

DCR-BOFF Forest Management Prescription

Project Name: Echo Lake

Property Name: Wachusett Mountain
State Reservation

Acres: 81.3

Forestry District: Mid State

Forester: Joelle Vautour

Date Proposed: October 10, 2025

Town(s): Princeton

Landscape Designation: Parkland

Rec Complex/District: Wachusett

FOTL/F&P Supervisor: Morrissey/Marble

Approved by: Management Forestry Program Supervisor

Signature: 

Thomas Brulé

Date: 9/03/2026

General Site Description

Acres	Overstory Forest Type	Understory Forest Type	Stand Description
24.1	Overstory: Mixed Softwood Plantation	Understory: American beech, red maple, black birch, northern red oak, yellow birch	Stand 1: Failing mature Norway spruce plantation with occurrences of red pine and eastern larch plantings on former pastureland. Native overstory species include eastern white pine, northern red oak, and black cherry. No evidence of previous forest management.
8.4	Overstory: N/A	Understory: Prunus spp., Vaccinium spp., Viburnum spp., maleberry, other forbs, poison ivy, eastern white pine	Stand 2: Shrubland field containing grasses, forbs, and a diversity of shrubs with small amounts of poletimber sized, open grown eastern white pine.
28.5	Overstory: Northern red oak	Understory: Black birch, red maple, American beech, eastern hemlock, yellow birch	Stand 3: Mixture of mature northern red oak, eastern white pine, red maple, black cherry, and white ash. Naturally regenerated on former pastureland. No evidence of previous forest management.
1.8	Overstory: Oak- Hardwoods	Understory: Eastern hemlock, American beech, eastern white pine, sugar maple, red maple	Stand 4: Forested hedgerow of small sawtimber sized northern red oak with occurrences of white ash, sugar maple, eastern white pine, black cherry, and red maple.
13.2	Overstory: N/A	Understory: Grasses, forbs	Stand 5: Grassland field with occurrences of forbs and woody encroachments, particularly eastern white pine poletimber along the field edges.

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5.3	Overstory: Northern hardwoods	Understory: Grasses, ferns, blackberries	Stand 6: A young forest containing gray birch, black birch, white birch, yellow birch, black cherry, eastern white pine, red maple, sugar maple, white ash, and northern red oak. While originally proposed for management, there will be no management of this stand prescribed at this time.
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Soils and Topographic Features

Acres	Soil Type	Soil Type Code (see Soils Map, page 22)	Drainage Characteristic
20.7	Paxton fine sandy loam, 3-8% slopes	305B	Well drained
8.1	Peru fine sandy loam, 3-8% slopes	360B	Moderately well drained
14.4	Berkshire-Marlow association, 15-45% slopes, extremely stony	901E	Moderately well drained
29.0	Peru-Marlow association, 3-15% slopes, extremely stony	905C	Moderately well drained
9.1	Pillsbury-Peacham association, 0-8% slopes, extremely stony	917B	Very poorly drained

Average Slope Percent: Variable

General Aspect: Varied

Terrain Consistency: Variable

Terrain Position: Multiple

Description of Soils and Topographic Features: Much of the project area is underlain by well drained to moderately well drained glacial till soils. The Pillsbury-Peacham association underlies a stream and bordering vegetated wetlands in the northern portion of the project area. While the topography is generally on a south facing aspect, a small hill with a northwestern aspect also occurs.

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Wetland Features

	Present	Crossing	Work within Filter/Buffer
Wetlands:	Yes	Possible	Possible
Regulated Streams:	Yes	Possible	Possible
Non-Regulated Streams:	Yes	Possible	Possible
Vernal Pools:	No	N/A	N/A
Seeps:	Possible	Possible	Possible

Description of Wetland Features: There are two wetland systems within the project area and one to the east of the project area south of Westminster Road. The wetlands contain native tree species, shrubs, and ground vegetation consistent with hydric soil conditions. Operability will be focused on areas with stable soil conditions. Planning efforts to avoid and minimize impacts to wetland resources, including crossings, will be made. All BMP's will be applied, and hazard tree mitigation will be implemented in resource areas in accordance with Chapter 132 regulations.

