

Rural Road Resilient Right-of-Ways Vegetation Assessment
Town of Marshfield Action Plan and Recommendations- **DRAFT**
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Introduction

Although strange in shape and character, roadsides are our public places. Most town right-of-ways span 49.5 feet, or just under 25 feet from the center of the road in each direction. While some roads and their associated clear zones (ditched or repeatedly cleared areas next to the road) span almost the entire right-of-way width, others are narrow and forested, creating canopy from trees in 12-foot wide strips of publicly managed land.

While many of us never picture picnicking in these bands of trees, shrubs, grasses or even wetlands, we look at them all the time. Driving, bicycling, or walking by, we take in what they are, and as a community, what we have decided our roadsides should be. Some rural roadsides afford beautiful mountain views, others feature century-old maples. Many are a collection of stick-thin trees and shrubs competing for light in what used to be another New England pasture.

Management of town roads is at the discretion of individual road foremen and their partnering selectboards. As such, it is no surprise that towns handle their municipal right-of-ways differently from each other. Some prioritize safe passage at high speeds on only their main thoroughfares while keeping small, residential roads narrow and with low speed limits. Other towns recognize the increasing width of their road machinery and the corresponding infrastructure and turning radius needs the road crew requires. Roads become wider, straighter, and allow faster traffic – characteristics that some residents enjoy, and others resent.

Statewide, towns are becoming more cognizant of stormwater runoff and the role that backroads play in contributing phosphorous and sediment to streams, rivers, lakes and ponds. Backroad repairs often include (sometimes by regulation) ditching, stone work (stone-line ditches, check dams, or stone turn outs), grass-lining or hydroseeding, and culvert repair or replacement. These often come at the expense of roadside trees whose branches, roots, or trunks lie in the way of road infrastructure or are damaged beyond repair during infrastructure improvements. Towns must accept where some roads must lose their tight, shaded rural character in favor of clean water and safe passage, and advocate for roads that can effectively utilize healthy vegetation as green stormwater infrastructure to slow erosion and improve stormwater infiltration. They must also think creatively about where other roads can retain, or restore, their rural character over the long term.

Rural roadside vegetation shapes our towns. It shades our backroads, livens our landscapes, and grows character in our front yards. Planning for healthy and safe vegetation is a cyclical process – thoughtful vegetation growth and maintenance practices reduce knee-jerk reactions to road-tree conflicts and consider both seasonal changes and emergency responses. Additionally, good communication among town selectboard members, road crews, and residents encourages a long-term vision for municipal roads that incorporates short-term changes or setbacks. With this planning, communication, and overarching vision, towns have the capacity to grow utility, beauty, safety and resilience along their roadsides.

Resilient Right-of-Ways Project Overview

In the summer of 2018, the town of Marshfield was selected as a partner community to work with the Vermont Urban & Community Forestry program as a case study town in the Rural Roads Resilient Right-of-Ways (ROW) project. Funded by the USDA Forest Service, this project has two broad goals:

1. to connect ten Vermont communities with resources and processes that advance understanding of the role of rural roadside vegetation in supporting local environmental, economic, and cultural values; and
2. to use the collected data and feedback from towns to create updated educational material and technical assistance surrounding rural road vegetation management to be offered state wide beginning in 2019.

The town was asked to form a Resilient Right-of-Ways project advisory committee made up of individuals knowledgeable about, and invested in, the future of healthy and resilient roadside vegetation communities. The liaison to Marshfield's municipal staff and volunteers is town Selectboard member Rich Baker. Members of the committee are:

Rich Baker, Selectboard

Anne Reed, Conservation Commission chair

Scott Ciampi, Road Crew member, for Tim Ksepka, Road Foreman

Resilient Right-of-Ways project coordinator Joanne Garton met with the Resilient Right-of-Ways project advisory committee on August 9, 2018 to outline the scope the extent of the project and address the town's roadside vegetation practices, concerns, and ideas. Rich Baker and Joanne Garton completed and signed the Letter of Collaboration on August 9, 2018 (see Appendix A: Letter of Collaboration). The work plan resulting from this project scoping meeting is included in Appendix B: Work Plan. **Project field work collected data that documented common roadside vegetation scenarios in Marshfield, revealed where conflicting interests may arise, and led to suggestions regarding direct action that the town can take to protect, manage, or restore site-appropriate trees, shrubs, and grasses.**

The roadside vegetation assessments were conducted in September of 2018 by Joanne Garton and Vermont Urban & Community Forestry summer intern Beth Bannar. Field routes covered approximately 24 miles of the 48 miles of unpaved roads in Marshfield. On unpaved backroads, Joanne and Beth assessed 100-foot long roadside vegetation plots on both the left and right sides of the road as travelled south-to-north and west-to-east. Data was recorded using the ESRI ArcCollector app and stored in the Agency of Natural Resources ESRI account. Selected plots conveyed a typical representation of the roadside environment at or near that quarter-mile marker. Itemized data fields are outlined in the Town of Marshfield Work Plan (Appendix B).

