Quabbin Harvest Proposal PE-23-13

Proposal Update, May 2024:

This forestry proposal was originally approved through the public process in 2022. At that time reference was made to salvaging or pre-salvaging planted red pines that were in decline due to fungal pathogens and/or red pine scale. DWSP wishes to clarify that all red pine plantation removals on Division lands comply with long standing DWSP management objectives to convert monoculture conifer plantations to diverse mixes of native tree species. The project was 'paused' along with most other state lands forestry projects as part of the EEA Forests as Climate Solutions Initiative. Following the close of the work of the Climate Forestry Committee, DWSP determined the activities in this proposal align with EEA climate considerations developed from the recommendations in the report issued from the CFC. The proposal language and mapping below are preserved unchanged from that presented to the public in 2022 in ArcGIS Online story map format.

Proposal Goals

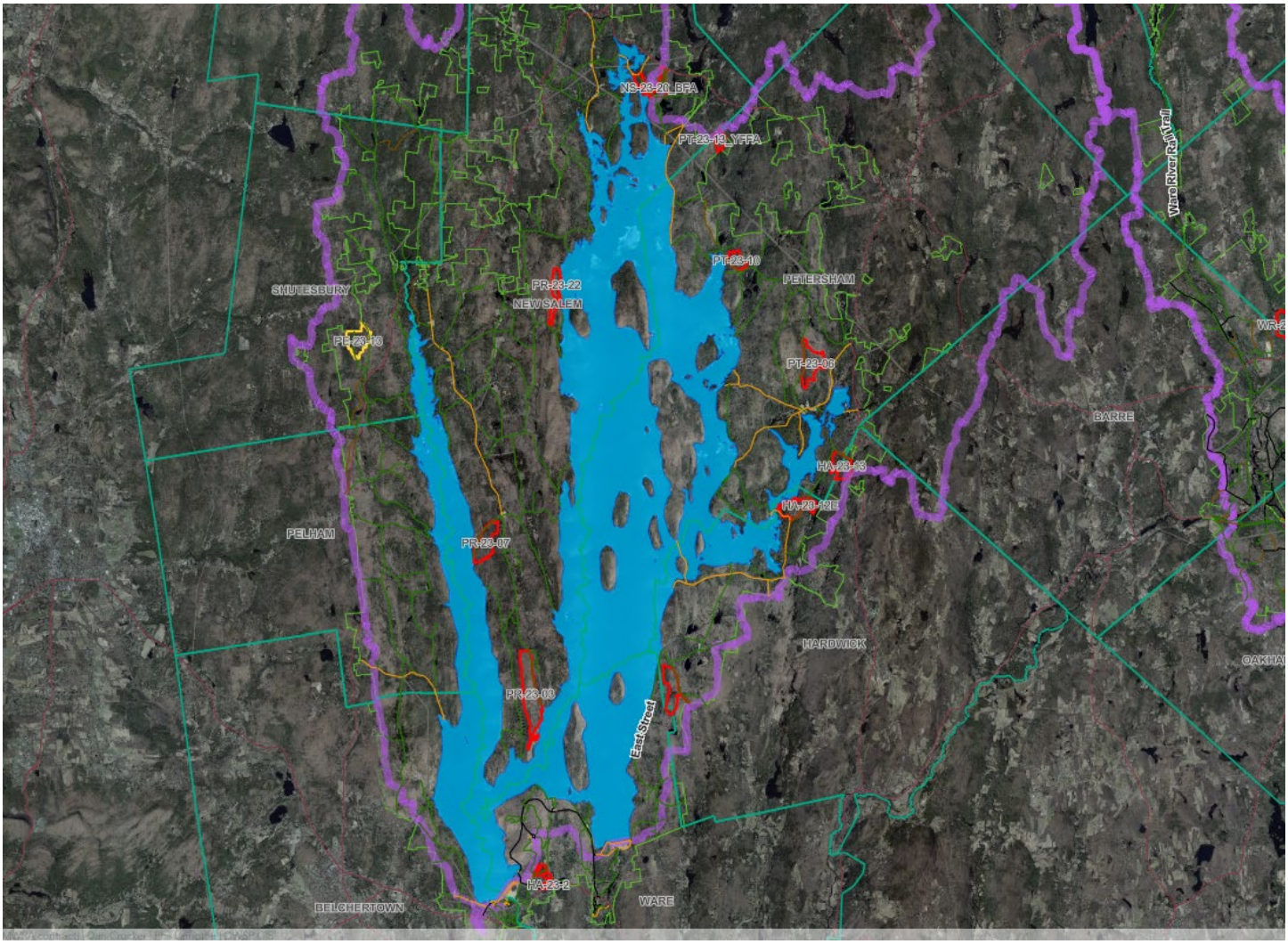
To further the DCR DWSP goals of forest resiliency, this management proposal seeks to promote resiliency through increased age and species diversity. The proposal focuses on recruiting new age classes across all stands, as well as altering the current path towards a more homogeneous forest of black birch, white pine, and red maple.

Proposal Location

(Yellow highlighted polygon in the map) This proposed management area in the town of Shutesbury covers the northern portion of an unnamed hill between Town Farm Road and Town Farm Brook. The northern boundary of this proposal is the DCR property boundary. The western side borders the complex of wetlands and stream channels of Town Farm Brook at the north, and then along the type boundary with a riverine eastern hemlock stand south. This eastern hemlock stand is an excellent example of its type and, given its current good health, is excluded from active management in this proposal. At its southern extent the proposal ends prior to a stand regrowing around the remains of an old homestead, which is currently overrun with Japanese barberry. The southeastern edge follows type and topography back to the top of the slope until descending back down the other side to Town Farm Road at the site of a proposed landing and turn around. The remaining boundary follows Town Farm Road north with the inclusion of a small stand of declining red pine on the eastern side of the road.

Total Acres: 122

Figure 1. Watershed Locus, PE-23-13.



General Description

Overstory Type(s)	Acres
White pine - oak	62.1
Oak - hardwoods	48.4
White pine	4.2
Red pine	3.6
Hemlock	2.2
White pine – hardwoods	1.3

	Understory Type(s)
Dominant	Tree seedlings/saplings dominate site
Secondary	Mountain laurel

Description of forest composition/condition:

This management area consists of eight stands:

Stand One (white pine - oak) covers 56.7 acres across the northern and western sides of the hill. Aside from some areas of ledge near the summit, slopes are mostly 5-15 %. The stand has a mature even aged, white pine-oak overstory averaging 136 ft² per acre basal area with a quadratic mean diameter (a measure of the average diameter slightly more focused on larger trees, abbreviated to QMD) of 16.9” and mean stand density of 140 trees per acre. Eastern white pine and northern red oak dominate the stand, accounting for a quarter of the total basal area each. Red maple, black birch, and eastern hemlock compose the majority of the remainder with small amounts of white ash, white oak, shagbark hickory, sugar maple, American beach, black oak, and paper birch. The American beech present is growing in a few small pockets of several sawlog sized stems and all individuals found were in steep decline due to beech bark disease. While the site is dominated by eastern white pine and northern red oak, that is almost entirely in the larger size classes and dominant canopy position, the smaller size classes are mostly composed of black birch, red maple, and eastern hemlock. Interfering vegetation is low across most of the stand, but there are a few pockets of tall dense mountain laurel, especially in small openings created during the last harvest. This stand has a single recorded previous harvest, Quabbin harvest 84 completed in 1971. This harvest covered the top of the hill, extending half into Stand One. Regeneration is mostly low diversity, black birch, eastern white pine, and eastern hemlock.

