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Ecological Planning Program Field Final
September 16-19, 2016

**Rapid Ecological Assessment of the
Newbury Town Forest, West Newbury, VT
for the Vermont Land Trust**

Part I: Tucker Mountain East

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For information on the Newbury Town Forest land north and west of Tucker Mountain, see Part II of this report, prepared by Anya Tyson.

I. EXECUTIVE SUMMARY

The Vermont Land Trust (VLT) is working with the Town of Newbury (Orange County) on a proposed town forest expansion project. This project would grow the town forest by approximately 600 acres, spread over multiple parcels owned by descendants of the family of Philip and Virginia Leach (Figure 1). Little is known about the ecological significance of either site.

In September 2016, two graduate students from the UVM Field Naturalist Program, Hannah Phillips and Anya Tyson, conducted a three-day rapid ecological assessment of the property at VLT's request. The objectives of the September 2016 visit to the site were to increase VLT's ecological knowledge of the property, with the primary goal of identifying state-significant natural communities and significant wildlife habitat.

The project was completed in three days, consistent with the requirements of the UVM Field Naturalist Program Comprehensive Exam. Because of the nature of the exercise, this report was completed in two parts: Part I, prepared by Hannah Phillips, addresses the land east of Tucker Mountain; Part II, prepared by Anya Tyson, addresses the land west and north of Tucker Mountain.

The proposed town forest is ecologically-significant for its size, variation in landscape types, connectedness to other conservation blocks, and abundance of ecologically-significant features. Property highlights include:

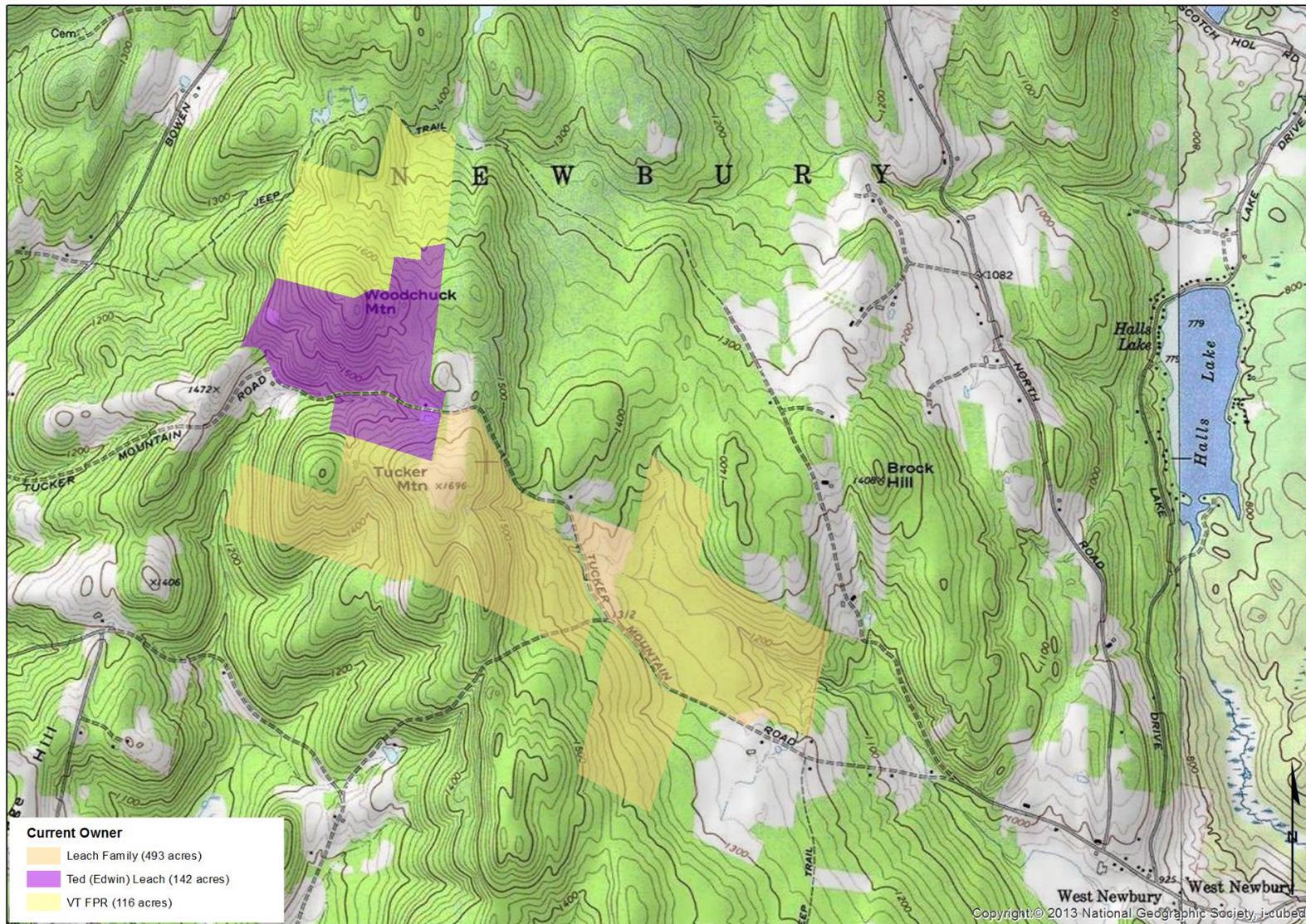
- Seven natural community types, including Red Maple-Black Ash Seepage Swamp (S4), Red Spruce-Cinnamon Fern Swamp (S3), Rich Northern Hardwood Forest (S4), Mesic Red Oak-Northern Hardwood Forest, Northern Hardwood Forest (S5), Seeps (S4), and Vernal Pools (S3).
- Three state-significant natural community element occurrences:
 - Red Spruce-Cinnamon Fern Swamp (S3); B-ranked.
 - Red Maple –Black Ash Seepage Swamp (S4); B-ranked.
 - Seep (S4); B-ranked.
- 33.5 acres of wetland comprising ~9% of the acreage east of the summit of Tucker Mountain.
 - Beaver meadow wetland complex is a Class II wetland in the VT Significant Wetland Inventory.
 - Forested wetlands qualify as Current Use Ecologically-Significant Treatment Areas (ESTAs).
- Two vernal pools offering amphibian breeding habitat.
- Matrix forests in varying stages of stand development; early successional softwood forests on the east; mid-successional hardwood forests in the central part of the property.
- Two seeps on calcareous Waits River Formation bedrock with potential for rare or uncommon plants.
- Abundant wildlife resources, including early successional habitat, hard and soft mast-producing species, and wetlands.