The assessed routes are drawn in red on Maps 1 through 10. All plot locations are displayed on Map 1: Right-of-Way Vegetation Type.

Process Recommendations

So much of road maintenance is guided by the overarching process that the town develops to meet its roadside maintenance goals within its budget. Recognize that vegetation is a pervasive part of road maintenance activities and that clarifying the processes you use to manage roadside vegetation will lead to functional, thoughtful right-of-way corridors.

1. Establish sustainable vegetation that promotes diversity of species, age, structure and density

Roadside forests are not your normal forest. Stressed by vehicle traffic, snow plows, mowers, road maintenance equipment, trash, pedestrians, and cyclists, vegetation in the right-of-way is in a state of perpetual disturbance. In addition, roadsides are largely unnatural – that is, they feature engineered topography and non-standard plant communities. Restoring roadsides to their most natural state, particularly after construction, promotes greater longevity of native plant species and resilience to typical disturbances. Roadsides can be safe while also being visually interesting, ecologically integrated, and engineered to manage stormwater cleanly.

Roadside vegetation management has changed a lot in the last 30 years along both state and town roads. What used to be a rash of herbicide treatment and a bi-annual regrading of the shoulder is now a multi-step process requiring tools including hydroseeders, straw mulch blowers, GPS, and mapping software. Towns consult licensed pesticide applicators, invasive species experts, and erosion control engineers to decide on a yearly course of action. Rural roadside right-of-ways represent over 27,000 acres of land in Vermont – management of this land is no small task. Establishing sustainable, multi-aged and diverse roadside vegetation takes thoughtful planning, appropriate expertise, and patience.

Recommendations

- Be intentional about vegetation clearing. Understand that after clearing, any regrowth of vegetation will be all the same age (called even-age) and, at least initially, will lack the structural diversity that keeps roadsides forests healthy.
 - Roadsides can provide strips of habitat for some species, although generally as temporary cover or food sources rather than as breeding or nesting sites. Some species continue to thrive in the edge habitat created by roadside vegetation, particularly if this vegetation acts as an ecological community not common throughout the region. However, not all wildlife are welcome along rural roads. Many early successional species (birch *Betula spp.*, poplar *Populus spp.* and willow *Salix spp.*) that persist in the continuously disrupted forest edge along roadsides are palatable browse for wildlife such as moose. Naturally, safety concerns of road users must be balanced with the risks presented through maintaining roads in rural areas.
- Establish a systematic annual planting schedule. Many of Marshfield’s roads are forested and will revegetate themselves (called “forest regeneration”) with common tree species. However, some right-of-ways that border wetlands, fields, or agricultural areas may benefit from bush and native grass planting to protect soil from erosions or from tree planting to create canopy or, particularly as roadside ash trees die. Start small to monitor progress and understand that planting efforts require site preparation, material purchases, monitoring, and possibly replacement of species that die. Ensure that planting efforts do not conflict with planned road construction.

- Establish a [pruning](#)¹ and maintenance schedule for existing trees. When done correctly, roadside pruning reduces the number of branches that could fall, reduce sight lines along roads, or grow into utility lines while maintaining or even improving tree health. Do not prune trees with a flail mower or boom arm mower.
- Take note of existing native plants. Utilize your town’s active citizen scientists and their data recorded on iNaturalist².
- Establish native vegetation in cleared areas, including where invasive plants have been removed. Consider using native seed mixes when planting grass in disturbed roadside areas. [The Vermont Agency of Transportation Technical Landscape Manual](#)³ (p. 2-47) recommends several seed mixtures, many of which can be applied with a hydroseeder. However, many contain no native species. As preliminary guidance, towns may consider using the *Sand and Gravel Sites Conservation Mix* and the *Wet Area Mix*, paying close attention to the amount of fertilizer and tackifier a site may need for seeds to successfully germinate. Contact the seed company distributor to learn more.
- Consult with neighboring towns to find out if planting or seeding initiatives can be shared. By combining missions, town may achieve an economy of scale that makes costs and logistics more palatable.