Desired Future Condition: A white pine-oak forest stand with a matrix of three distinct age classes. The canopy species composition has a larger portion of the overstory in the secondary hardwood component like shagbark hickory. A forest with a diversified regenerating understory, and smaller diameter midstory, with a reduced dominance by black birch and red maple.

Stand Two is a 48.4 acre oak-hardwoods stand extending northeast to southwest over the top of the hill. Primarily facing an eastern aspect, the stand contains the steepest slopes of the management area and ranges from dry top of slope to more mesic and enriched lower slope. The stand averages 144 ft² basal area and 140

trees per acre with a QMD of 12.2". Northern red oak is nearly a third of the total basal area and is present at all saw log size classes. Eastern white pine is the next most dominant canopy tree, but in terms of total basal area, black birch and red maple are the next largest components with a large portion of total basal area in firewood size classes and lower canopy positions. The remainder of the basal area is in black oak, eastern hemlock, and white oak. There is little evidence of spongy moth related oak mortality in the stand and most of the northern red oak and white oak is of good form and health. The black birch present varies in form, much of it with significant sweep, and a moderate amount of nectria canker across the stand. The red maple similarly is of moderate to low health and quality. Stand Two has the largest amount of dense, tall, extensive mountain laurel patches, presenting a significant impediment to forest regeneration. The entirety of Stand Two was treated during Quabbin harvest 84 in 1971, primarily with a thinning and tending of the northern red oak. This is likely when the black birch and red maple established. The stand currently has two age classes, but the younger age class is almost entirely black birch and red maple. Regeneration is low with evidence of moderate to severe browse levels throughout the stand.

Desired Future Condition: Three distinct age classes in a matrix of group sizes, with group size increasing with decreasing slope position. The canopy species composition is dominated by northern red, black and white oak, with a diverse secondary hardwood component. Mountain laurel present in the two younger age classes is dispersed and not a significant interfering agent.

Stand Three is a 5 acre dry site white pine-oak stand located at the southwest corner of the management area at the top of the slope. The stand carries lower basal area than the rest of the management area, 90 ft^2 per acre, but has a relatively denser black birch understory growing up under the dominant eastern white pine, northern red oak, eastern hemlock overstory. Like Stand Two, Stand Three currently has two distinct age classes, but it's younger age class, established with Quabbin harvest 84 in 1971 is a near monoculture of black birch. Its topographic position at the top of the hill and well-draining soils results in the stand being is somewhat xeric and site index is lower than much of the rest of the management area.

Desired Future Condition: A forest with three distinct age classes, one in two contiguous group, and the second and third in the surrounding matrix. The overstory of the matrix is dominated by northern red oak and eastern white pine, with the smaller black birch component of the middle age class. The youngest age class in groups of mixed northern red oak, black birch, red maple, and eastern white pine.

Stand Four is a 4-acre inclusion in the northwest corner of Stand One. It is an even aged, nearly pure eastern white pine stand, averaging 170 ft^2 per acre a mean density of 74 trees per acre and a QMD of 20.5". More than three quarters of the live basal area is eastern white pine with a very small amount of northern red oak, red maple, black cherry, and black birch comprising the remainder of the stand. There is very little understory present, little regeneration but also very little interfering vegetation cover. There is a scattering of small pole-sized northern red oaks distributed across the stand that are likely a distinct age class from the rest of the overstory. The slope is 5 – 15 % on a western aspect. The eastern half of the stand was part of Quabbin harvest 084 and was likely thinned at that time.

Desired Future Condition: A two aged eastern white pine dominated white pine-oak stand with clustered retention of large legacy eastern white pine. The distinction between Stands One and Five are more diminished.

Stand Five is a 2.2 acre patch of even aged Hemlock – Hardwoods transitioning into an oak-pine stand with continuing hemlock woolly adelgid (HWA) related mortality. The mean stand basal area is 140 ft^2 per acre with a QMD of 15.3" and a stand density of 109 trees per acre. The canopy is dominated by eastern hemlock,

northern red oak, and eastern white pine. The HWA related mortality in the stand is creating small (~ 0.2 acre) gaps in the canopy, though regeneration is still low in the tannic footprint of the eastern hemlock litter. Regeneration is somewhat low under the rest of the dense canopy, but there is eastern hemlock and red maple seedlings present with evidence of moderate browse damage.

Desired Future Condition: Maintained eastern hemlock canopy composed of the healthiest individuals currently present with some regenerating small (< 0.5 acre) gaps placed around HWA related mortality.

Stands 6 & 7 are both red pine stands (2.2 & 1.4 acres) laying on opposite east and west sides of the management area. The stand on the western side likely originated with planting before the taking of Quabbin Reservation while the area was part of Shutesbury Town Forest. This stand contains the one verified vernal pool within the management area within a seep that has evidence of former agricultural use. The red pine stand on the eastern side originated in the plantation efforts of the Quabbin Reservoir establishment. The eastern stand contains the foundations and well of an old homestead. Both stands are collapsing from red pine scale infestation and at the time of inventory more than 50 % of the basal area was dead, or damaged beyond commercial viability. The western stand is beginning to regenerate to eastern white pine red maple, and black birch. Regeneration in the eastern stand is very limited.

Desired Future Condition: A mix of eastern white pine and hardwood species with standing dead red pine snags, but no remaining live red pine standing beyond the regulated area around the vernal pool, and the sensitive areas around the foundations. Town Farm Rd will be more open with fewer large diameter individuals immediately adjacent to the road, with NET blazed trees remaining in place.