Natural Heritage / Wildlife-Habitat Management / Other Resources

Natural Heritage Polygon: No

Natural Heritage Restrictions: No

Restrictions on the Project: N/A

Wildlife Management Opportunities: Yes

Best Practices: Maintain and enhance habitat for SWAP species, particularly migratory songbirds

Additional Habitat Management: Yes

Habitat Type: Shrubland and grassland

SWAP: Yes

ACEC: No

BIO Map2: No

Public Water Supply: Yes

Additional Detail: Maintaining hard and soft mast species is important for providing a diversity of wildlife food sources into the future. Additionally, diversifying structure will create nesting and foraging habitat for a variety of migratory songbird and mammal species. Applying an uneven aged management approach will maintain young forest on the landscape. It may be beneficial to implement larger openings in adjacent stands in future projects to maintain and enhance habitat opportunities for SWAP species.

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Forest Health / Invasive Species

Forest Health Concern: Yes

Species Affected: American beech, white ash, eastern hemlock

Management Considerations: Beech leaf disease and beech bark disease are affecting American beech, hemlock is infested with hemlock woolly adelgid and hemlock elongate scale, and white ash is infested with emerald ash borer. Management will focus on maintaining any healthy American beech, white ash, and eastern hemlock to maintain a genetic presence on the landscape. Prescribed silviculture is intended to increase species diversity and structural complexity, which will increase forest resiliency to future disease and pest outbreaks. High risk species within two tree lengths of any infrastructure will be assessed for potential future hazards and possibly removed to mitigate future hazard conditions.

Plant Invasive Species Present: Yes

Species Present: Autumn olive, burning bush, multiflora rose, Japanese knotweed

Management Considerations: Current infestations are isolated and mapped and densities remain low currently. To control further spread, a combination of mechanical and chemical control will likely occur, and management practices will be implemented outside of the mapped areas.

Insect Invasive Species Present: Yes

Species Present: Emerald ash borer, hemlock woolly adelgid, beech leaf disease, beech bark disease

Management Considerations: See above.

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Infrastructure / Recreation/ Aesthetics

Access Road: Forest road off Westminster Road, Administration Road

Condition: Fair - Good

Existing Landing: No

Ownership: DCR

Road Repair/Upgrade: Yes

Landing Repair/Upgrade: Yes

Project Access and Landing Site: Landings will be in the fields of stands 2 and 5. Some road upgrades will be required to access stand 2. A landing will likely be required off Administration Road. Ultimately, landing locations will be determined at the time of Forest Cutting Plan filing.

Existing Skid Trail Network: No

Pre-Harvest Repair/Upgrade: Possible

Skid Trail Network Description: There are no pre-existing skid trails in the project area.

Shared Infrastructure: Yes

Road/Trail Names: Administration Road, Echo Lake Trail, Echo Lake Road

Management Considerations: The project area surrounds a large portion of the Echo Lake Trail and abuts Administration Road, two heavily recreated sites at the property. Hazard tree mitigation, outreach, and education regarding the project, including trail closures, will be necessary.

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Silviculture

Acres	Silviculture Type	Silviculture Description
52.6	Individual Selection and Group Openings (Variable Retention Thinning)	Stands 1 and 3. Group openings up to 2 acres in size, mimicking natural disturbance, and optimizing growing conditions to achieve maximum species diversity. Individual tree selection will be implemented between group openings. Reserve areas within the stand will be implemented.
8.4	Mowing	Stand 2. All woody stems larger than 1" DBH will be harvested and removed from the field. A periodic mowing regiment will be established post-harvest to optimize maintenance of this field as a shrubland.
1.8	Clearcut	Stand 4. All woody vegetation greater than 1" dbh will be harvested and removed from this stand to increase the connectivity and habitat potentials between both sections of stand 5 that are adjacent.
13.2	Mowing	Stand 5. All woody stems larger than 1" DBH will be harvested and removed from the field. A periodic mowing and/or prescribed fire regiment will be established post-harvest to optimize maintenance of this field as a grassland.

General Comments on Silviculture Proposed: Species diversity will be maintained in stands 1 and 3 during field work for harvest preparation. Future management techniques should continue moving these stands from an even aged to an uneven aged structure. Overstory trees that exhibit poor form, vigor and resiliency to more frequent and intense natural disturbances should be focused for removal. Reserving large mast producing trees and/or snags for wildlife habitat and carbon storage will be considered.