2. Prepare for emerald ash borer and manage ash tree health

Emerald ash borer (EAB), an invasive beetle that eats and kills all species of ash in North America, was first detected in Vermont in February of 2018. In central Vermont, the insect has been confirmed in Montpelier, Plainfield, Orange, Berlin and Barre Town. In northwestern Vermont, EAB has been confirmed in South Hero. All Vermont towns are encouraged to prepare and manage the impacts of EAB and the upcoming loss of ash trees. Once present, EAB kills over 99% of ash trees (if not chemically treated); those along public roads can then pose a risk to safety when diseased or dying.

Southern Marshfield is within [a known infested area](#)⁴ in central Vermont and neighbors a confirmed infestation in Plainfield. Almost all remaining sections of Marshfield are in the high-risk area, defined as between 5 and 10 miles of a known infestation. As of the writing of this report, EAB has not been detected in Marshfield. Joanne alerted Forest Health Specialist Neil Monteith of Vermont Forest, Parks & Recreation to the presence of woodpecker activity and canopy dieback on ash trees in and near the right-of-way along Beaver Meadow Road; Neil visited the road on October 12, 2018 and determined there were no definitive signs of EAB.

The Resilient Right-of-Ways field assessment included a count of ash trees at each plot location that were either in the right-of-way or would affect the right-of-way if diseased or dying. While some roads will be heavily impacted by the removal or death of ash trees in both forested and primarily mowed areas (e.g. Hollister Hill Road, Calais Road, Ennis Hill Road), other forested or tree-lined roads have a

¹ Pruning. Vermont Urban & Community Forestry Program. <https://vtcommunityforestry.org/resources/tree-care/pruning>.

² More on iNaturalist can be found at <https://www.inaturalist.org/>.

³ Seed Mixes. Page 2-47. Vermont Agency of Transportation Technical Landscape Manual. <https://vtrans.vermont.gov/sites/aot/files/highway/documents/environmental/VTrans%20Technical%20Landscape%20Manual.pdf>.

⁴ Emerald Ash Borer Infested Area in Vermont, Vermont Agency of Natural Resources. <http://vtanr.maps.arcgis.com/apps/PublicInformation/index.html?appid=cfd013ad1464b7b9103a3d7806f0cc5>

relatively low concentration of roadside ash (e.g. Brook Road, Nasmith Brook Road, Bailey Pond Road), at least as evaluated every ¼ mile during this survey.

Recommendations

- Marshfield is currently in the known emerald ash borer infested area and the high-risk emerald ash borer area. Plan for the arrival of emerald ash borer by completing an [ash inventory](#)⁵ and an [Emerald Ash Borer Management Worksheet](#)⁶ as described on the VT Urban & Community Forestry website.
- Review the Urban & Community Forestry Program’s other [on-line resources](#)² regarding EAB management and consider if the town plans to perform any preemptive removals, where the town may use or collect ash wood, and if the town will provide outreach material to private landowners regarding emerald ash borer and the recommended actions to slow the spread of the beetle.
- Ensure that the Marshfield road crew or any other contracted service is well-trained in the dangers associated with taking down dead or dying ash trees. Ash trees in the first year of EAB infestation lose a significant portion of their strength. Because EAB may not be detected in a tree for several years, even healthy-looking ash trees may be structurally compromised if EAB is in the area.
- Ensure that any ash tree removal within 10 feet of a utility line and/or within the utility right-of-way is completed by the utility company.
- Encourage the municipality and private landowners to follow the Slow the Spread recommendations issued by Vermont Forests, Parks and Recreation when [moving ash](#) or [processing ash](#)⁸.
- Stay current with other Vermont town efforts and “lessons learned” about preemptive ash tree removal. VT UCF keeps current and publicly available materials on its [Emerald Ash Borer Management](#)⁹ webpage, which now includes examples of Requests for Proposals and Provisions related to EAB.
- Work with the Stranahan Memorial Town Forest Stewardship Committee to promote awareness about ash tree management in public places and to promote local ash wood use.