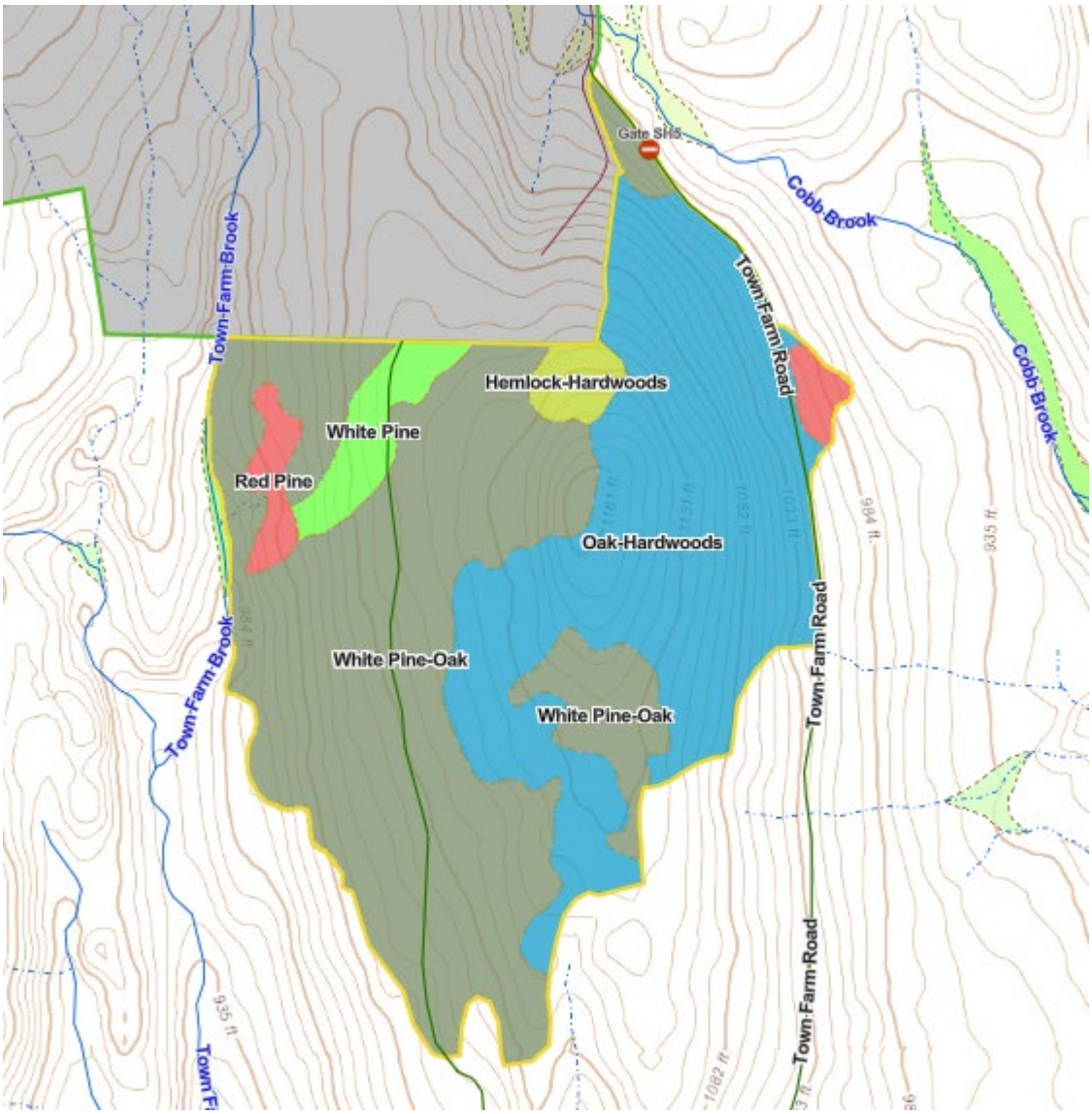
Stand Eight is a 1.3 acre eastern white pine stand. It is a sliver of area between Town Farm Rd and the DCR DWSP property boundary to the west. This even aged, mature forest is dominated by eastern white pine with a small northern red and black oak component, some recently dead large diameter eastern hemlock, and a dense understory of black birch and red maple saplings.

Desired Future Condition: A two aged white pine-hardwood stand with basal area below 100 ft^2 per acre, and only healthy well-formed individuals in the canopy and the hardwood younger age class is dispersed and free to grow. Understory interfering vegetation on operable slopes is short and dispersed.

Assessment of Terrestrial Invasive Species:

Japanese barberry is present around an old homestead adjacent to the southwest corner of the proposed area. An old woods road, which may be utilized during the harvest, runs through the infested area. Control efforts will take place prior to the start of the harvest to reduce spread into the harvested area.

Figure 2. Forest cover types, PE-23-13.



Soils

Drainage Class	%
Excessively Drained	0
Well Drained Thin	0
Well Drained Thick	95
Moderately Well Drained	5
Poorly to Very Poorly Drained	0

Millsite-Woodstock complex soils make up 54% of the lot and primarily compose the hilltop and eastern and southern slopes. USDA NRCS reports site index for northern red oak on the Millsite soils is 60 and oak there is of good form and height. Woodstock soils show a site index advantage for eastern white (55 vs 47). There are smaller inclusions of Millsite-Chicester complex soils (6%), within the pockets of chicester soil eastern white pine has a greater site index than northern red oak (65 vs 55) and similar to the pockets of Woodstock soils these pockets may account for much of the eastern white pine within the oak-pine stands.

The next major component is Henniker sandy loam (29%) on the northwestern slope of the hill. The highest site index here is 75 for eastern white pine, and correspondingly, these soils contain the stands here have the highest white pine composition of the proposal. Chicester fine sandy loam (4%) dominates the toe of the northwestern slopes.

The area where a new landing would be constructed is Metacomet fine sandy loam (4%) and is rated as moderately suited to landing construction. It will need the addition of gravel to create a firm operable landing. The rest of the area is well suited to eastern white pine with a reported site index of 80, but is currently dominated by oak-hardwoods. It's possible that at the scale at which soils surveys are generated, a delineation of the soils may find a continuation of the Millsite Woodstock complex soils, which are similarly rated as moderately suited to landing construction.

