range of species including red oak, red maple, white oak, black birch, paper birch, yellow birch, black cherry, white ash and hickory (both shagbark and pignut) and sugar maple. There's even a bit of black gum in and near the wetland in the north end of the sale area. The oak/hardwood stands are similarly diverse but overall have a greater component of red oak. The understory is highly variable with areas of good advance regeneration, areas dominated by mountain laurel and areas with a variety of understory shrubs such as maple-leaved viburnum and hobblebush along with a variety of ferns.

A regeneration survey shows that there is adequate advance regeneration in 35% of the plots and marginal regeneration in 27% of the plots. There was interfering levels of mountain laurel and/or witch-hazel in 13% of the plots.

Most of this area was logged in the late 1980s prior to state acquisition when it appears a lot of white pine was removed.

There are numerous stone walls throughout this area clearly indicating that this was all once pasture. Based on the age of the forest, one pasture, in the far south end of this sale area was abandoned in about 1920. The forests in the other wall-off pastures originated from 1935 to 1940 following abandonment. The age structure of this management area is as follows: 0%, 0-20 years old; 4% 21-40 years; 0% 41-60 years; 31% 61-80 years; 58% 81-100 years and 7% >100 years old. The oldest stand is the red maple stand in the wetland at the north end of the area…it originated in about 1912.

Site Selection:

The ideal watershed protection forest is one which best serves the function of the land as a producer of high quality drinking water in both short- and long-term. This forest must be vigorous and diverse in tree species and ages, be actively accumulating biomass and actively regenerating. Such a forest will be ideally suited to be resilient to and quickly recover from small- and large-scale disturbances such as diseases, insect infestations, ice storms and hurricanes.

This area was chosen in 2013 along with another site in Holden as part of a long-term paired watershed study. The goal of this study is to test the hypothesis, supported by previous research findings at other North American sites, that DWSP Best Management Practices and harvesting policies are effective in preventing measurable impacts on stream water quality from timber harvesting operations. This site was more recently chosen as the one that would receive treatment in the form of a harvesting operation. The Holden site will serve as the control and so will not be harvested for the duration of this study.

Silvicultural Objectives:

As such, no more than 25% of the total stocking in this subwatershed can be removed in this operation. Openings in the overstory will be made where the advance regeneration is adequate while following the rules for the green retention. A regeneration survey found that adequate advance regeneration was present in 35% of plots with marginally adequate regeneration present in 27% of the plots. Most of these plots are concentrated in the southern and western portion of the sale area which is where the openings will be concentrated as well.

One of the management practices that is being tested in this experiment is that no more than 25% of the total stocking in any subwatershed will be removed in any given 10-year period. The typical subwatershed that this rule is applied to is hundreds to thousands of acres in size and numerous individual management operations take place within any given 10-year period. In this case, this 169 acre subwatershed will represent the typical much larger subwatershed and this single forest management operation will represent several operations spread across time. Normally the goal of our operations is to create a new young age class on about 1/3rd of any given management area assuming there is adequate regeneration present well-distributed throughout the area. Partial cutting may also occur as well on some proportion of the area. In this case, however, the total area regenerated plus the acreage of the partially cut areas multiplied by the fraction of the stocking removed, cannot exceed 25.5 acres which is 25% of the 102 acres that DCR owns in this subwatershed.

With perhaps 20 acres of openings, which is reasonable given the amount and distribution of good regeneration present, partial cutting can occur on up to 16.5 acres if 1/3rd of the stocking is removed in these areas or on up to 11 acres if half of the stocking is removed as in an establishment cut. What will happen is a combination of openings, improvement/thinning cuts and establishment cuts that when all added together, do not exceed the 25.5 prorated acres.