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Climate Adaptation and Carbon Considerations

Action Type	Identified Issue	Action Description
Resilience	Homogenous, even aged overstory of mature species that lacks vegetative diversity and has a low adaptive capacity in the face of climate change.	Diversification of species composition and structure will create more resilient conditions by increasing the sites adaptive capacity in the face of climate change. Transition current conditions to an uneven aged heterogenous structure by mimicking natural disturbance patterns over time.

Adaptive Management Strategies: Per the Response to the Report of the Climate Forestry Committee: "Focus active management for resilience on areas...most at risk and in need of ecological restoration/climate resilience such as plantation monocultures"; Promote a diversity of tree species and age classes across the project area to increase resiliency to climate change, facilitate natural regeneration of native species, and enhance habitat opportunities as identified in the Massachusetts SWAP.

Climate Change Considerations

Activities proposed	Alignment of Activity with Climate Oriented Strategies and Recommendations
Full overstory removal, partial stand, variable retention harvesting in stands 1 and 3 will focus on increasing species diversity and structural complexity.	Variable retention (VR) is a regeneration technique based on natural disturbance ecology that retains important biodiversity components of the stand during the harvest to meet habitat objectives. The retained components include a diverse species mix of live and dead trees in a range of diameters with an emphasis on the larger sizes, cavity trees, and large snags and logs of different decay stages. These are in a patchwork pattern across the stand from single trees to large groups measured in acres. • This practice more closely aligns with natural disturbance patterns. • Promotion of a diversity of age classes, species composition and structural diversity enhances overall forest resiliency. • More carbon is left on the landscape for longer periods, in live trees, snags, and coarse woody material while regeneration develops. • Improving conditions for a wide variety of local wildlife through the creation of temporary young forest habitat.

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	• Maintenance of continuous forest corridors provides for wildlife habitat connectivity. • As part of a regeneration system this method can be used to help guide species diversity towards more future-adapted mixes.
Full overstory removal, complete stand, plantation conversion to native species within stand 1, to convert the softwood plantation to a native forest ecosystem.	Long considered a critical practice on agency lands to improve biodiversity and forest resilience, the conversion of single-species conifer plantations to more diverse mixes of native species has recently been encouraged as a climate-smart practice by NIACS and other climate adaptation experts. Tree monocultures, intensively managed throughout the world to produce much of the wood we all use, are highly vulnerable to the kinds of pest and disease impacts that are likely to worsen as climate changes. Conversion of monoculture plantations aligns with many climate-smart forestry practices highlighted in the CFC report, including but not limited to: • Improving resistance to pests and pathogens. • Increasing resiliency by promoting diversity of plant species. • Providing age class/structural diversity. • Improving conditions for a wide variety of local wildlife through the creation of temporary young forest habitat. • Promoting future-adapted tree species in the regeneration mix.
Tree mowing & mulching within stands 2 and 5	Mowing and mulching are used to perpetuate both non-forest (grasslands) and young sapling forest conditions within a given footprint on the landscape. This practice resets the development of a stand that has grown out of the sapling stage to provide critical habitat in the absence of localized natural disturbances such as flooding or fire. Is an important practice for maintaining young aspen stands that support species of greatest conservation need. • Recommended as one type of climate-smart alternative for young forest habitat. • Aligns with carbon objectives versus

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	harvesting mature forests. Can be prohibitively costly to implement.
Habitat restoration and maintenance prescribed fires -- heath, shrubland, woodland, or grassland within stand 5	Prescribed Fire is the planned use of fire in a particular place and time, under established conditions and safety requirements to accomplish resource management goals. • Prescribed fire improves habitat for a variety of wildlife and native plants and restores natural communities dependent on fire. • In fire-influenced natural communities, fragmentation of the landscape and the suppression of fires (prescribed or natural) leads to accumulation of volatile surface, mid-story, and canopy vegetation hazardous fuels. • Excessive fuel buildup negatively impacts the habitat quality of the natural community and may eventually lead to an unplanned, catastrophic wildfire. • Prescribed fires that reflect natural return intervals increase below-ground carbon storage and sequestration. The consequences of catastrophic wildfires include: • The release of large amounts of carbon. • Kills trees. • Causes severe soil, duff, and below ground vegetation impacts. • May alter soil chemistry. • Threaten firefighter safety, human communities, and property damage. • May volatilize and release soil carbon. • Cause severe smoke impacts within a large airshed.