3. Address hazard trees with the tree warden

Marshfield’s current tree warden, Ron Smith, serves the role of advocate for trees in the town’s public places and right-of-ways, and as a resource for citizens wanting to know more about when to remove, plant, or treat public trees. One of the most important duties of the tree warden in any town is to address public safety concerns resulting from roadside vegetation. Remember that for a tree to be considered a *hazard* tree by the tree warden and be removed without a public hearing, the tree itself

⁵ [Ash Tree Inventories](https://vtcommunityforestry.org/ash-inventory). Vermont Urban & Community Forestry Program: <https://vtcommunityforestry.org/ash-inventory>

⁶ [Emerald Ash Borer Management Worksheet for Vermont Municipalities](https://vtcommunityforestry.org/community-planning/tree-pests). Vermont Urban & Community Forestry Program: <https://vtcommunityforestry.org/community-planning/tree-pests>

⁷ [Emerald Ash Borer Management](https://vtcommunityforestry.org/community-planning/tree-pests). Vermont Urban & Community Forestry Program: <https://vtcommunityforestry.org/community-planning/tree-pests>

⁸ [Slow the Spread Recommendations](https://vtinvasives.org/land/emerald-ash-borer-vermont). Vermont Invasives. <https://vtinvasives.org/land/emerald-ash-borer-vermont>

⁹ [Emerald Ash Borer Management](https://vtcommunityforestry.org/community-planning/tree-pests). Vermont Urban & Community Forestry Program. <https://vtcommunityforestry.org/community-planning/tree-pests>

must be a hazard, not its placement. If a roadside tree is close to the road edge but not damaged or infested, it cannot be deemed a hazard tree by the tree warden.

During the legislative session of 2018, Vermont Forests, Parks & Recreation participated in introducing [new legislation that would modernize Vermont's tree warden statutes](#)¹⁰. However, the draft bill did not advance as an official bill and was not considered further that year. The Tree Warden Statute amendments will not go to legislative committee again this year (2019) and no changes are known at the time of writing this report. As such, the original [Vermont Tree Warden Statutes](#)¹¹ (last amended in 1969) still apply. They are included in this report in Appendix C: Selected Resources for Tree Wardens.

Recommendations

- Invite the tree warden to conservation commission meetings or Selectboard meetings that address roadside tree maintenance. Refer to the [Vermont Tree Wardens](#)¹² page for an overview a Tree Warden's role.
- Consult the Vermont Urban & Community Forestry Program's [Resources for Tree Wardens](#)¹³ webpage, including the [Guidelines for Public Hearings for Tree Removals](#).
- Consider a yearly "look-up drive" conducted jointly by the tree warden and the road foreman during which all trees along town roads are observed via a drive-by assessment and view into the canopy. This will give the selectboard, conservation commission, and any interested landowners time to provide input on any hazard trees identified by the tree warden. The selectboard will also be able to allocate a budget for tree removal, ensure that road crew members are properly trained, or subcontract the tree removal work.
- Retain an updated map of hazard trees as identified by the road foreman and tree warden. This could be done on paper or electronically – the Vermont Urban & Community Forestry Program can help with electronic resources if desired.

4. Develop a town tree ordinance or policy

Developed and active tree ordinances are effective tools to aid towns in attaining and supporting healthy and well-managed urban and community trees. When well-crafted, tree ordinances define ambiguous terms with language that reflects the goals and perspectives of each town. They clarify processes regarding tree planting, removal, and maintenance that act as a reference for the entire town, often reducing the number of circumstances requiring a public hearing. They can also address management of specific tree or plant species, including invasive species.

Tree wardens can remove hazardous trees in the right-of-way without a public hearing, but they cannot remove or plant trees on private property. Some communities have enacted tree ordinances that give the municipality the authority to request that the landowner remove a hazard tree that could

¹⁰ [Proposed Tree Warden Statutes Amendments](#). Vermont Urban & Community Forestry Program.

<https://vtcommunityforestry.org/resources/vermont-tree-wardens-0/proposed-tree-warden-statutes-amendments>

¹¹ [Vermont Tree Warden Statutes](#). Title 24, Chapter 033.

http://vtcommunityforestry.org/sites/default/files/pictures/tree_warden_statutes-1.pdf

¹² [Vermont Tree Wardens](#). Vermont Urban & Community Forestry Program:

<https://vtcommunityforestry.org/resources/vermont-tree-wardens>

¹³ [Resources for Tree Wardens](#). Vermont Urban & Community Forestry Program.