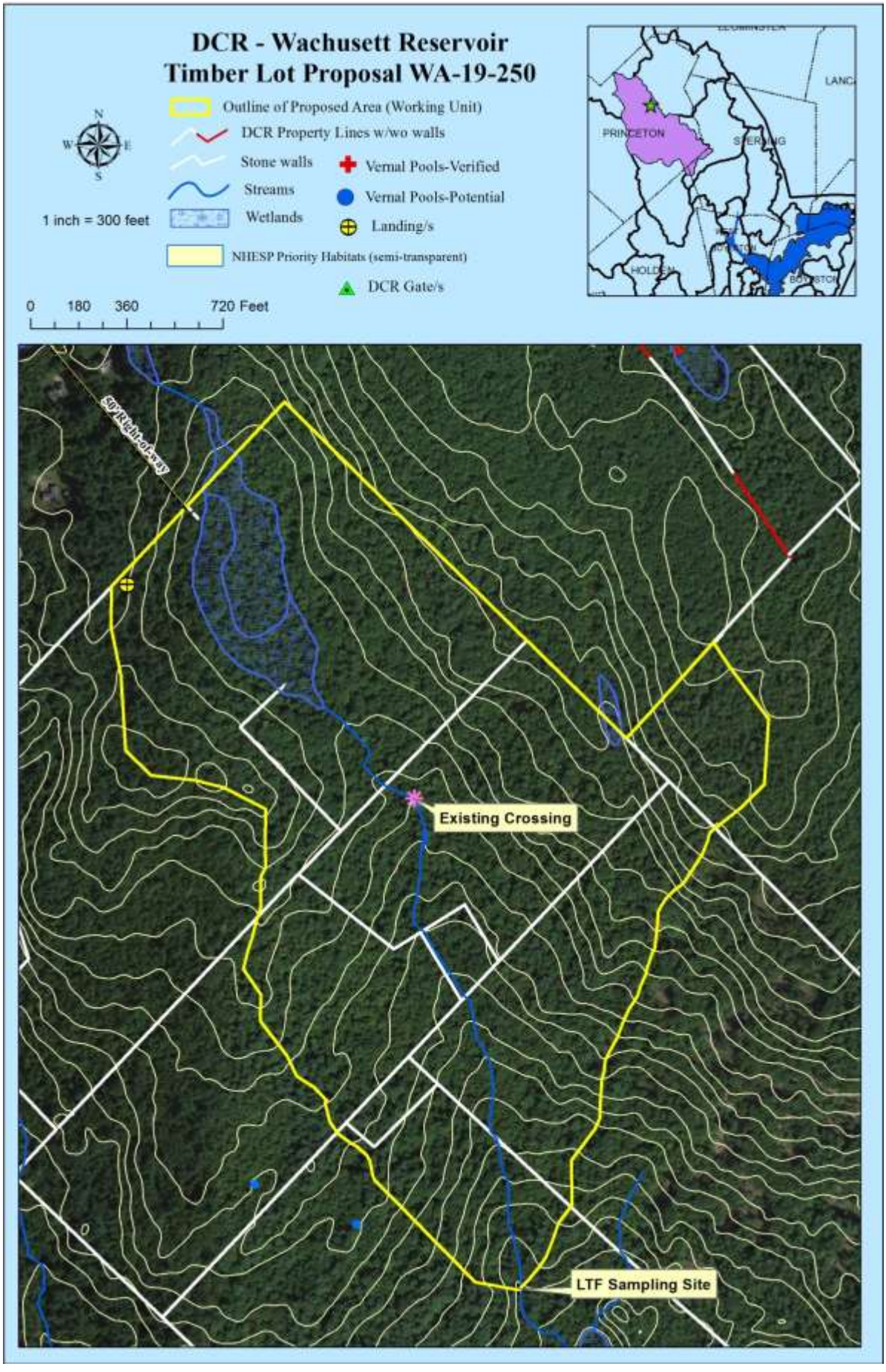
Cultural Resources:

This area will be assessed by the DCR Archeologist for both known sites of cultural or archeological importance as well as for potential use by pre-Contact Native Americans.

Wildlife/Rare or Endangered Species:

All DWSP Best Management Practices for wildlife management such as the protection and enhancement of wildlife habitat features will be an integral part of the silviculture and job layout. Diverse hard and soft mast species will be retained and the healthiest trees will be released to improve seed production, which will promote tree seedlings and food for wildlife. Large snags, den trees, logs and nest trees will be retained whenever possible as valuable habitat. No stick nests were observed, but if they are identified in the further steps of this process they will be protected. Where they occur; streams, wetlands, seeps and vernal pools will be protected for water quality and wildlife habitat.

DCR - Wachusett Reservoir
Timber Lot Proposal WA-19-250



Massachusetts Department of Conservation and Recreation

Division of Water Supply Protection, Office of Watershed Management

Forest Management Project Proposal Summary

DWSP Proposal Number: WA-19-328

Site Information

Watershed: Wachusett	**Town(s)**: Sterling
Acres: 62.3	**Nearest Road:** Justice Hill Road
Natural Heritage Atlas overlap?: No	**Public Drinking Water Supply Watershed?:** Yes
Forest Types: White pine/oak; Mixed oak; Hemlock/hardwood	
Soils: Primarily Chatfield-Hollis-Rock outcrop complex along with some Paxton fine sandy loam, extremely stony, Woodbridge fine sandy loam, extremely stony and the poorly drained Ridgebury fine sandy loam, extremely stony.	
Wetland Resources: A narrow wetland sits at the bottom of the south facing slope and this drains to the southeast into a larger stream which is a tributary of Rocky Brook. A short stretch of Rocky Brook forms the far western boundary of this proposed sale area.	
Vernal Pools: There are no known vernal pools.	

NARRATIVES

General Description/Forest Composition/History:

The area is comprised of three properties purchased by DCR since 2016. The far western parcel shows no signs of having been logged within the past few decades. The primary species in the overstory is red oak along with white oak, black birch, red maple and scattered, large, dominant white pines. Nearer to Rocky Brook there is more yellow birch and white ash. This area is extremely rocky with a decent amount of advance regeneration, which due to the higher stocking of the overstory is far less well developed compared to the rest of the proposed area. The understory is comprised of maple-leaved viburnum, highbush blueberry and striped maple.