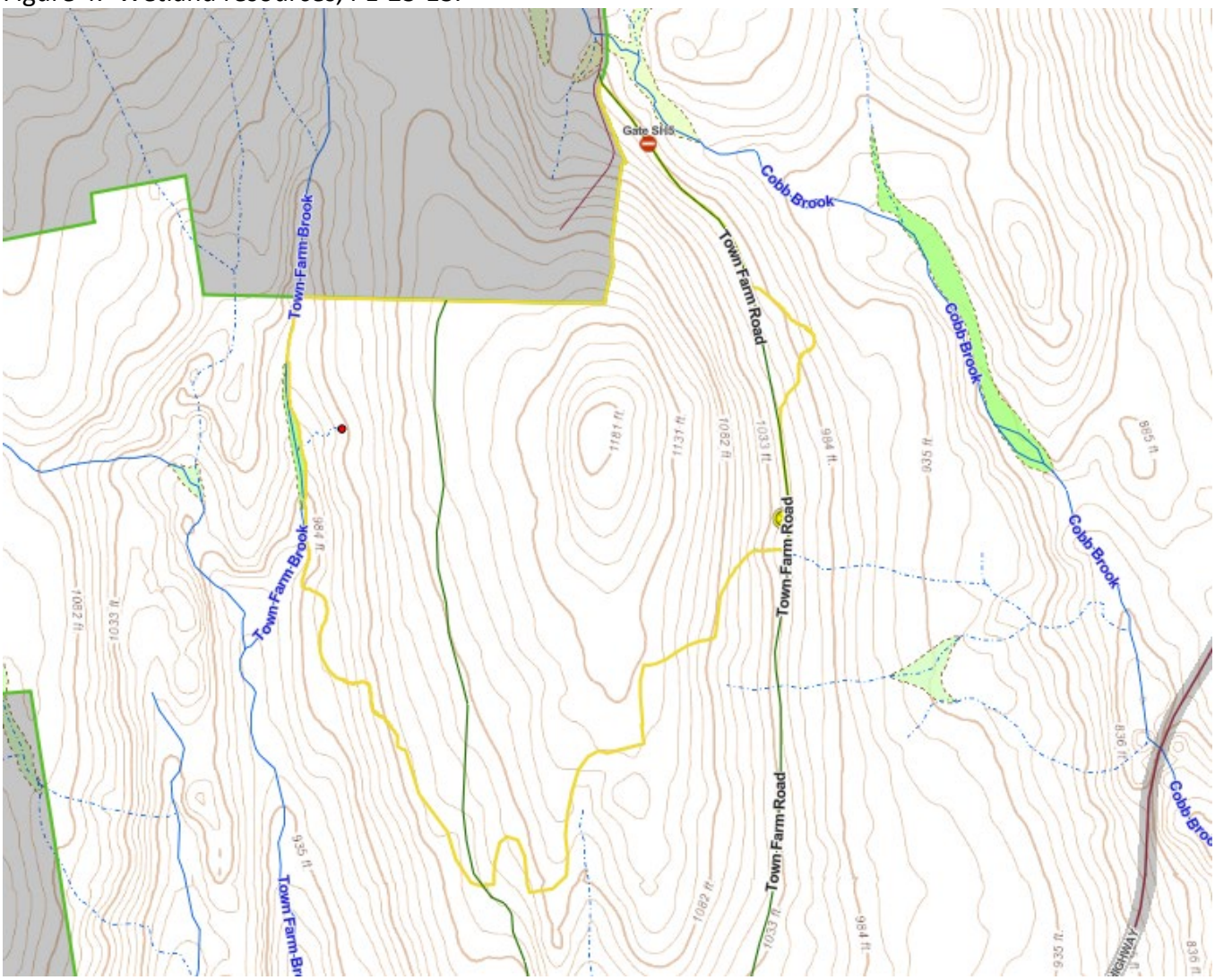
Figure 3. Soil classes, PE-23-13.

Wetlands

- Wetlands present? - **Yes**
- Streams present? - **Yes**
- Vernal pools present? - **No**
- Seeps present? – **Yes**
- Are stream crossings required? - **No**
- Are wetland crossings required? - **No**
- Is logging in filter strips planned? - **Yes** **(Riparian Zone Mgt)**
- Is logging in wetlands planned? - **No**

The proposed area borders Town Farm Brook on the north west side and some accompanying wetlands. As the brook continues south a hemlock stand in good health develops as the slope increases on either side of the brook. This proposed harvest excludes the associated wetlands and the hemlock stand. One new vernal pool was verified.

Figure 4. Wetland resources, PE-23-13.



Silviculture

Acres in Intermediate cuts: **25**
Acres in prep/establishment cuts: **4**
Acres in Regeneration cuts: **38**
Average regen opening size: **1**
Maximum regen opening size: **2**

Description of advance regeneration in proposal area:

During inventory all of the stands showed a mean browse level of impacted or greater. Stand One showed the lowest browse level, Stands Five and Six the highest. Regeneration was of moderate diversity, and generally low density. Mountain laurel presented a significant interference across much of Stand Two.

General comments on silviculture proposed:

Stand One. To Accomplish diversification of this stand's age structure a group selection silvicultural system will be applied to the stand over two harvests. This proposed harvest is the first and will regenerate a 20-40 % of the stand acreage in gaps ranging from ¾ to 2 acres. Edge tree retention will favor healthy well-formed individuals of a broad diversity, but with preference to retention of oaks or hardwoods less common in the stand. Where regeneration is somewhat diverse, gaps will be opened to release it. In the areas of the stand where the previous harvest resulted in small gaps, this proposed harvest will seek to expand that structure with adjacent openings. In the areas of the previous harvest that resulted in dense tall mountain laurel, mechanical treatment will be required. Opportunistic thinning in the matrix will slightly reduce basal area, but a closed canopy will be maintained to reduce the likelihood of releasing black birch seedlings and saplings before the second harvest. Beech in the stand will be treated differently by health; at the time of harvest if a beech is found in good health it will be retained and protected, otherwise beech will be cut to attempt to initiate coppice regeneration. The return harvest is planned for ten years after this proposed harvest. At that time an additional third of the stand will be treated with the same prescription, and the remaining third left thinned at that time but otherwise left to grow in the current age class.

Stand Two. A similar group selection silvicultural system will be applied to Stand Two to diversify its age structure. To maintain the oak dominance group edge retention trees will highly favor healthy codominant oak trees across the oak group. Group size will correlate with slope position with smaller groups (0.5 acre) at the top of the slope, and group size increasing towards the toe of the slope up to 2 acres, based on research on competitive success of northern red oak. The exception will be areas with tall dense mountain laurel. These areas with impeded regeneration will be treated with larger openings (up to 2 acres), and mechanical treatment of the mountain laurel will be required. Some thinning in the matrix will occur at the initial harvest to reduce low quality firewood sized black birch and reduce black birch seed source after harvest. Tall dense mountain laurel in the surrounding matrix will be buffered and avoided at initial harvest to prevent further release. Green tree retention will prioritize oak species to maintain the seed source for future harvests. While prescribed fire is not being considered for this initial harvest, this site could benefit from a post-harvest fire to reduce competition from generalist species after the return harvest in ten years.

Stand Three. To diversify the species composition of the stand across future age classes the removal of firewood sized black birch will be a priority in Stand Three. Establishing a third age class will be accomplished with small gap silviculture focusing on release of any present diverse regeneration. Green tree retention will

prioritize northern red oak. Given the vulnerable slope position, eastern white pine will be a priority for overstory removal, and where retained it will be clustered to reduce windthrow vulnerability.

Stand Four. Establishment of a new age class in Stand Four will be accomplished with a shelterwood system. This initial harvest will reduce the standing basal area to 50 ft² per acre of distributed clusters of eastern white pine to reduce windthrow vulnerability. Where pole sized northern red oak saplings are found, they will be targeted for release and provided more growing space. In ten years at the return harvest basal area should be reduced to 20 ft² per acre retaining the largest diameter eastern white pine.

Stand Five. Given the current trajectory of the stand towards a more similar composition to Stand Two, silviculture in Stand Five will focus on release of existing eastern hemlock in both the overstory and understory. There is evidence that providing eastern hemlock with more sunlight provides some benefit in resisting HWA related death. Retaining this small eastern hemlock stand and promoting eastern hemlock health may allow it to persist long enough for the results of continuing bio control efforts to be better understood. To release the understory eastern hemlock the stand will be treated with intermediate thinning of the poorest quality/health stems in the stand. Eastern hemlock and northern red oak will be priorities for retained overstory. Given the small size of the stand it should be assessed for the health of the retained eastern hemlock, and TSI needs at the return harvest. If the overstory eastern hemlock has continued to decline the stand should be considered for conversion to pine-oak overstory at the return harvest.