II. BACKGROUND

The parcels in question are collectively owned by descendants of the Phillip and Virginia Leach Family. Four hundred and ninety-three of these acres are already protected by a conservation easement held by the Vermont Land Trust since 1992. An adjacent 142 acres owned by Ted (Edwin) and Deborah Leach are now for sale, and negotiations are underway with VLT regarding the purchase of the property. If acquired, this parcel would link Tucker Mountain and the Leach land to a 116-acre parcel north of Woodchuck Mountain, which will likely be conveyed to the Town of Newbury from the Vermont Department of Forest, Parks, and Recreation (Figure 1).

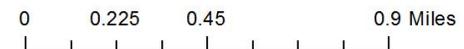
Three other reports have documented various aspects of the property. A Baseline Documentation Report (BDR) was completed in 1992 when the owners donated a VLT conservation easement on the 493-acre parcel. In 2010, Jeffrey Smith of Butternut Hollow Forestry prepared a Forest Management Plan for 493-acre Leach family land. Finally, VLT Conservation Ecologist Allaire Diamond conducted a remote ecological assessment of the property in 2015.

Figure 1: Current Ownership of the Proposed Newbury Town Forest, Newbury, VT.



Map prepared by Hannah Phillips 9/18/19
UVM Ecological Planning Program

Current Ownership of the
Proposed Newbury Town Forest
Vermont Land Trust



III. SITE DESCRIPTION:

A. Geography

The Leach land is perched in a zone of transition, where the Connecticut River Valley meets the Orange County Hills. The proposed Newbury Town Forest exists entirely within the Town of Newbury, Vermont, in the the Northern Vermont Piedmont biophysical region, which spans the eastern foothills of the Green Mountains from the Waits River to the Canadian border. However, the land's proximity to the Connecticut River valley lends it moderate climactic conditions that generally dominate the Southern Vermont Piedmont (Thompson and Sorenson 2000).

B. Watershed Context

The proposed Newbury Town Forest ranges in elevation from ~1100 feet at the eastern edge of the property, to over 1700 feet at the summit of Woodchuck Mountain. The Tucker Mountain-Woodchuck Mountain ridgeline divides the headwaters of two sub-watersheds of the Connecticut River. East of the Tucker Mountain and Woodchuck Mountain summits, the Halls Brook headwaters drain to the Connecticut River. West of the summits, water drains via Hedgehog and Meadow Brooks to the Waits River before flowing on to the Connecticut River.

C. Bedrock

The proposed Newbury Town Forest is underlain by meta-sedimentary bedrock of the Gile Mountain Formation and the Waits River Formation, laid down during the Lower Devonian and Upper Silurian periods, and later metamorphosed during the Taconic, Alleghenian and Acadian Orogenies. The eastern half of the parcel is underlain by a noncarbonaceous quartz schist interbedded with quartzite (Gile Mountain Formation), while the western half of the parcel is dominated by a micaceous quartzite (Gile Mountain Formation; Ratcliffe et al. 2011). A band of carbonaceous metalimestone (Waits River Formation) runs north to south adjacent to the summits of Tucker Mountain and Woodchuck Mountain (Ratcliffe et al. 2011).

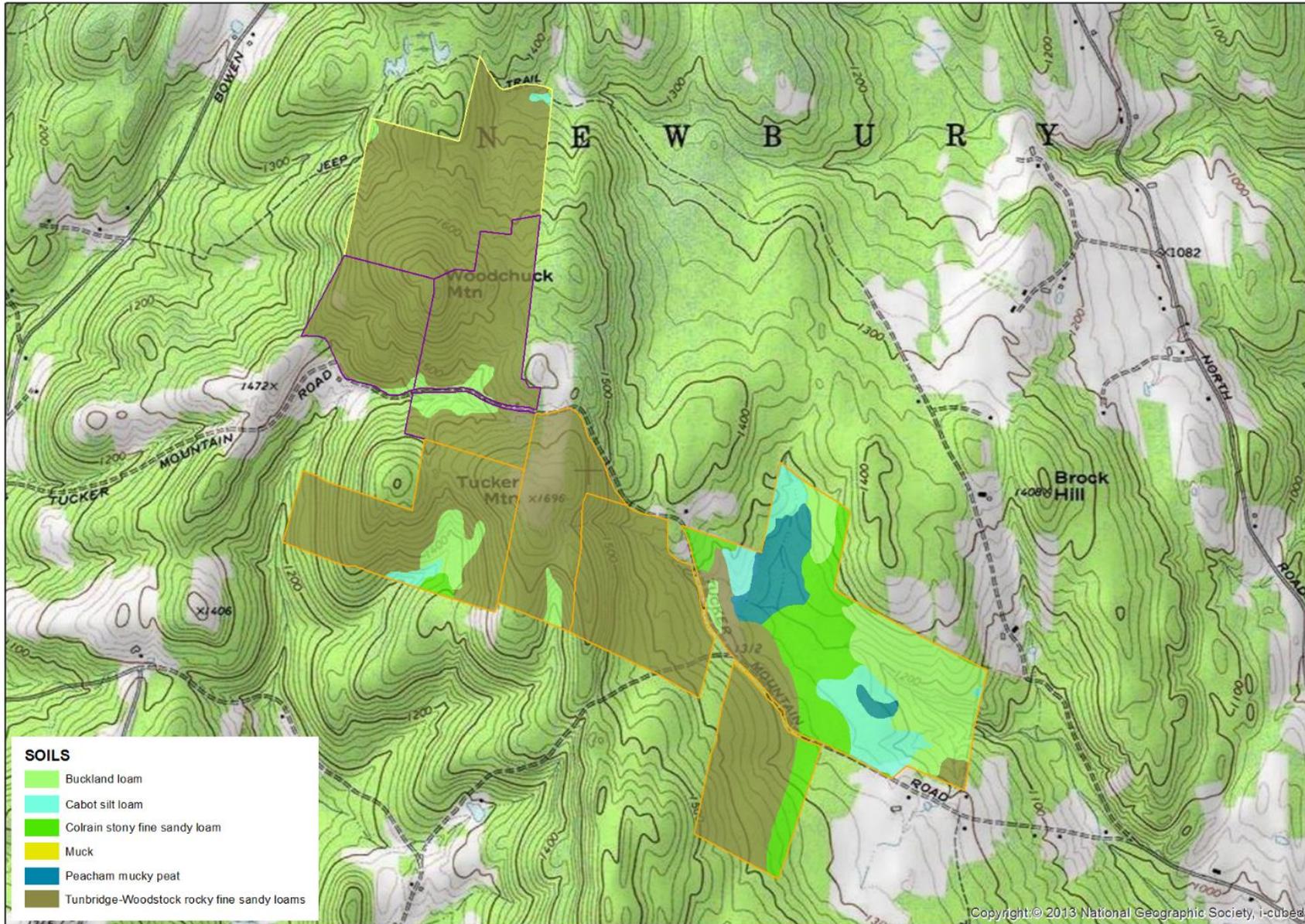
D. Surficial Geology

Like much of Vermont, West Newbury was covered by the Laurentide Ice Sheet approximately 15,000 years ago. The advance and retreat of the glaciers left a nearly ubiquitous blanket of till covering the landscape; the hills of Orange County are no exception. Throughout the region, sedimentary deposits from glacial meltwater dot the landscape, feature varying degrees of sorting. At the time of the glacial retreat, West Newbury would have been near the shores of Glacial Lake Hitchcock, which filled the Connecticut River Valley to elevations of approximately 600 feet (Bigl 2013).