<https://vtcommunityforestry.org/resources/vermont-tree-wardens-0/resources-tree-wardens>

affect the public right-of-way. The ordinance can also specify that if the landowner does not remove the tree in a certain amount of time – for example, within 60 days – the municipality can remove the tree and seek payment from the landowner. Like any situation regarding private property and public safety, the town can work with the landowner to assess the level of risk posed by private property.

Recommendations:

- Review the existing tree warden statutes as listed in Section 4, above.
- Learn more about [tree ordinances](#)¹⁴ to determine if Marshfield should develop its own tree ordinance or policy. If you choose to develop a tree ordinance or policy, utilize the [Guide to Tree Ordinances and Policies for Vermont Municipalities](#)¹⁵.
- For the village center, several [new tree selection resources](#)¹⁶ now exist including an updated [Vermont Tree Selection Guide](#)¹⁷.

5. Develop a mowing policy for the clear zone

Marshfield is already aware of its common roadside invasive plants: common buckthorn (*Rhamnus cathartica*), Japanese barberry (*Berberis thunbergii*), Japanese knotweed (*Fallopia japonica*), and honeysuckle (*Lonicera spp.*). Wild parsnip (*Pastinaca sativa*), garlic mustard (*Alliaria petiolata*) and cow parsley or wild chervil (*Anthriscus sylvestris*) have been recorded in few locations and have the capacity to spread quickly. The prevalence in Marshfield of active agricultural fields, thin roadside hedgerows, and extensive forest edge creates a landscape prone to spreading invasive species. Multiflora rose (*Rosa multiflora*) has been detected at a singular location on the southern end of Hollister Hill Road.

Although not considered invasive, poison ivy (*Toxicodendron radicans*) is becoming problematic along some Vermont roadsides; it has been recorded in two locations in Marshfield, one near Twinfield School and another along the bike path near the school.

Roadside construction, maintenance and mowing can carry invasive plant seeds and fragments to other sections of roads. Developing a mowing policy in tandem with updated and improved mowing procedures can reduce the spread of invasive species along roadsides.

Recommendations

- Do not mow invasive plants after seeds have set. Knowing when invasive plants bloom will let you use mowing to your advantage to reduce the spread of invasive seeds. Follow the invasive plant phenology calendar below to learn when invasive plants bloom in Marshfield.
- Clean mowing equipment between road segments. Note where there are currently few invasive plant species (Map 7: Invasive Plant Species) and make sure that all mowing equipment is thoroughly cleaned before mowing, digging or ditching in these locations. In Marshfield, roads with few infestations of invasive plants include Cooper Hill Road, McKinstry Hill Road, Grimes Road, Barnes Road, and Centerville Road.

¹⁴ [Public Policy](#) on Vermont Urban & Community Forestry website: <https://vtcommunityforestry.org/resources/public-policy>

¹⁵ [Guide to Tree Ordinances and Policies for Vermont Municipalities](#). Vermont Urban & Community Forestry Program. <https://vtcommunityforestry.org/sites/default/files/pictures/treeordinanceguide.pdf>

¹⁶ [Tree Selection](#). Vermont Urban & Community Forestry Program. <http://www.vtcommunityforestry.org/resources/tree-selection>

¹⁷ [Vermont Tree Selection Guide](#). Vermont Urban & Community Forestry Program. https://vtcommunityforestry.org/sites/default/files/pictures/complete_vt_tree_selection_guide_2019.pdf

- During construction, minimize soil disturbances to avoid future weed control and inspect and wash equipment before moving to another site.
- Within these mowing parameters, consider allowing vegetation to be 10-12" high by the end of the growing season to protect native plants from winter damage¹⁸.
- For more information on reducing the spread of invasive plants along roadsides, see Appendix D: [Best Management Practices for Roadside Invasive Plants](#)¹⁹, released by The Nature Conservancy.
- For more information on the management of specific invasive terrestrial plants, see the VTinvasives.org website at <https://vtinvasives.org/gallery-of-terrestrial-plants>.