Stands Six & Seven. The two red pine stands will be treated with sanitation harvests felling all stand live red pine outside of the regulated buffer surrounding the vernal pool in Stand Six, and especially sensitive areas surrounding the cultural resources in Stand Seven. Since Stand Six is isolated on the western side of the hill standing snags will be left in place. In Stand Seven, which lies closer to Town Farm Road and that segment of the New England Trail, all live and dead red pine which pose a hazard to the public will be felled. These stands should be assessed for TSI needs at the return harvest but will be fully regenerated during this proposal and the continued red pine scale related mortality.

Stand Eight. Given its size, position abutting neighbors, and difficult slopes where it abuts Stand Two, releasing Stand Eights younger age class will be accomplished with heavy thinning to release the existing hardwood regeneration and allow for some treatment of the areas of interfering mountain laurel. The goal will be to reduce basal area below 90 ft² per acre to allow release of the younger age class without a drastic change to the current aesthetic quality of the stand.

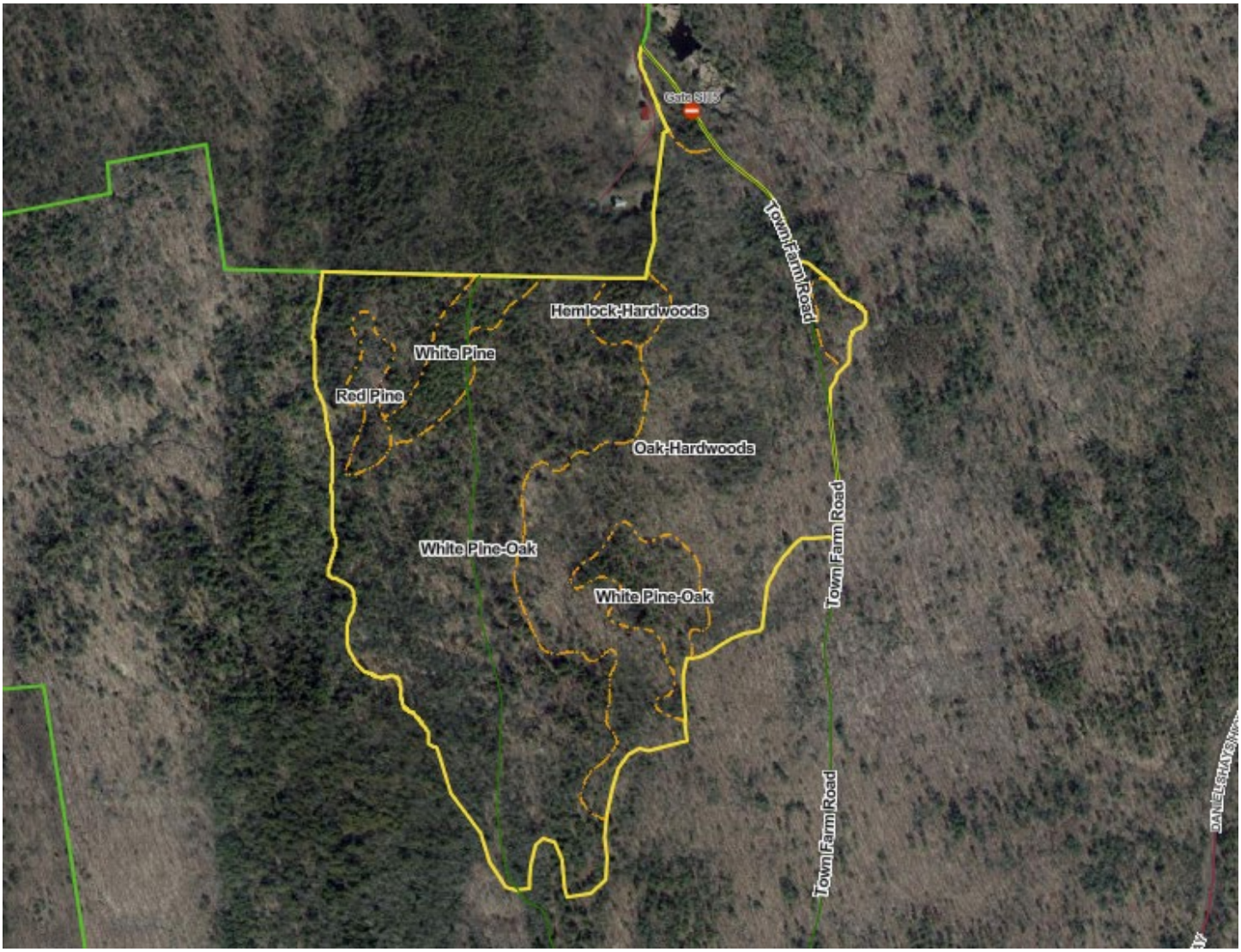
Climate Change considerations:

While carbon management is not the primary goal of DWSP forestry it is an important consideration in our management decisions. The primary carbon related benefit of DWSP management is the carbon resiliency gained from diversifying the age class of this largely even aged forest, and from practices encouraging maintenance or promotion of increased species diversity. Secondary carbon benefits will come from the following practices applied where not interfering with the primary regeneration and structural goals of each stand. The largest diameter individual stems will be prioritized for retention to maintain their standing C stock as these largest individuals hold the most carbon per tree in a stand's above ground stocks.

Except for the red pine stands, and a 100 ft buffer along the New England Trail, dead snags and large diameter down woody debris will be left as is on site (safety allowing). If removal of large diameter pulpwood (~22" dbh) is necessary to accomplish regeneration goals, girdling and allowing the tree to die in place will be the first consideration, with felling in place the second preferred option. Green tree retention across the proposal

will prioritize healthy, well formed individuals most likely to respond to release and persist into the future. Finally, trees with unique wildlife characteristics, such as large cavities, will be a priority for retention.

Figure 5. Orthophoto and cover types, PE-23-13.