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Stand Exam Data

Stand 1 Data Synopsis:

Acres: 24.1

Overstory: Mixed Softwood Plantation

Understory: American beech, red maple, black birch, northern red oak, yellow birch

Estimated CWD (ft³/acre): 2,242

Median Stand Diameter (in): 12.8

Estimated Relative Density: 96

Stand 1 Data Tables and Descriptions:

Table 1A: Stand 1 Volume Estimates

Species	Sawlog Bf/Acre	Pulp Cords/Acre	Sawtimber Mean Ht (logs)	Total Bf (Stand)	Total Cords (Stand)	Topwood Cords (Stand)
Eastern white pine	8,407	6.53	2.1	202,600	157.4	74
Red maple	-	1.12	-	-	27.0	-
Black cherry	-	-	1.0	-	-	-
White birch	777	-	-	18,733	-	-
Black birch	-	1.05	-	-	25.3	-
Northern red oak	1,458	1.63	1.5	35,142	39.4	19
Norway spruce	4,127	2.47	1.6	99,449	59.5	64
Total	14,769	12.80	-	355,924	308.5	157

Table 1A represents volume estimates for Stand 1 by overstory tree species and product type

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Table 1B: Stand 1 Stocking Information

Species	Total Trees/acre	Total BA/acre	% BA/acre by Spp	Quadratic Mean Diameter	Relative Density	% AGS
Eastern white pine	118.0	100.0	50%	12.5	37.9	60%
Red maple	23.6	6.7	3%	7.2	5.9	100%
Black cherry	10.6	6.7	3%	10.7	5.4	0%
White birch	11.9	6.7	3%	10.1	0.0	100%
Black birch	23.9	6.7	3%	7.2	5.9	0%
Northern red oak	37.1	20.0	10%	9.9	18.0	100%
Norway spruce	92.4	53.3	27%	10.3	20.2	75%
Total	317.5	200.0	100%	10.7	93	67%

Table 1B: Table 1B represents stand stocking information for Stand 1 by overstory tree species as calculated in trees per acre, basal area per acre, quadratic mean diameter, and relative density.

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Table 1C: Stand 1 Regeneration Estimate

Species	Size Class 1	Size Class 2	Size Class 3	Size Class 4	Total Count/Acre
Northern Red Oak	1,000.00	-	-	-	1,000.00
Red maple	833.33	-	-	-	833.33
Black birch	-	-	166.67	-	166.67
Estimated Total Per Acre	1,833.33	-	166.67	-	2,000.00

Table 1C: Table 1C represents an estimation of understory tree regeneration for Stand 1 by species and size class.

Table 1D: Stand 1 Understory Vegetation Estimate

Species	Avg % Cover	# Plots Observed	% Plots Observed
Canada mayflower	17.50	5	83.33
Cinnamon fern	18.83	3	50.00
Hay scented fern	11.67	1	16.67
Wild sarsaparilla	1.33	2	33.33
Wood fern	10.00	1	16.67
Starflower	2.00	2	33.33
Hawthorn	0.33	1	16.67
Poison ivy	2.50	1	16.67
Estimated Total Percent Cover	64.16		

Table 1D: Table 1D represents an estimation of understory vegetation for Stand 1 by species and average percentage of plot coverage.

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Stand 3 Data Synopsis:

Acres: 28.5

Overstory: Northern red oak

Understory: Black birch, red maple, American beech, eastern hemlock, yellow birch

Estimated CWD (Ft³/Acre): 176.1

Median Stand Diameter (in): 12.0

Estimated Relative Density: 134

Stand 3 Data Tables and Descriptions:

Table 3A: Stand 3 Volume Estimates

Species	Sawlog Bf/Acre	Pulp Cords/Acre	Sawtimber Mean Ht (logs)	Total Bf (Stand)	Total Cords (Stand)	Topwood Cords (Stand)
Eastern white pine	3,192	1.34	1.8	90,983	38.3	50
Red maple	1,340	11.09	1.0	38,194	316.1	39
Northern red oak	4,323	1.69	1.5	123,192	48.3	67
Norway spruce	805	-	-	22,943	0.0	-
Total	5,489	14.13		275,312	402.7	157

Table 3A represents volume estimates for Stand 3 by overstory tree species and product type.