E. Soils

The majority of the proposed Newbury Town Forest is on Tunbridge-Woodstock rocky fine sandy loams. Poorly-drained Peacham mucky peat (Hydrologic Group D) and Cabot silt loam (Hydrological Group D) dominate the wetlands in the northeast corner of the property, while the upland soils of the eastern half of the property are primarily Colrain stony fine sandy loam (Hydrologic Group A) and Buckland loam (Hydrologic Group D). Intrusions of Cabot silt loam, Buckland loam and Colrain stony fine sandy loam appear occasionally in the major drainages around the property (Figure 2).

Figure 2 Soils of the Proposed Newbury Town Forest, West Newbury, VT.



Map prepared by Hannah Phillips 9/16/19
UVM Ecological Planning Program

Soils of the
Proposed Newbury Town Forest
Vermont Land Trust

0 0.25 0.5 1 Miles

F. Landscape Context:

The Nature Conservancy Resilience Dataset ranks the proposed Newbury Town Forest as “slightly above average” for landscape connectedness (Appendix B, Anderson et al. 2012). Protecting connected wildlife corridors will allow species sensitive to a warming climate to travel to more suitable habitats as the climate changes. The Tucker Mountain-Woodchuck Mountain ridgelines offers a stopping ground between the Groton State Forest to the northwest, the Fairlee Town Forest to the south (>1500 acres of woods and wetlands), and the White Mountain National Forest to the east.

Within Vermont, Vermont Conservation Design has modified The Nature Conservancy Resiliency methodology to help guide landscape conservation efforts within the state (Sorenson et al. 2015). The landscape elements they identify as crucial to maintain an ecologically functional landscape are 1) interior forest blocks, 2) connectivity blocks, 3) surface waters and riparian areas, 4) riparian areas for connectivity, and 5) physical landscape diversity blocks. This model ranks the proposed Newbury Town Forest as containing a ‘Moderate’ to ‘Very High’ concentration of components contributing to a resilient landscape (Appendix C). On the western half of the property, the low-to-mid elevation calcareous bedrock boosts the rating to ‘High,’ while in the east the wetland complex and Halls Brook drive the ranking to ‘Very High’; the matrix forest of the eastern half of the property is of ‘Moderate’ significance.

Additionally, although outside of the scope of the *Staying Connected Wildlife Initiative* Priority Linkages, the proposed Newbury Town Forest offers another potential linkage between the Orange Hills and the White Mountains (Hawk et al 2012). The White Mountains serve as a gateway to the Northern Forest expanse in Maine and Quebec.

The proposed Newbury Town Forest is located squarely within The Nature Conservancy’s Pine Hill Matrix Block, an area identified as priority for forest conservation projects based on their representative “matrix” forest community, minimal interruption by large roads, and representative physical landscapes (Anderson 2005).

IV. SIGNIFICANT ECOLOGICAL FEATURES (see Figure 3):

NTF-1: Red Maple-Black Ash Seepage Swamp (S4; State-Significant, B-rank; 8.03 acres)

This seepage swamp is adjacent to the beaver meadow; undoubtedly the hydrology of this site has been influenced by the downslope beaver activities (see photo, Appendix D). This community has been heavily altered by recent logging, and a logging road passes through the community near where the east arm meets the main body of the wetland. Although the community structure has been heavily altered in the western arm, the presence of characteristic herbaceous species (including *Rubus pubescens*, *Impatiens* spp., *Geum rivale*), black ash, red maple, and red spruce in the overstory, and saturated soils suggests that this area is perpetually wet. A prong of upland mixed forest bisects the wetland down the middle. Soils within this community are organic to approximately 8” deep, below which a dense, sandy-silty composite inhibits water percolation (likely till-derived). Both the dense sandy substrate and the organic muck were close to neutral (pH 6.5). I assigned this community a B-rank for size, a C-rank for condition (due to recent logging throughout the polygon), and a B-rank for landscape context.

| Trees/Shrubs | Herbaceous |
|------------------------------|----------------------------------|
| <i>Fraxinus nigra</i> | <i>Carex gynandra</i> |
| <i>Acer rubrum</i> | <i>Impatiens capensis</i> |
| <i>Betula allegheniensis</i> | <i>Tiarella cordifolia</i> |
| <i>Picea rubens</i> | <i>Carex trisperma</i> |
| <i>Abies balsamea</i> | <i>Chrysosplenium americanum</i> |
| <i>Fraxinus americana</i> | <i>Osmunda cinnamomea</i> |
| | <i>Geum rivale</i> |
| | <i>Rubus pubescens</i> |

NTF-2: Beaver Ponds (15.92 acres)

The beaver ponds in the center of the wetland complex are recognized as a Class II Wetland in the Vermont Significant Wetland Inventory (see photo, Appendix E). I observed no signs of current beaver activity during my visit; I did not see an active beaver dam, nor did I see recent signs of beaver feeding. Additionally, while the Forest Management Plan, written in 2010, makes mention of numerous species of waterfowl using the pond, no waterfowl were observed during this visit. I followed the beaver impoundments up Halls Brook to the west and found a series of small dams which terminate where the brook crosses the road. There are no signs of beaver activity below the major beaver pond.

Electroconductivity, measured at the point where the western arm of the beaver meadows meets the main beaver pond, was 71 mS, compared to 72 mS at the point where the Halls Brook exits the beaver pond. In the northeast corner of the pond where the Red Maple-Black Ash Seepage Swamp meets the beaver pond, electroconductivity was 55 mS. None of these values are abnormally high to suggest that water is seeping from the ground, indicated by a higher presence of conductive cations.