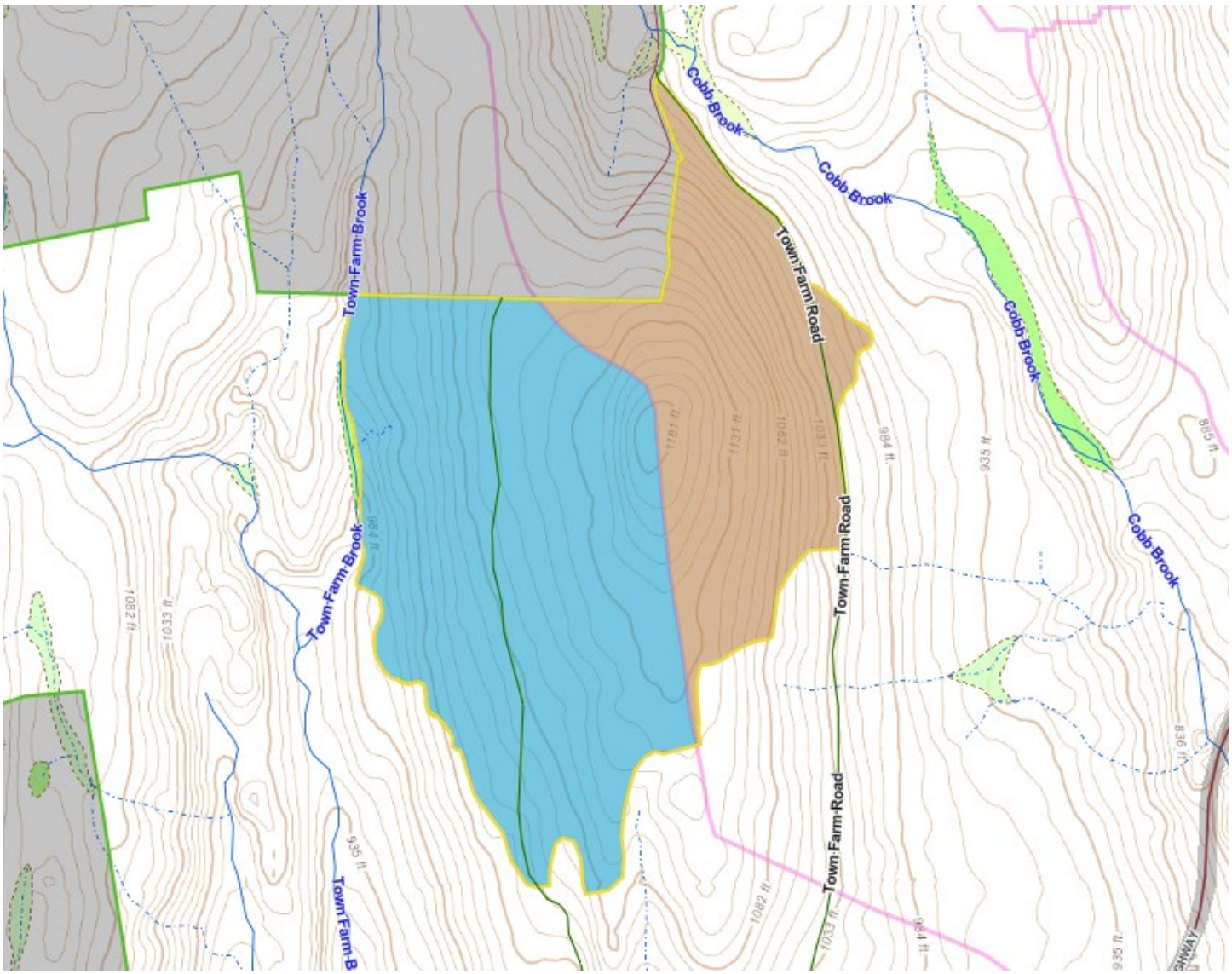


Subwatershed Analysis

Sub-watershed number	Total DCR-owned Acres	Acres Regenerated on DCR Land in the last 10 years	Acres Remaining for Regenerating Up to the 25% / 10 Year	Acres part of this proposal
47 (Atherton Brook)	958	19	220	78
46 (Cobb Brook)	413	3	100	44

Within Sub-Watershed 47, Atherton Brook, Harvest 2037 with 13 acres regenerated within the watershed was completed in 2012 and will likely be more than 10 years old by the time this proposal is harvested.

Figure 6. Subwatersheds, PE-23-13.



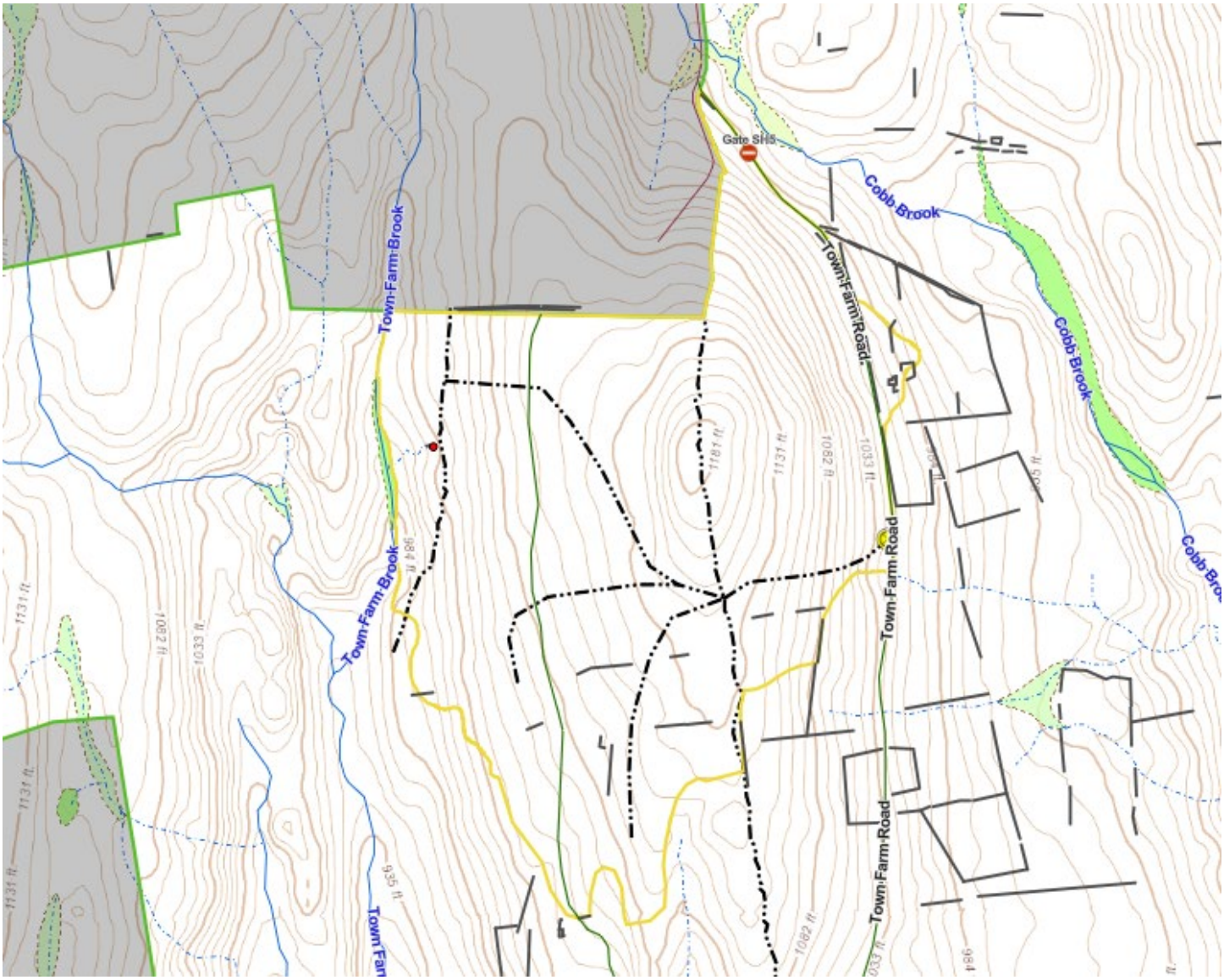
Equipment

Forwarder required: **No**
Feller/processor required: **No**
Steep slopes present: **No**

Comments on harvesting limitations:

The conditions of the proposed harvest area do not require specific limitations.