Table 3B: Stand 3 Stocking Information

Species	Total Trees/acre	Total BA/acre	% BA/acre by Spp	Quadratic Mean Diameter	Relative Density	% AGS
Eastern white pine	38.8	32.0	18%	12.3	12.4	75%
Red maple	181.7	80.0	45%	9.0	68.1	50%
Northern red oak	91.4	48.0	27%	9.8	44.0	100%
Norway spruce	13.9	8.0	5%	10.3	3.3	100%
Apple	14.7	8.0	5%	10.0	0.0	0%
Total	340.4	176.0	100%	9.7	128	68%

Table 3B represents stand stocking information for Stand 3 by overstory tree species as calculated in trees per acre, basal area per acre, quadratic mean diameter, and relative density.

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Table 3C: Stand 3 Regeneration Estimates

Species	Size Class 1	Size Class 2	Size Class 3	Size Class 4	Total Count/Acre
Red maple	1,000	-	-	-	1000
Northern red oak	16,600	-	-	-	16,600
Eastern white pine	600	-	-	-	600
Total	18,200	-	-	-	18,200

Table 3C represents an estimation of understory tree regeneration for Stand 3 by species and size class.

Table 3D: Stand 3 Understory Estimate

Species	Avg % Cover	# Plots Observed	% Plots Observed
Low bush blueberry	5.00	3	60.00
Hay scented fern	22.00	3	60.00
Partridgeberry	1.40	1	20.00
Wild sarsaparilla	0.60	1	20.00
Cinnamon fern	1.00	1	20.00
Canada mayflower	1.80	2	40.00
Starflower	1.60	2	40.00
Lycopodium spp.	1.00	1	20.00
Dewberry	0.60	1	20.00
Maleberry	1.00	1	20.00
Estimated Total Percent Cover	36%		

Table 3D represents an estimation of understory vegetation for Stand 3 by species and average percentage of plot coverage.

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Stand 4 Data Synopsis:

Acres:1.8

Overstory: Oak-hardwoods

Understory: Eastern hemlock, eastern white pine, sugar maple, red maple, American beech

Estimated CWD (Ft³/Acre): 44.8

Median Stand Diameter (in): 24

Estimated Relative Density: 65

Stand 4 Data Tables and Descriptions:

Table 4A: Stand 4 Volume Estimates

Species	Sawlog Bf/Acre	Pulp Cords/Acre	Sawtimber Mean Ht (logs)	Total Bf (Stand)	Total Cords (Stand)	Topwood Cords (Stand)
Eastern white pine	4,503	-	1.1	8,105	-	10
Northern red oak	3,002	1.77	-	5,404	3.2	-
Total	7,505	1.77		13,509	3.2	10

Table 4A represents volume estimates for Stand 4 by overstory tree species and product type.

Table 4B: Stand 4 Stocking Information

Species	Total Trees/acre	Total BA/acre	% BA/acre by Spp	Quadratic Mean Diameter	Relative Density	% AGS
Eastern white pine	8.6	26.7	29%	23.9	8.6	100%
Northern red oak	20.9	66.7	71%	24.2	56.4	80%
Total	29.5	93.3	100%	24.1	65	86%

Table 4B represents stand stocking information for Stand 4 by overstory tree species as calculated in trees per acre, basal area per acre, quadratic mean diameter, and relative density.

Table 4C: Stand 4 Regeneration Estimates

Species	Size Class 1	Size Class 2	Size Class 3	Size Class 4	Total Count/Acre
American beech	-	-	333	333	666
Eastern white pine	-	333	-	-	333
Northern red oak	11,000	-	-	-	11,000
Red maple	333	-	-	-	333
Black birch	666	-	-	-	666
Totals	12,000	333	333	333	13,000

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Table 4C represents an estimation of understory tree regeneration for Stand 4 by species and size class.

Table 4D: Stand 4 Understory Estimate

Species	Avg % Cover	# Plots Observed	% Plots Observed
Canada mayflower	2.00	2	66.67
Wood fern	16.67	1	33.33
Estimated Total Percent Cover	18.67%		

Table 4D represents an estimation of understory vegetation for Stand 4 by species and average percentage of plot coverage.

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Marking Instructions

Project Level: Paint project boundaries with triple marks. Main equipment trails designated with yellow paint and flagging.

Stand/Type: Stands 1, 3, 4: cut tree mark (blue paint). Horizontal bands for sawtimber trees, slash for pulpwood and firewood trees, "X" for hazard trees along trails. Retain species diversity.