It is unclear how continued beaver absence will impact the seepage communities above and below the wetland complex. With water traveling a more focused course through the center of the complex via Halls Brook, it is not clear if the forested wetlands adjacent will retain their saturated, mucky soils.

| Trees/Shrubs | Herbaceous |
|------------------------|---------------------------------|
| <i>Corylus cornuta</i> | <i>Osmunda regalis</i> |
| <i>Alnus incana</i> | <i>Bidens cernua</i> |
| <i>Acer rubrum</i> | <i>Sparganium</i> sp. |
| | <i>Iris versicolor</i> |
| | <i>Nabulus</i> sp. |
| | <i>Hypericum</i> sp. |
| | <i>Typha</i> sp. |
| | <i>Spiraea tomentosa</i> |
| | <i>Linnaea borealis</i> |
| | <i>Osmundastrum cinnamomeum</i> |
| | <i>Lemna minor</i> |
| | <i>Thymus pulegioides</i> * |

NTF-3: Red Spruce-Cinnamon Fern Swamp (S3; State-Significant, B-Rank; 3.24 acres)

A Red Spruce-Cinnamon Fern Swamp runs in a narrow band south from the end of the beaver pond (see photo, Appendix F). Although this area was harvested in the past (stumps are present throughout), it appears to have been spared during the most recent round of harvest. Dense bryophyte cover blankets the ground, and red spruce, the dominant canopy tree, forms a mat of roots on which other species take hold. Hemlock, yellow birch, red maple and black ash are present in the mid- and overstory, and striped maple and beaked hazelnut are common understory shrubs. Herbaceous vegetation on the ground is starkly divided between that growing on the hummocks and that growing in the hollows, with acidic-tolerant upland species growing atop the bryophyte mats and species favoring moisture and enrichment growing in the hollows.

In many respects, this wetland more closely fits the description of a Hemlock-Balsam Fir-Black Ash Seepage Swamp. Structurally, this wetland has many of the same characteristics of seepage swamps including hummock/hollow topography, buttressed roots, and tip-ups. The species composition includes some species that prefer mineral enrichment (*Chrysosplenium americanum*, *Glyceria melicaria*), and the close-to-neutral pH (6.5) in the hollows indicates water flow through the organic muck layer. However, the red spruce canopy dominance and the “perched” red spruce root layer on which the bryophyte layer develops and the majority of herbaceous vegetation is growing drives this community to express itself as primarily acidic.

| Trees/Shrubs | Herbaceous |
|------------------------------|----------------------------------|
| <i>Acer pensylvanicum</i> | <i>Rubus pubescens</i> |
| <i>Picea rubens</i> | <i>Impatiens</i> sp. |
| <i>Tsuga canadensis</i> | <i>Onoclea sensibilis</i> |
| <i>Betula allegheniensis</i> | <i>Osmundastrum cinnamomeum</i> |
| <i>Acer rubrum</i> | <i>Phegopteris connectilis</i> |
| <i>Fraxinus nigra</i> | <i>Chrysosplenium americanum</i> |
| <i>Corylus cornuta</i> | <i>Tiarella cordifolia</i> |
| <i>Ribes lacustre</i> | <i>Carex trisperma</i> |
| | <i>Equisetum hyemale</i> |
| | <i>Cornus canadensis</i> |
| | <i>Hydrocotyle americana</i> |

| | |
|--|--------------------------------|
| | <i>Symphyotrichum puniceum</i> |
| | <i>Glyceria melicaria</i> |
| | <i>Carex flava</i> |
| | <i>Scutellaria lateriflora</i> |
| | <i>Micranthes pensylvanica</i> |

NTF-4: Wetland – Unclassified (2.91 acres)

The natural community characteristics of the wetland downstream of the beaver meadow are unrecognizable given the recent logging that passed through here. However, the saturated Peacham muck soils would likely support a wetland community similar to the Red Spruce-Cinnamon Fern Swamp just upslope (NTF-3). If this land is conveyed to the Town of Newbury with a VLT easement, this area should be demarcated as a no-touch zone.

NTF-5: Hemlock-Balsam Fir-Black Ash Seepage Swamp (S4; 1.31 acres)

A 1.3-acre Hemlock-Balsam Fir-Black Ash Seepage Swamp is perched just south of the road, in line with the main wetland complex. This wetland was abnormally dry this summer, though mottling in the A-layer suggests fluctuations in the water table are not uncommon. In the center of the wetland, five inches of organic matter was perched atop a mottled grey, dense sandy A-layer of unknown depth. The pH in both layers was 6.5. Deer beds were observed in the middle of the wetland. Lastly, given the location of the wetland, it seems plausible that prior to road construction, this wetland would have been part of the larger wetland complex that features a Red Spruce-Cinnamon Fern Swamp downstream.

| Trees/Shrubs | Herbaceous |
|---------------------------|----------------------------------|
| <i>Acer rubrum</i> | <i>Tiarella cordifolia</i> |
| <i>Abies balsamea</i> | <i>Epipactus helleborine</i> |
| <i>Pinus strobus</i> | <i>Aralia nudicaulis</i> |
| <i>Quercus rubra</i> | <i>Solidago canadensis</i> |
| <i>Fraxinus americana</i> | <i>Geum rivale</i> |
| <i>Betula papyrifera</i> | <i>Symphyotrichum puniceum</i> |
| <i>Fraxinus nigra</i> | <i>Onoclea sensibilis</i> |
| <i>Spiraea tomentosa</i> | <i>Osmundastrum cinnamomeum</i> |
| | <i>Bidens cernua</i> |
| | <i>Impatiens sp.</i> |
| | <i>Equisetum sp.</i> |
| | <i>Chrysosplenium americanum</i> |
| | <i>Micranthes pensylvanica</i> |
| | <i>Sparganium sp.</i> |

NTF-6: Wetland-Unclassified (0.38 acres)

A small (0.38-acre) seep appears altered by logging traffic. If the Town acquires this property, it is recommended that this seep/wetland is left to reforest, at which time another ecological evaluation may be better able to comment on the significant components within.

NTF-7: Vernal Pool (S4; 0.07 acres)

A small vernal pool has formed in a small depression at the inflection point of the adjacent slope. Although dry at the time of survey, the compressed, muddy leaves and lack of vegetation indicate seasonal saturation. Canopy cover above the vernal pool is good, and there is downed woody debris providing structural complexity below the presumed water level. This vernal pool should be revisited in the spring to verify the presence/absence of breeding amphibians. The proximity of this vernal pool to the unnamed wetland (NTF-6) bodes well for breeding amphibians.