Figure 7. Harvesting limitations, PE-23-13.

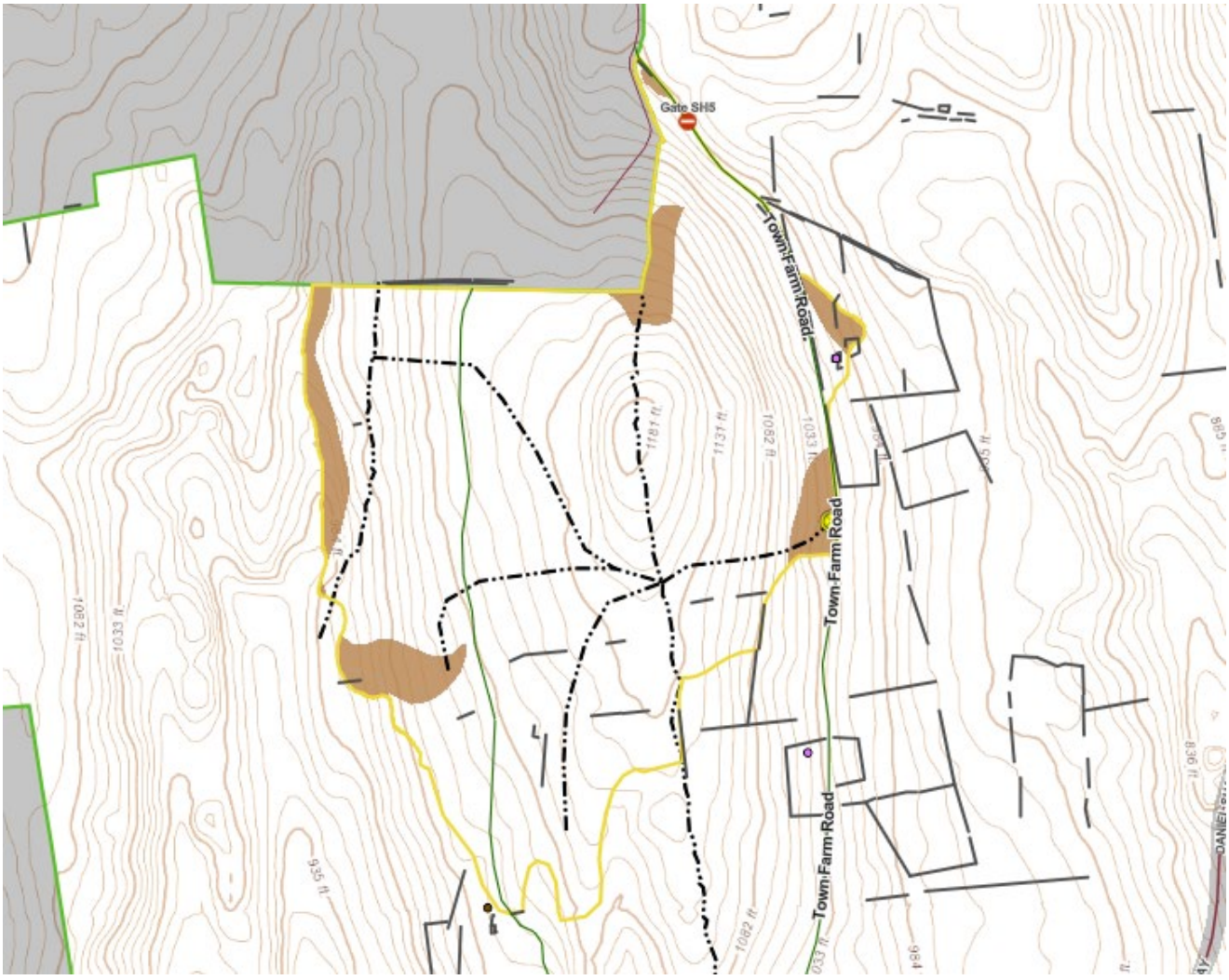


Cultural Resources

Comments on Cultural Resources:

The proposal abuts the area surrounding a known barn (MDC inventory number 446-9) but due to extensive barberry and distance from the proposed landing this area is excluded from the proposal. The small inclusion on the eastern side of Town Farm Road includes the foundations for a dwelling and an accompanying well (MDC inventory number 446-2). The area was included for the harvesting of dying red pine and all foundations and wall will be flagged and protected during harvest. A cellar hole has been found in the southern portion of the proposed area along the cart road on the western side of the hill. A well was found in the northerwestern portion of the proposed area but no foundations or cellar holes were immediately obvious nearby. Stone walls are extensive within the small inclusion on the east side of Town Farm Road, but are otherwise mostly absent from the remainder of the proposed area. For all areas there are adequate existing openings in the walls to allow for operation without needing to create new breaks in the walls. Any above-ground features present within the proposed area will be protected with the implementation of appropriate BMPs.

Figure 8. Stony and Extremely stony soils, PE-23-13.