Plant-specific recommendations

- Areas infested with phragmites, Japanese knotweed or purple loosestrife **should not be mowed**. Small root fragments easily resprout in new locations. Chemical treatment is almost always required to eradicate Japanese knotweed. Japanese knotweed is very prevalent in Marshfield – consider locations where knotweed can be kept at bay enough to establish native trees that ultimately crowd out some knotweed, or where knotweed should be eradicated to preserve sight lines along roads.
- Other common invasive species (buckthorn, honeysuckle) should be cut (or mowed) **before they go to seed in mid-July**. Treatment of these species may also include use of herbicide by a licensed pesticide applicator.
- **Beware of poison ivy**. It is technically not an invasive species but is certainly problematic for road crews, walkers, and bicyclists.
- Poison (wild) parsnip (*Pastinaca sativa*) is most effectively removed by digging out the taproot. This plant is phototoxic; anyone handling it must wear protective clothing. For large infestations, mow after peak bloom but before seeds set (likely early July). Plants will resprout after mowing, so consider a second round of mowing or if chemical treatment is required. Burning is not an effective treatment.
- Areas infested with cow parsley/wild chervil (*Anthriscus sylvestris*) should be mowed **before the plants bolt and produce flowers (late May, early June)**. The plants are low at this time. Focus mowing on known infested areas to monitor changes over time and clean equipment before leaving infested areas.
- Wild chervil and poison (wild) parsnip (*Pastinaca sativa*) will flower again after mowing – repeat cutting before the plant seeds again to eradicate the plant population.
- Treatment of garlic mustard (*Alliaria petiolata*) should also occur before it goes to seed beginning **in late June**. However, mowing is not an effective control method. Hand pulling or use of foliar herbicide in the spring (late April, early May) or use of foliar herbicide on the basal rosettes by fall are effective control methods, as is flame weeding. Remember that application of any pesticide must be completed by a licensed pesticide applicator.

CALENDAR OF COMMON INVASIVE PLANT SPECIES PHENOLOGY IN VERMONT

¹⁸ Best Practices Handbook for Roadside Vegetation Management. Minnesota Local Road Research Board. <https://www.lrrb.org/pdf/200820.pdf>

¹⁹ Best Management Practices for Roadside Invasive Plants. The Nature Conservancy. <https://vtinvasives.org/sites/default/files/Best%20Management%20Practices%20for%20Roadside%20Invasive%20Plants.pdf>

Name	Apr	May	Jun	Jul	Aug	Sep	Oct
Common barberry (<i>Berberis vulgaris</i>)		Flowering		Seed Production			
		Mow					
Common buckthorn (<i>Rhamnus cathartica</i>)		Flowering		Seed Production			
		Mow					
Dame's rocket (<i>Hesperis matronalis</i>)		Flower & Seed Production					
		Mow					
Garlic Mustard (<i>Aliaria Petiolata</i>)		Flowering	Seed Production				
		Mow					
Glossy buckthorn (<i>Frangula alnus</i>)		Flowering		Seed Production			
		Mow					
Japanese barberry (<i>Barberis thunbergii</i>)		Flowering		Seed Production			
		Mow					
Japanese knotweed (<i>Fallopia japonica</i>)			Flower & Seed Production				
			Mow				
Shrub honeysuckle (<i>Lonicera spp.</i>)		Flowering		Seed Production			
		Mow					
Wild chervil or Cow Parsley (<i>Anthriscus sylvestris</i>)		Flowering	Seed Production				
		Mow					
Wild parsnip or poison parsnip (<i>Pastinaca sativa</i>)		Flowering	Seed Production				
		Mow					

6. Understand the vegetation management goals of your utility companies

The Marshfield town plan specifies that “town policy is to promote transmission and distribution lines which are designed to minimize negative impacts on natural and scenic resources”. Understanding the vegetation management goals of the utility companies operating in Marshfield and opening dialog with these utilities will help residents understand how to safely manage and plant vegetation on their property and learn how utility line maintenance will affect existing vegetation over time. The Marshfield road crew can also benefit from knowing the clearing rotation of vegetation in utility right-of-ways and plan accordingly to manage ash trees, hazard trees, invasive species and living snow fences that affect rural roads.

Marshfield is served two electrical utilities, Green Mountain Power and Washington Electric Co-op.

Recommendations

- Review the vegetation management plans of your local utility companies listed below. Consider if the town should enter into discussion regarding clearing practices in the right-of-way.
 - Green Mountain Power shares both a [2014 Integrated Vegetation Management Plan](#)²⁰ and a [2013 Transmission Right-of-Way Management Plan](#)²¹.
 - Washington Electric Cooperative shared their 2006 Vegetation Management Plan with the Vermont Urban & Community Forestry Program – it is included as Appendix E. Dan Weston of WEC also noted that the cooperative is in the process of developing a plan to manage for EAB along their routes. Note that single phase primary and/or secondary

²⁰ The link to the Green Mountain Power [2014 Integrated Vegetation Management Plan](#) is too long to print here. Use a search engine to search the specific title; you will then be able to download the document.