Permit Requirements / Opportunities

Restrictions	Description
Seasonal: No	None
Equipment: Possible	To be determined
Recreation: Yes	There will be an impact on recreation during active management. Collaboration with DCR Operations and DCR Trail staff will be required.
Green Docket: No	No permitting requirements needed outside of Chapter 132 Forest Cutting Plan
In-kind Services: Possible	Possible additions of stone or gravel to improve current and future access

Potential Local Economic Benefits: Local economic benefits include, timber harvesters, machine servicing (welders, hose manufacturers), fuel and trucking, local wood producers, mill owners and workers, contractors, builders, and natural resources professionals, among others. The sale of forest products within the community helps underserved and rural economies in many ways. Historically, firewood that is harvested in this region of Massachusetts remain local and is sold and processed by local businesses to sell to local homeowners. Road and trail improvement services utilize local resources when hauling and/or the spreading of material is required.

Attachments:

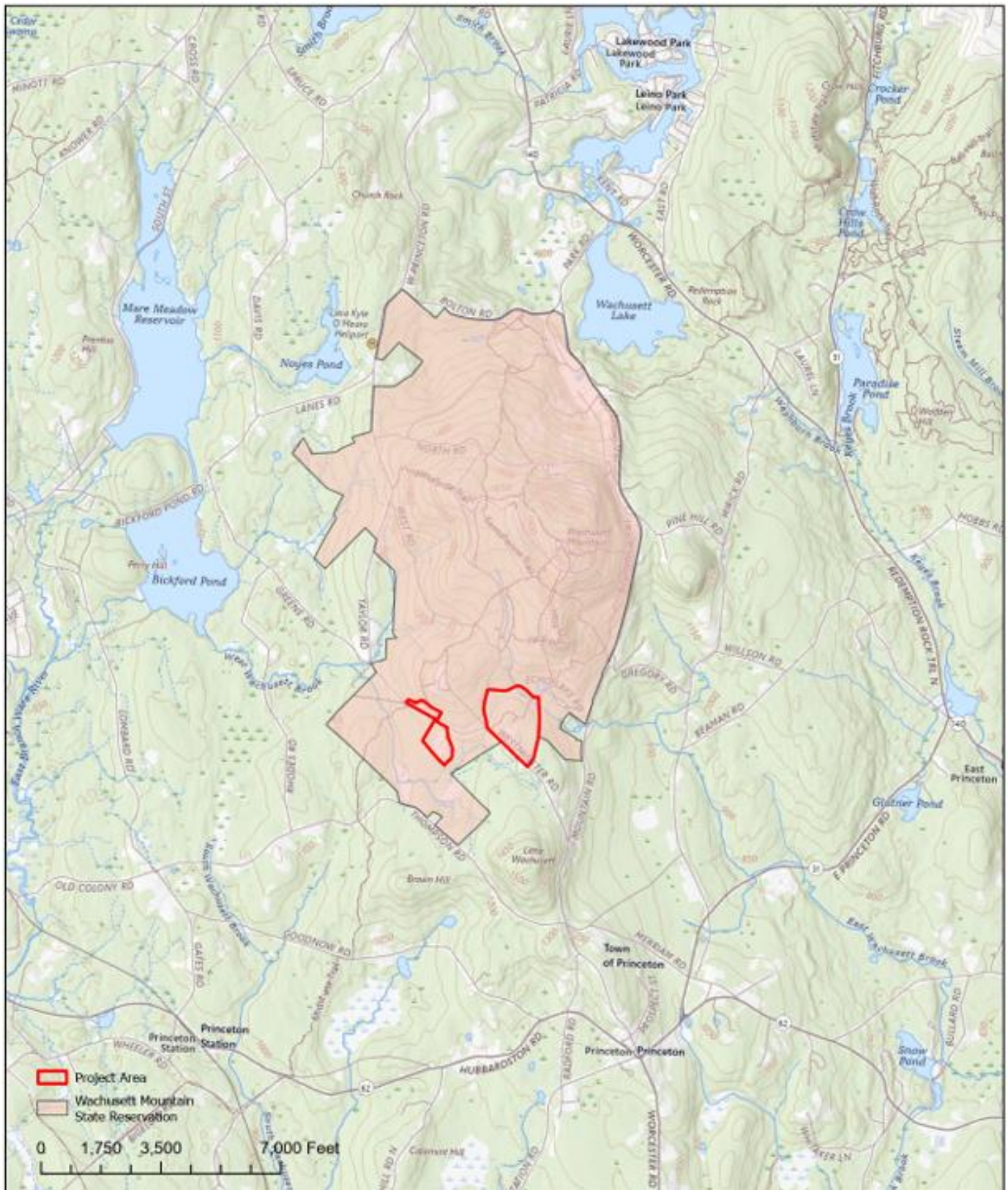
Locus Map

Project Map

Soils Map

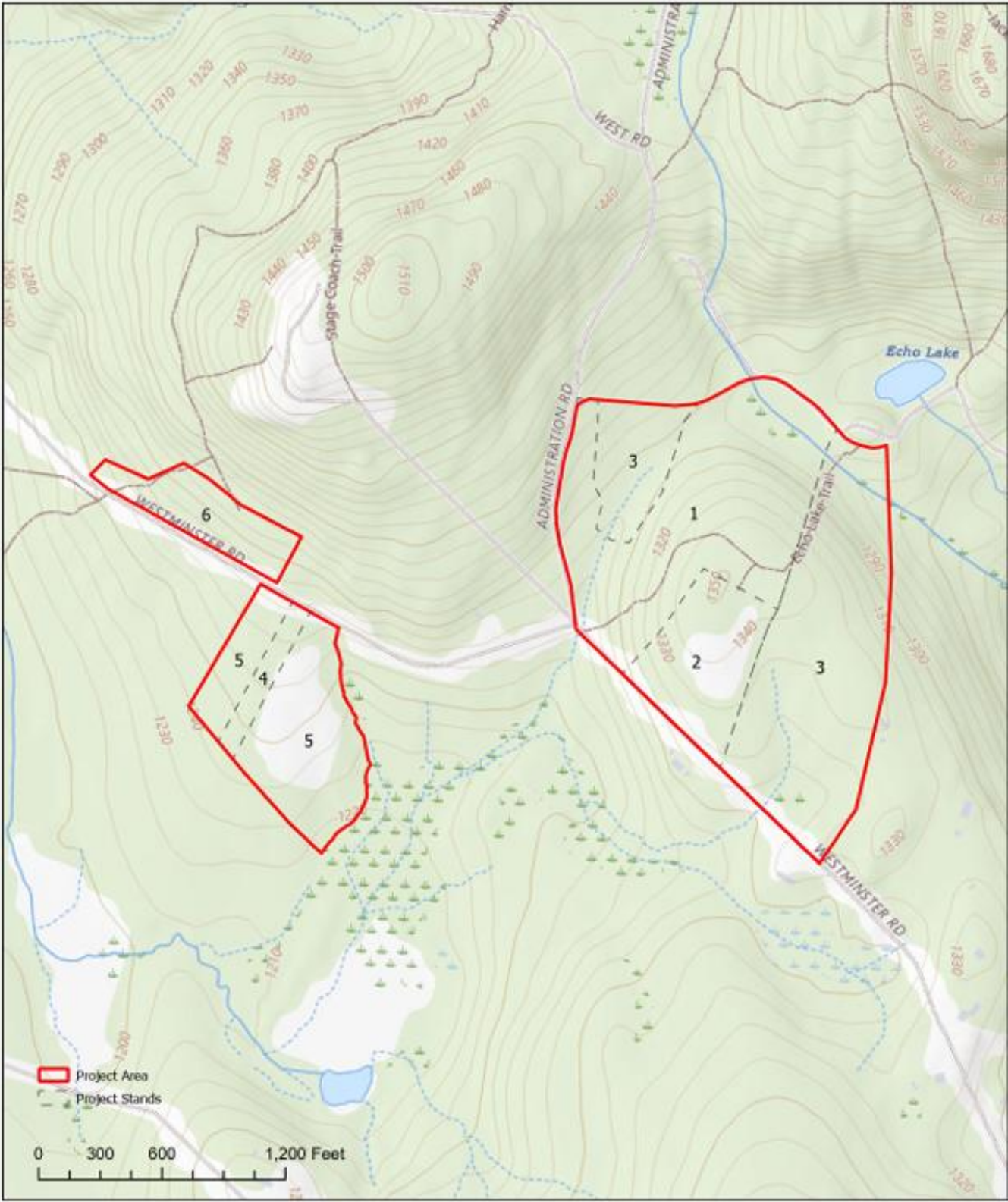
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Locus Map
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Project Map
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Soils Map
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