NTF-9: Wetland – Unclassified (0.09 acres)

A small wetland is perched in a hollow on the southern boundary border in the central part of the property. An intermittent stream appears to flow through the middle, although it was dry during this visit. I did not follow it off-site.

| Trees/Shrubs | Herbaceous |
|---------------------------|----------------------------|
| <i>Acer pensylvanicum</i> | <i>Rubus pubescens</i> |
| <i>Acer rubrum</i> | <i>Laportea canadensis</i> |
| <i>Fraxinus americana</i> | <i>Impatiens sp.</i> |
| | <i>Tiarella cordifolia</i> |

NTF-10: Red Maple-Black Ash Seepage Swamp (S4; 0.42 acres)

A small Red Maple-Black Ash Seepage Swamp (0.42 acres) is hidden in a valley south of the summit of Tucker Mountain, adjacent to NTF-11 and NTF-12 (see photo, Appendix G). Though I had to move quickly through this community during my visit to the site, Anya Tyson’s report offers further details about this polygon. Notably, although a road passes adjacent to the wetland and through NTF-11 and NTF-12, this area appears relatively unaltered and the most unaltered example of a hardwood swamp on the land I surveyed. Depth of organic matter at the edge of the swamp was greater than one meter, and the nutrient enrichment from the Rich Northern Hardwood Forest and Seep upslope likely give rise to other, undocumented plants of interest in the swamp.

| Trees/Shrubs | Herbaceous |
|-----------------------|---------------------------------|
| <i>Picea rubens</i> | <i>Osmundastrum cinnamomeum</i> |
| <i>Fraxinus nigra</i> | <i>Symphotrichum puniceum</i> |
| <i>Acer rubrum</i> | <i>Impatiens capensis</i> |
| | <i>Typha sp.</i> |

NTF-11: Seep (S4; State-Significant, B-rank; 0.19 acres)

A small seep spans the distance between the upslope Rich Northern Hardwood Forest (NTF-12) and the downslope Red Maple-Black Ash Seepage Swamp. Although I visited this area late in the day and did not have time to linger, the richness expressed in the forest above may give rise to undocumented plants of interest in this area. Please see Anya Tyson’s report for more detail on this polygon. On first pass, I gave this area a C-rank for size, a B-rank for condition (a small ATV trail passes along the edge of the seep), and a B-rank for landscape context (logging upslope may have had mild effects on the seep).

| Trees/Shrubs | Herbaceous |
|-----------------------|------------------------|
| <i>Acer saccharum</i> | <i>Rubus pubescens</i> |

| | |
|------------------------|-----------------------------|
| <i>Tilia americana</i> | <i>Geranium robertianum</i> |
| | <i>Onoclea sensibilis</i> |

NTF-12: Rich Northern Hardwood Forest (S4; 2.64 acres)

Upslope of NTF-10 and NTF-11, a beautiful, hidden cove of large-DBH, towering sugar maples capitalizes on the richness expressed in the soils and herbaceous layer. Although I did not have time to linger, *Aquilegia canadensis* and *Asarum canadense* both jumped out to me as I was leaving the cove, attesting to the richness on site. The eastern bank of this ravine is comprised of large talus blocks. The forest itself has a higher degree of structural complexity than elsewhere on the property: large standing dead snags and huge fallen trees suggests that this area has not been altered in some time. This cove, with its habitat heterogeneity, may serve as a wildlife haven.

NTF-13: Vernal Pool (S3; 0.25 acres)

A large vernal pool sits in an odd arrangement below the open field at the summit of Tucker Mountain (see photo, Appendix H). Perched adjacent to a stone wall and a large, open grown yellow birch, the vernal pool (dry now) featured 12cm of organic matter (pH 6.5) atop 24 cm of a dense, silty sandy A-layer (pH 7.5). Below this, a B-layer comprised of coarse sand descended to unknown depths (pH 7.0). This substrate is perplexingly out of the place at an elevation of ~1600 feet, and I postulate that it may be a function of land use history on site, from a time when the field was plowed for agriculture.

Although the vernal pool was not holding water at the time of my visit, it did host a suite of wetland plants around the edges, including *Onoclea sensibilis*, *Pilea pumila*, *Chrysosplenium americanum*, *Scirpus cyperinus*, *Mentha canadensis*, and *Persicaria punctata*. This site should be revisited in the spring to check for the presence of breeding amphibians.

NTF-14: Seep (S4; 0.06 acres):

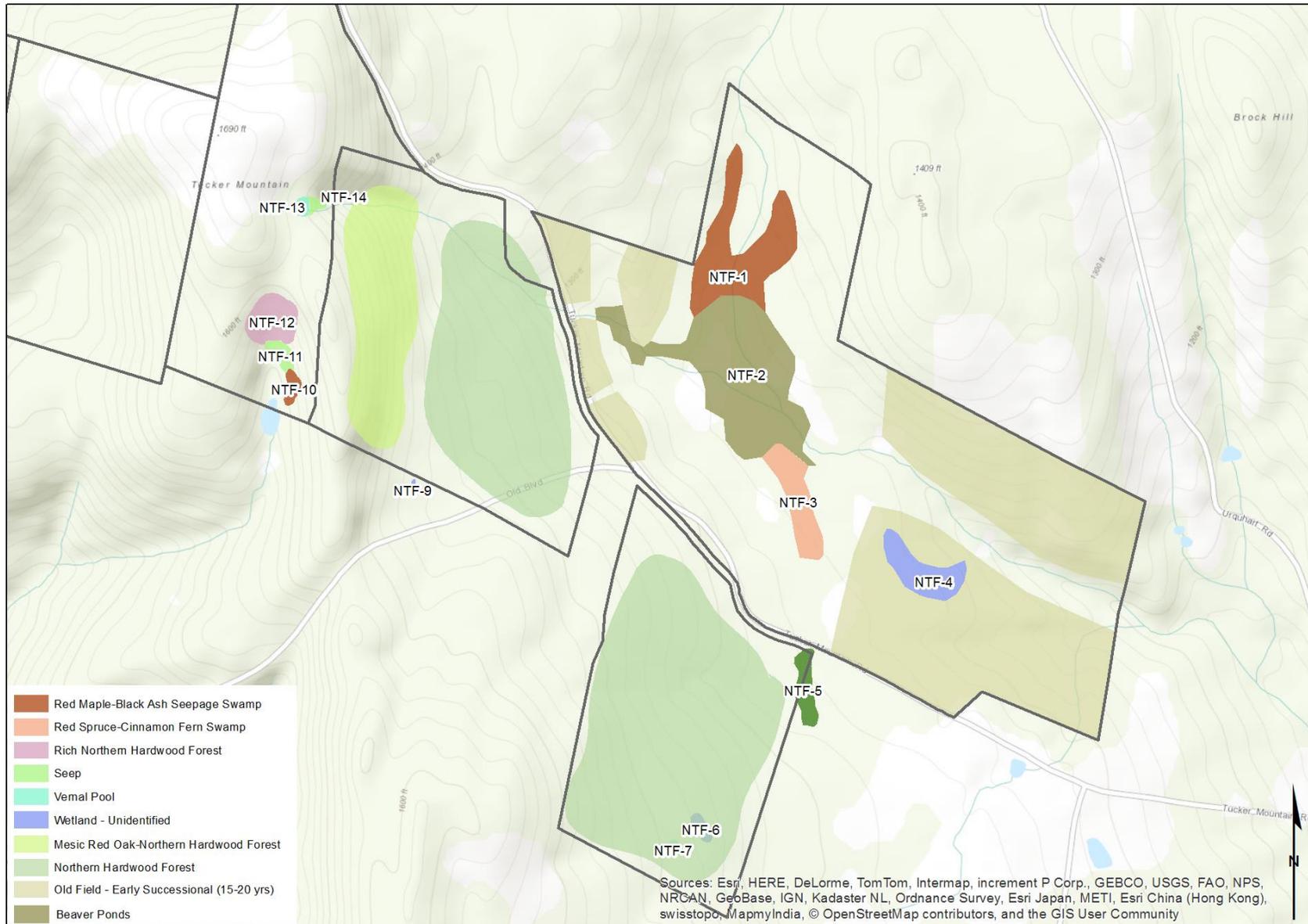
This seep functions as the headwaters of Halls Brook, and appears to emerge from a water source that is hydrologically separate from the aforementioned vernal pool. Below the vernal pool, a steep “headwall” descends to a concave slope-bottom, where the seep emerges. The water coming from the seep has an astonishingly high electroconductivity rating, at 227 mS. One interpretation of this peculiar arrangement and high EC-value is that the water may have been in contact with meta-limestone bedrock of the Waits River formation for some time, and bring with it a good deal of mineral enrichment.