Wildlife Resources & Rare and Endangered Species

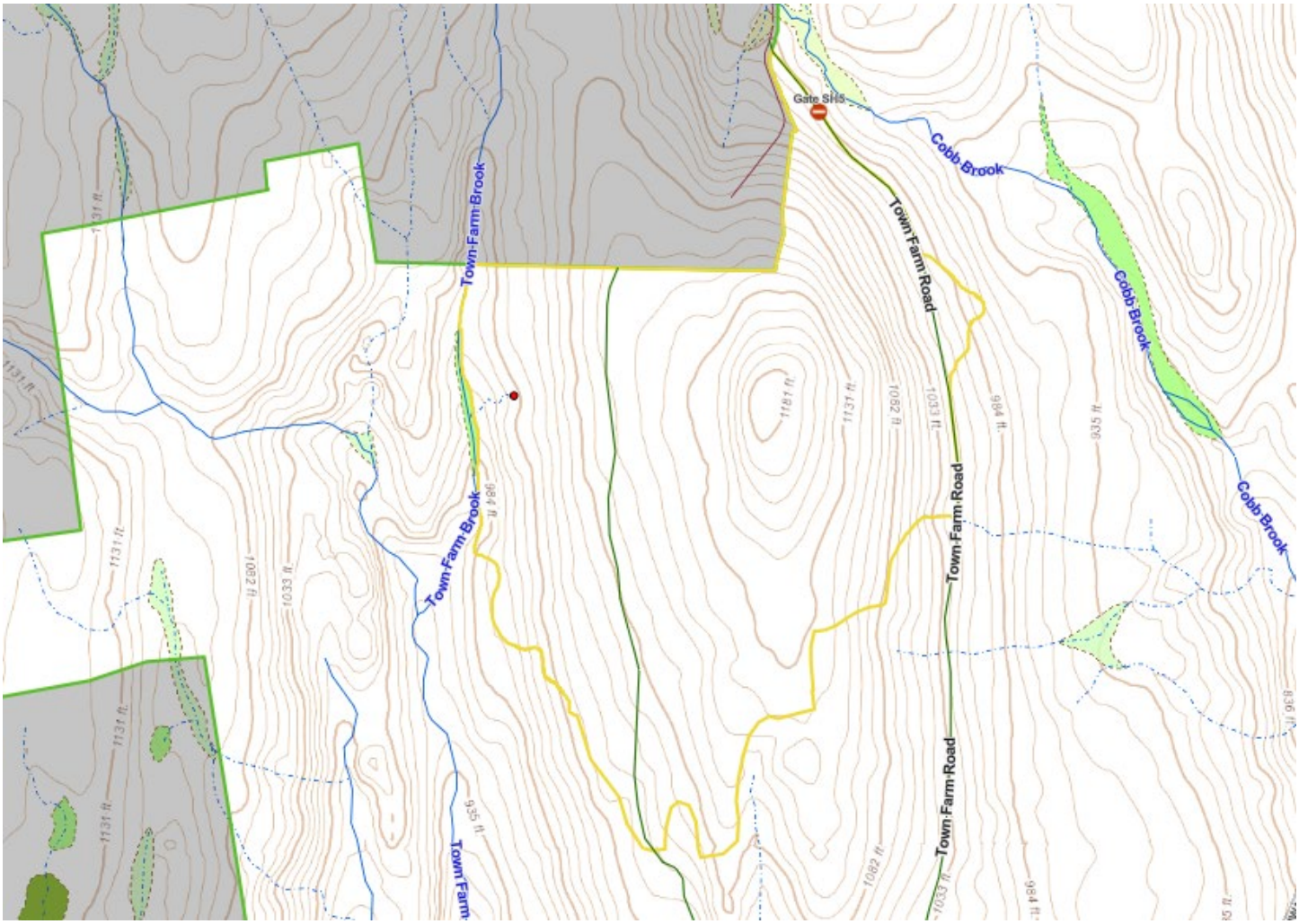
General Wildlife Comments:

Browse was impacted to heavily impacted throughout the proposed area, along with signs of deer and moose scat present throughout.

Comments on Rare Species/Habitats:

No NHESP habitats in the treatment area. Two new vernal pools were identified and confirmed as active. Directly to the west of this proposal is healthy hemlock ravine stand that is being intentionally excluded for preservation.

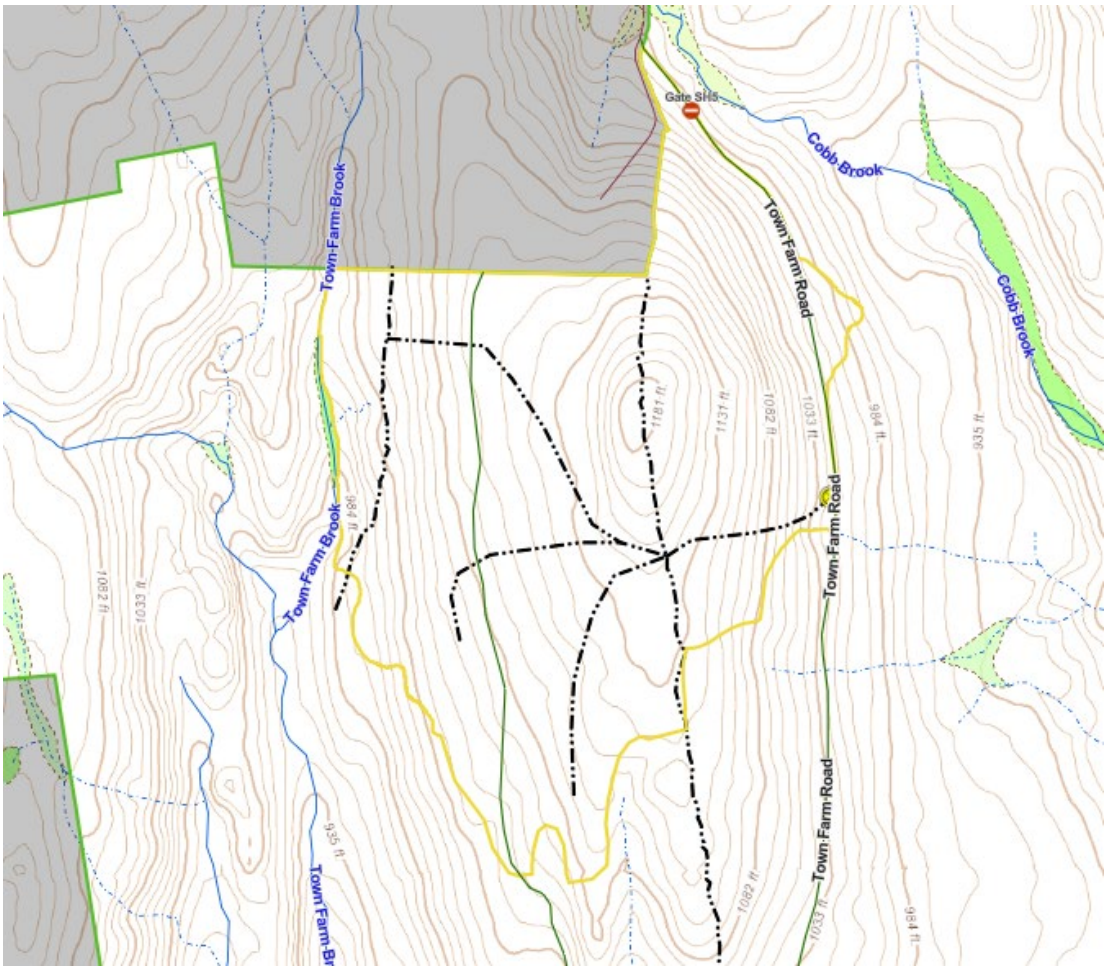
Figure 9. NHESP Priority habitat overlay, PE-23-13.



Environmental Quality Engineering

Comments on EQ Issues:
No stream crossings on this lot.

Figure 10. Access planning, PE-23-13.



Forest Access Engineering

Gravel needed: Yes
Landing work needed: Yes
Culverts needed: Yes
Work needed on permanent bridges: No
Beaver issue: No

Further comment on access needs:

A new landing and truck access is needed on Town Farm Road. To accomplish truck access, work will be needed to improve the intersection of DWSP Town Farm Road and the town managed section of the road to reduce the current steep approach angle. A culvert and material may be needed where the existing town road drainage is. The DWSP section of Town Farm Road to the proposed landing site needs grading and ditch improvement. The proposed landing site will need earthwork and gravel.

Figure 11. DWSP FY 2023 Forestry Proposals – Master Legend for story maps