²¹ Similarly, the link to the Green Mountain Power [2013 Transmission Right-of-Way Management Plan](#) is too long to print here. Use a search engine to search the specific title; you will then be able to download the document.

conductors are cleared of trees within 15 feet of each side of the pole line center.
Three phase primary conductors are cleared within 25 feet each side of the pole line.

7. Understand updated stormwater regulations

Backroad erosions is recognized as a non-point source of sediment and phosphorous pollution in Vermont's waterways. As part of the state's all-in approach to clean water, municipalities are now required to create multi-year plans to correct drainage patterns along eroding roads that are connected to streams, ponds, and other water bodies. The new [Municipal Roads General Permit](#) outlines the steps towns must now take to identify erosion risks in their town and plan for corrective action.

However, trees and other vegetation play a role in controlling erosion and protecting water quality. The Municipal Roads General permit includes some waivers where standard permit regulations do not need to be met as prescribed. These include areas where roadside construction would impact significant environmental and historic resources (including historic landscapes) or landscapes or vegetation within 250 feet of a lakeshore. Review the updated recommendations in the [Better Roads Manual](#)²² (January 2019) and look for places where clean water goals can be met through carefully balanced construction and vegetation preservation.

8. Keep abreast of funding opportunities

Grants to support water quality improvements, vegetation planning, road maintenance that benefits water quality, and community and commerce development may benefit Marshfield as it moves forward with vegetation planning in public spaces including the road right-of-way. Although Unfortunately, the granting organization, due date for applications, and amount of available funding change annually. Below is a list of key grants that may be available to Marshfield, particularly if it has a roadside vegetation plan already in place.

²² Vermont Better Backroads Manual, January 2019:

<https://vtrans.vermont.gov/sites/aot/files/highway/documents/lrf/Better%20Roads%20Manual%20Final%202019.pdf>

**KEY GRANTS TO SUPPORT MUNICIPALITIES
ROADSIDE VEGETATION MANAGEMENT, ROAD EROSION CONTROL & WATER QUALITY INITIATIVES**

VERMONT AGENCY OF NATURAL RESOURCES

GRANT PROGRAM	DESCRIPTION	FUNDING DETAILS	DUE DATE
Caring for the Canopy	Support the development of sustainable urban and community forestry programs at the local level. Grants are currently focused on emerald ash borer municipal planning	Awards change each year. 2019 awardees received \$2,000 in cost-share grant money.	Annually, January
Vermont Watershed Grant	Support water-related projects that protect or restore fish and wildlife habitats, protect or restore water quality, and shorelines, reduce phosphorus loading and/or sedimentation as part of DEC's Clean Water Initiative objectives, enhance recreational use and enjoyment, identify and protect historic and cultural resources; educate people about watershed resources, or monitor fish and wildlife populations and/or water quality.	Awards made up to \$10,000, depending on project category type. Category types and the maximum grant amount for each project category type are as follows: <ul style="list-style-type: none"> • Education and outreach – up to \$5,000 • Planning, assessment, inventory, monitoring – up to \$3,500 • On-the-ground implementation – up to \$10,000 	Annually, February
Municipal Roads Grants-in-Aid Pilot*	Road erosion control projects on hydrologically connected road segments currently not meeting draft Municipal Roads General Permit standards	Funding allocated based on towns' hydrologically connected road miles Match Requirement: 20% local cash/in-kind	Annually, July
Ecosystem Restoration Grants*	Design and construction of water pollution abatement and control projects that target nonpoint sources of pollution, including stormwater management, natural resources restoration, road erosion control, and municipal capital equipment projects	Match Requirement: 50% for MS4 stormwater/road projects Capital equipment projects: 50% for large towns (> 5,000 residents) 20% for small towns (< 5,000 residents) Non-MS4/capital equipment projects	Rolling applications with quarterly review
Multi-Sector Clean Water Block Grant	Construction of clean water improvement projects, administered by statewide partner(s), including stormwater management and natural resources restoration projects	Total Funding Available: \$1.5 million Match Requirement: 50% for MS4 stormwater/road projects 20% for non-MS4 projects	Annually, June