The far eastern parcel was logged about twenty years ago prior to DCR acquisition. There is excellent advance regeneration beneath most of the white pine, red oak, white oak and red maple overstory. Many of the white pine, especially in the northern end, are very large, bully trees.

The majority of the proposed sale area is the middle parcel that was purchased in 2017. This area was also logged about 20 years and, as a result, has an excellent understory of advance regeneration comprised of red oak, white pine, red maple, black birch, hickory, sassafras and hemlock. In the higher elevations to the north, there is also a significant component of chestnut oak in the understory. The overstory on the south facing slope is very diverse, comprised of red oak, white oak, chestnut oak, white pine, hemlock, black birch red maple, hickory and sassafrass. Understory shrubs present are maple-leaved viburnum (very tall), lowbush and highbush blueberry, mountain laurel and arrowwood. There is black gum in the wetland at the base of the slope along with red maple, yellow birch and hemlock. On the hill in the southern, narrow part of the sale area, the overstory is dominated by hemlock, red oak, red maple and white pine. Hemlock wooly adelgid is present in this forest and is having a noticeable impact on the health of the hemlock.

Across the entire sale area, sampling found that there is adequate advance regeneration present in 60% of the plots with marginal regeneration in and 17%. Native shrubs are at interferring levels in only 2% of the plots.

The age structure for this area is as follows; 0% 0-20 years old, 0% 21-40 years, 0% 41-60 years, 0% 61-80 years, 62% 81-100 years and 38% >100 years old. The oldest stands in the western end of the area originated in about 1899 making them about 119 years old.

Site Selection:

The ideal watershed protection forest is one which best serves the function of the land as a producer of high quality drinking water in both short- and long-term. This forest must be vigorous and diverse in tree species and ages, be actively accumulating biomass and actively regenerating. Such a forest will be ideally suited to be resilient to and quickly recover from small- and large-scale disturbances such as diseases, insect infestations, ice storms and hurricanes.

This area was selected for management because of the lack of age diversity both in these 62.3 acres as well as in the 2,189 DCR-owned acres from which water flows into Rocky Brook and ultimately into the Wachusett Reservoir. There is no young forest and no forest less than 80 years old while 62% of the forest is between 81 and 100 years old and 38% is more than 100 years old.. This harvest will contribute as much as 21 acres or 33% of young forest towards the ideal protection forest which would have at least 3 distinct age classes of trees distributed throughout this sale area.

Silvicultural Objectives:

One of the management practices that is being tested in this experiment is that no more than 25% of the total stocking in any subwatershed will be removed in any given 10-year period. The typical subwatershed that this rule is applied to is hundreds to thousands of acres in size and numerous individual management operations take place within any given 10-year period. In this case, this 169 acre subwatershed will represent the typical much larger subwatershed and this single forest management operation will represent several operations spread across time. Normally the goal of our operations is to create a new young age class on about 1/3rd of any given management area assuming there is adequate regeneration present well-distributed throughout the area. Partial cutting may also occur as well on some proportion of the area. In this case, however, the total area regenerated plus the acreage of the partially cut areas multiplied by the fraction of the stocking removed, cannot exceed 25.5 acres which is 25% of the 102 acres that DCR owns in this subwatershed.

With perhaps 20 acres of openings, which is reasonable given the amount and distribution of good regeneration present, partial cutting can occur on up to 16.5 acres if 1/3rd of the stocking is removed in these areas or on up to 11 acres if half of the stocking is removed as in an establishment cut. What will happen is a combination of openings, improvement/thinning cuts and establishment cuts that when all added together, do not exceed the 25.5 prorated acres.

Cultural Resources:

This area will be assessed by the DCR Archeologist for both known sites of cultural or archeological importance as well as for potential use by pre-Contact Native Americans.

Wildlife/Rare or Endangered Species:

All DWSP Best Management Practices for wildlife management such as the protection and enhancement of wildlife habitat features will be an integral part of the silviculture and job layout. Diverse hard and soft mast species will be retained and the healthiest trees will be released to improve seed production, which will promote tree seedlings and food for wildlife. Large snags, den trees, logs and nest trees will be retained whenever possible as valuable habitat. No stick nests were observed, but if they are identified in

the further steps of this process they will be protected. Where they occur; streams, wetlands, seeps and vernal pools will be protected for water quality and wildlife habitat.

DCR - Wachusett Reservoir
Timber Lot Proposal WA-19-328

1 inch = 300 feet

- Outline of Proposed Area (Working Unit)
- DCR Property Lines w/wo walls
- Stone walls
- Streams
- Wetlands
- Vernal Pools-Verified
- Vernal Pools-Potential
- Landing/s
- NHESP Priority Habitats (semi-transparent)
- DCR Gate/s

0 180 360 720 Feet