Despite the predicted high nutrient input, the plants observed were similar to those observed in other seeps, including: *Chrysosplenium americanum*, *Impatiens capensis*, *Geranium robertianum*, *Tiarella cordifolia*, *Hydrocotyle americanum*, *Epipactus helleborine*, *Symphotricum lanceolatum*, and *Micranthes pensylvanica*.

Halls Brook

I walked Halls Brook from the lower wetland (NTF-4) to the property boundary. Despite this summer’s drought, the stream was flowing steadily through the property with minimal obstructions. The stream reached a maximum width of nine feet, a maximum depth of fourteen inches, and the water temperature fluctuated around 70 degrees. Canopy cover over the stream was excellent, and the streambed was rocky with few fine sediments. When flipping over rocks, I found numerous caddisfly cases, dragonfly nymphs, stoneflies, and a northern dusky salamander (*Desmognathus fuxus*). The macroinvertebrates identified are especially sensitive to pollution, so their presence indicates the water in the stream is healthy.

Figure 3 Significant Ecological Features of the Proposed Newbury Town Forest, Newbury, VT.



Map prepared by Hannah Phillips 9/18/19
UVM Ecological Planning Program

Significant Ecological Features of the
Proposed Newbury Town Forest
Vermont Land Trust

0 0.1 0.2 0.4 Miles

V. OTHER NATURAL FEATURES

Matrix Forests

The matrix forest east of Tucker Mountain has been altered significantly by logging. Operations were underway during my visit, and my observations of harvested trees on the landings, and the trees marked in the forest revealed a large number of large, healthy red oaks marked for removal on the steeper slopes abutting Tucker Mountain. The quantity of oaks, and also the surprisingly high number of hophornbeam on the dry, shallow soils led me to believe this community may best be described as a Mesic Red Oak-Northern Hardwood Forest variant. Although the slope is not south-facing, the shallow, well-drained soils and warm climate due to proximity to the Connecticut River explain these normally warm site species.

Further east on the shallower slopes of the Newbury Town Forest lowlands, a more typical Northern Hardwood Forest is growing. While logging through the parcel has altered the community structure with time, the abundance of beech, red maple, sugar maple, red oak, and hemlock reveal a classic warm-site derivative of Vermont's most common matrix forest.

Old Fields – Early Successional Forest (12.33 acres)

A series of old fields, in varying phases of succession, flank the smaller branch of beaver ponds adjacent to the wetland complex, and both sides of Halls Brook in the easternmost portion of the parcel. The stands adjacent to the beaver ponds are likely 15-20 years old, and are nearly impassable with dense softwood cover.

The stands adjacent to Halls Brook are in a later stage of succession, and may have been in fields closer to 30 years ago. Since then, the understory has been thinned and a new crop of trees, primarily balsam fir and white pine, has started growing beneath. Because agricultural practices on the land likely decimated the seed bank, natural regeneration of the original community type may take time (if left to regenerate by natural processes), or may require more direct management. It is not clear whether the resulting community would be hardwood or softwood dominated, as attempts to locate unaltered vegetative communities in a similar landscape position were fruitless.

VI. WILDLIFE SIGNIFICANCE

The Leach land is a forested haven for wildlife in a patchily agricultural landscape; food of all types is abundant. The beaver wetland and adjacent forested wetlands are likely a destination for large mammals seeking to avoid humans and feed on lush summer vegetation. The red oaks provide ample hard mast, and the recently harvested areas provide soft mast in the *Rubus* that dominates the understory.

The wide range of successional habitats in the forests on the property cater to a variety of habitat preferences, though trend towards early-successional forest dwellers; animals craving dense softwood cover need not look far beyond the bounds of the wetland complex. While traversing the property, I startled two white-tailed deer, observed moose scrapings on striped maple, and identified coyote scat. Additionally, I saw what I believe was black bear scat beneath a large, healthy red oak.

VII. RECOMMENDATIONS FOR FOLLOW-UP

- Vernal pools should be inventoried in the spring to check for the presence/absence of breeding amphibians.
- A more detailed analysis of NTF-10 – NTF-13 in different seasons (especially spring) may reveal a greater number of calciphilic species.
- Wildlife cameras in the wetland, in an area with high red-oak density, and in the ravine by NTF-10 may help log wildlife on the property.

- Analysis of land use history to determine the cultural significance of the site.

VIII. CONCLUSIONS

The proposed Newbury Town Forest derives its ecological significance from its size, landscape context, variety of natural community types, and habitat potential for wildlife. Management planning should take into consideration the attributes of the landscape that provide conservation value, including the following:

- A vegetative species assemblage that is responsive to a changing climate (ex. red oak, hophornbeam)
- A connected landscape that allows for lateral and elevational range shifts for vegetative species and wildlife, both with adjacent parcels and within focal parcels
- A forest with heterogeneous structure and age, offering wildlife value and requiring ongoing forest management
- Mast-producing tree species that provide a food source for wildlife
- Wetland communities that provide vegetative biodiversity, habitat heterogeneity, and wildlife value

The proposed town forest may support multiple uses, including forest management and recreation, while also protecting the ecological integrity of the site. Further assessment of the seeps and vernal pools on site may reveal individual species of interest, and a deeper study of wildlife activity on the property (via a wildlife camera) will help predict how management decisions will impact wildlife visitation. While not the focus of this assessment, further study of the land use history and cultural significance of the site may help guide planning decisions.

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X. APPENDIX A: SPECIES LIST WITH SCIENTIFIC AND COMMON NAMES

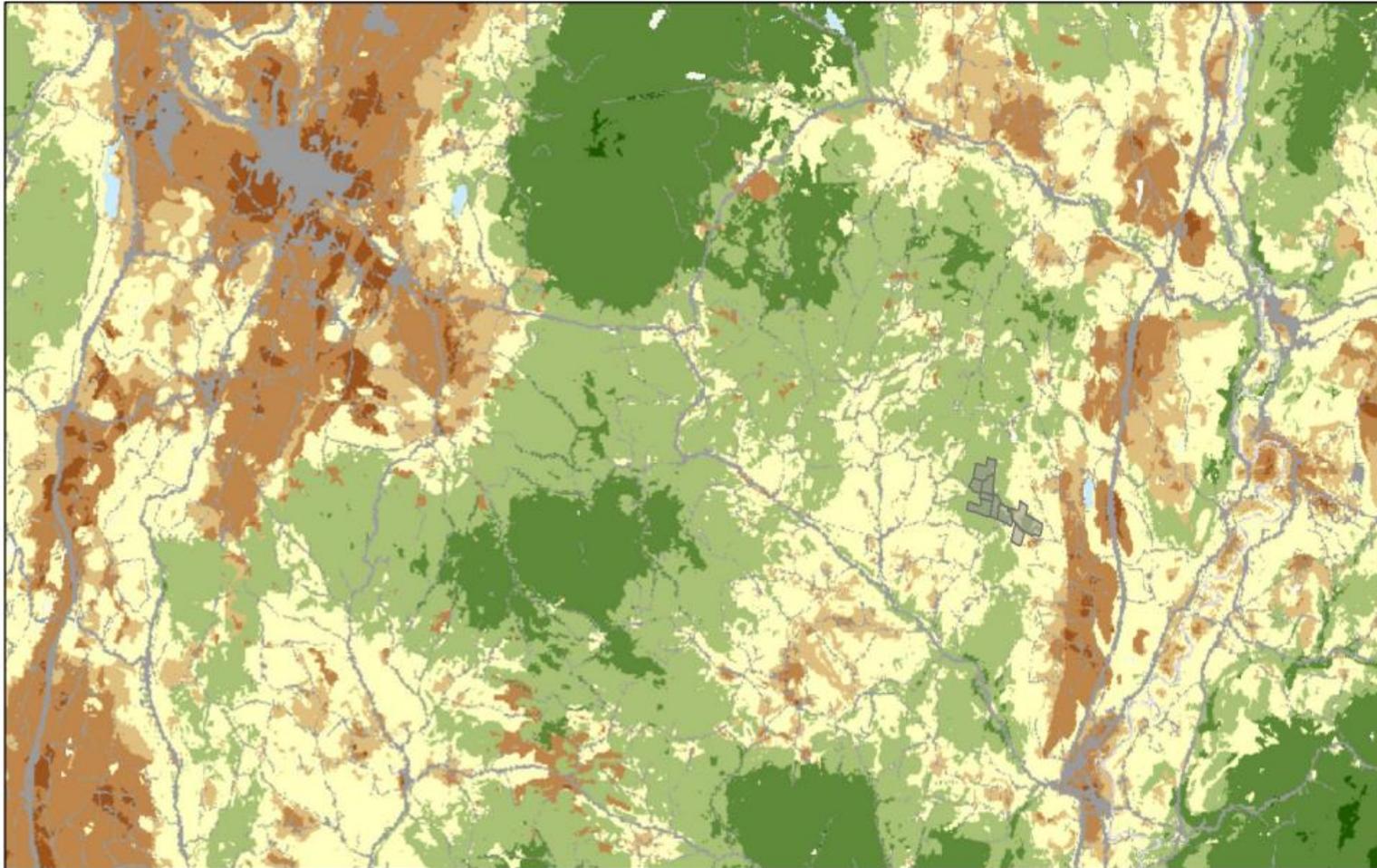
| | |
|----------------------------------|--------------------------------|
| <i>Abies balsamea</i> | Balsam fir |
| <i>Acer pensylvanicum</i> | Striped maple |
| <i>Acer rubrum</i> | Red maple |
| <i>Acer saccharum</i> | Sugar maple |
| <i>Alnus incana</i> | Speckled alder |
| <i>Aralia nudicaulis</i> | Wild sarsaparilla |
| <i>Arisaema triphyllum</i> | Jack-in-the-pulpit |
| <i>Betula allegheniensis</i> | Yellow birch |
| <i>Betula papyrifera</i> | Paper birch |
| <i>Bidens cernua</i> | Nodding beggar-ticks |
| <i>Carex flava</i> | Yellow-green sedge |
| <i>Carex gynandra</i> | Nodding sedge |
| <i>Carex trisperma</i> | Three-seeded sedge |
| <i>Chrysosplenium americanum</i> | Golden-saxifrage |
| <i>Cornus canadensis</i> | Bunchberry |
| <i>Corylus cornuta</i> | Beaked hazelnut |
| <i>Epipactus helleborine*</i> | Broad-leaved helleborine |
| <i>Equisetum spp.</i> | Horsetail |
| <i>Eurybia divaricata</i> | White wood-aster |
| <i>Fagus grandifolia</i> | American beech |
| <i>Fraxinus americana</i> | White ash |
| <i>Fraxinus nigra</i> | Black ash |
| <i>Geranium robertianum</i> | Herb-robert |
| <i>Geum rivale</i> | Water avens |
| <i>Glyceria melicaria</i> | Northeastern mannagrass |
| <i>Huperzia lucidula</i> | Shining clubmoss |
| <i>Hydrocotyle americana</i> | American marsh-pennywort |
| <i>Hypericum spp.</i> | St. John's-wort |
| <i>Impatiens capensis</i> | Spotted touch-me-not |
| <i>Iris versicolor</i> | Blue flag iris |
| <i>Laportea canadensis</i> | Canada wood nettle |
| <i>Lemna minor</i> | Common duckweed |
| <i>Linnaea borealis</i> | American twinflower |
| <i>Lycopodium clavatum</i> | Wolf's-foot clubmoss |
| <i>Medeola virginiana</i> | Indian cucumber root |
| <i>Mentha canadensis</i> | American wild mint |
| <i>Micranthes pensylvanica</i> | Swamp small-flowered-saxifrage |

| | |
|---------------------------------------|-------------------------------|
| <i>Nabulus spp.</i> | |
| <i>Onoclea sensibilis</i> | Sensitive fern |
| <i>Osmunda regalis</i> | Royal fern |
| <i>Osmundastrum cinnamomeum</i> | Cinnamon fern |
| <i>Ostrya virginiana</i> | Hophornbeam |
| <i>Persicaria punctata</i> | Dotted smartweed |
| <i>Phegopteris connectilis</i> | Beech fern |
| <i>Picea rubens</i> | Red spruce |
| <i>Pilea pumila</i> | Canada clearweed |
| <i>Pinus strobus</i> | White pine |
| <i>Polystichum acrostichoides</i> | Christmas fern |
| <i>Pteridium aquilinum</i> | Bracken fern |
| <i>Quercus rubra</i> | Red oak |
| <i>Ribes lacustre</i> | Swamp currant |
| <i>Rubus pubescens</i> | Dwarf raspberry |
| <i>Scirpus cyperinus</i> | Woolgrass |
| <i>Scutellaria lateriflora</i> | Maddock skullcap |
| <i>Solidago caesia</i> | Blue-stem goldenrod |
| <i>Solidago canadensis</i> | Canada goldenrod |
| <i>Sparganium spp.</i> | Bur-reed |
| <i>Spiraea tomentosa</i> | Rosy meadowsweet |
| <i>Symphyotrichum lanceolatum</i> | Lance-leaved american aster |
| <i>Symphyotrichum puniceum</i> | Purple-stemmed american aster |
| <i>Parathelypteris novaboracensis</i> | New York fern |
| <i>Thymus pulegioides*</i> | Lemon thyme |
| <i>Tiarella cordifolia</i> | Foamflower |
| <i>Tilia americana</i> | Basswood |
| <i>Tsuga canadensis</i> | Hemlock |
| <i>Typha spp.</i> | Cattail |
| <i>Vaccinium angustifolium</i> | Common lowbush blueberry |

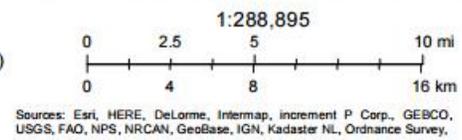
XI. APPENDIX B-C: ADDITIONAL MAPS

Appendix B: The Nature Conservancy Resilient Land Mapping Tool – Local Connectedness Model (Anderson et al. 2012)

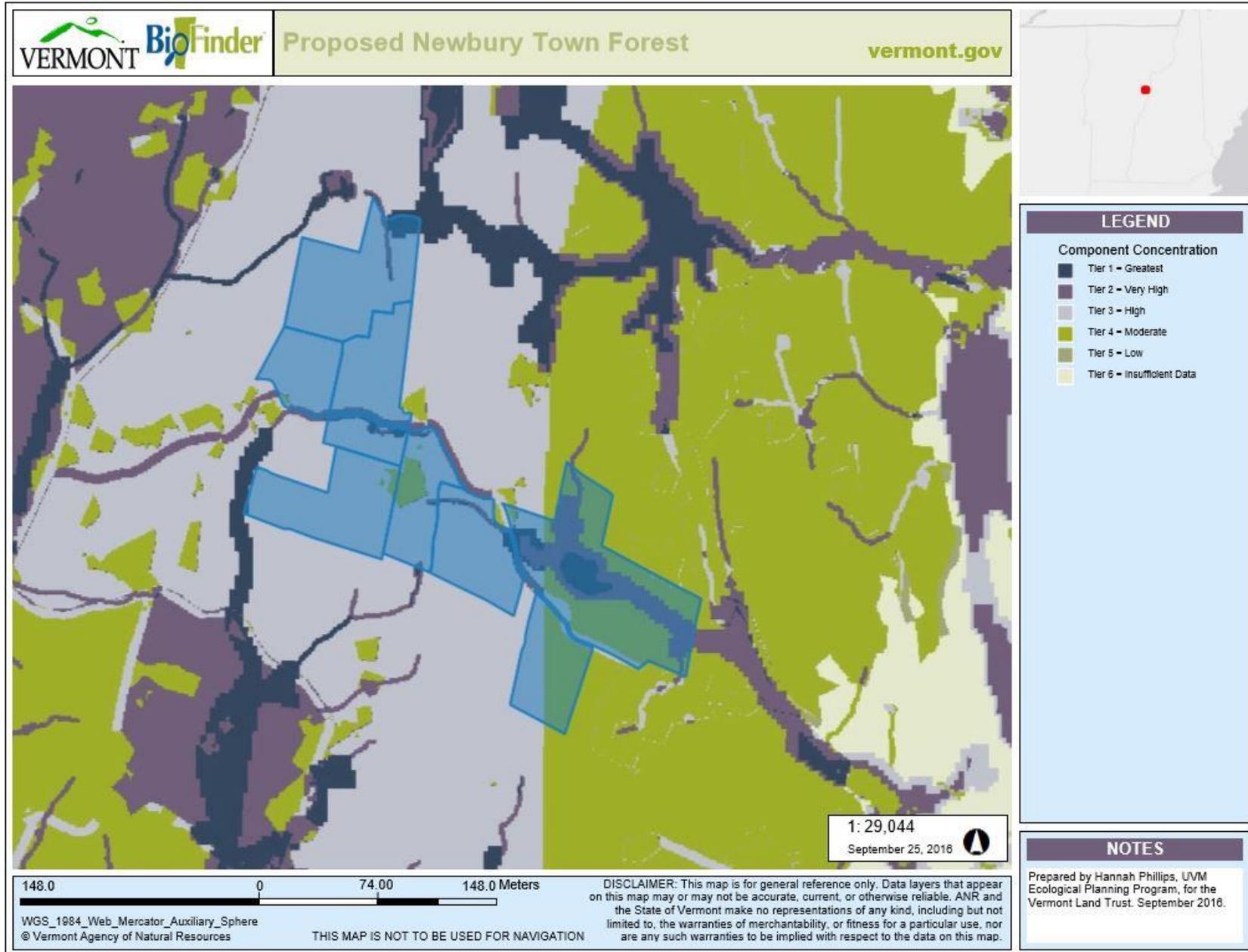
Newbury Town Forest - Local Connectivity



October 2, 2016



(c) The Nature Conservancy



XII. APPENDIX D-H: PHOTOS

Appendix D: NTF-1-Red Maple-Black Ash Seepage Swamp (S4)



Appendix E: NTF-2-Beaver Pond



Appendix F: NTF-3-Red Spruce-Cinnamon Fern Swamp (S3)



Appendix G: NTF-10-Red Maple-Black Ash Seepage Swamp



Appendix H: NTF-13-Vernal Pool