VERMONT AGENCY OF TRANSPORTATION

GRANT PROGRAM	DESCRIPTION	FUNDING DETAILS	DUE DATE
Municipal Highway and Stormwater Mitigation*	Environmental mitigation activities, including stormwater and water pollution prevention, management, and control related to highway construction or highway runoff	Max. Award: N/A Match Requirement: 20% local	Annually, late summer
Better Roads*	Municipal roadway improvements that benefit water quality: <ul style="list-style-type: none"> • Inventories of roadway erosion and/or stormwater management issues and capital budget planning (Category A) • Correction of road related erosion and/or construction of stormwater management projects (Category B) • Correction of streambank and/or slope related problems (Category C) 	Max. Award: Category A: \$8,000 Category B: \$20,000 Category C: \$40,000 Category D: \$40,000 Match Requirement: 20% local	Annually, late spring

	<ul style="list-style-type: none"> Roadway structures and culvert upgrades (Category D) 		
Transportation Alternatives Program*	Environmental mitigation activities, including stormwater and water pollution prevention, management, and control related to highway construction or highway runoff	Maximum Award: \$300,000 Match Requirement: 20% for design and construction, 50% for scoping	Annually, fall

VERMONT AGENCY OF COMMERCE AND COMMUNITY DEVELOPMENT

GRANT PROGRAM	DESCRIPTION	FUNDING DETAILS	DUE DATE
Municipal Planning Grant	Encourages and supports planning and revitalization for local municipalities in Vermont. Since 1998, the MPG program has provided over \$12 million to 234 cities and towns across Vermont to help breathe new life into communities, plan for future growth and development, and improve the quality of life.	Maximum Award: \$35,000 in 2019 Match Requirement: 10% local	Annually, October
Downtown Transportation Fund	Funds transportation-related capital improvements within or serving a designated downtown district. Past projects include parking facilities, pedestrian and streetscape improvements and utility relocation. New this year – the DTF has clean water funds to support green stormwater infrastructure improvements in coordination with the transportation project.		Annually, March
Better Connections	The grant program is a partnership between ACCD and VTrans that supports and guides local investments in transportation options through a wide array of planning activities including, downtown and village center master plans, corridor plans and innovative guidelines and bylaws. For a complete list of current and past projects, visit the program’s story map .	Match Requirement: 10% local	Annually, January

OTHER GRANTING ORGANIZATIONS

GRANT PROGRAM	DESCRIPTION	FUNDING DETAILS	DUE DATE
Vermont Community Foundation	The scope of grants managed by the Vermont Community Foundation vary by location. See their website for current available grants.	See applicable grant application.	

* As borrowed from the Vermont Clean Water Funding Opportunities for Municipalities (SFY2018).
http://www.nvda.net/files/sw_MunicipalWQGrants_2017.pdf

Resilient Right-of-Ways

Field data for the Town of Marshfield, Vermont
Part of the Resilient Right-of-Ways Action Plan and Recommendations
Prepared by Joanne Garton, Vermont Urban & Community Forestry Program
May 7, 2019





Resilient Right-of-Ways Project Data Marshfield, VT

1. Resilient Right-of-Way Community Types



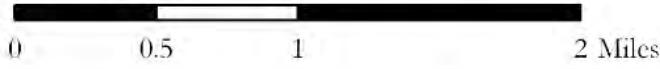
Vermont Department of
Forests, Parks & Recreation

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Cartographer: Elizabeth Bannar

Date: 4/8/2019

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Legend

— 2018 Inventory Roads

Road Surface

— Paved

--- Unpaved

--- Other

Type

🌲 No overstory (shrubs & saplings)

🌲 Immature overstory (≤6" dbh)

🌲 Mature overstory (>6" dbh)

🌲 Bare

🌲 Mowed

🌲 Wet Area

🌲 Forest

🌲 Street Trees



WHAT

Right-of-way vegetation is sometimes indistinguishable from the forests or fields on private land that neighbor rural roads. At other times, however, the transition between this publicly managed land and private property can be quite stark: young beech trees can end abruptly at a private lawn, or a cleared roadside ditch can border mature private trees. Town-managed land can be quite different from surrounding land.

HOW

Within each 100-meter plot, vegetation in the right-of-way was classified into one of four broad categories, each with distinguishing subcategories:



Tree-lined or forested

- **Emerging Overstory:** A shrub or sapling-lined road that exhibits stages of an early forest but does not yet exhibit canopy that shades the road.
- **Immature Overstory:** The tree-lined or forested roadside with overstory composed of mostly immature trees of less than 6" diameter (at breast height, also called "DBH").
- **Mature Overstory:** As above with overstory composed of mostly mature trees of greater than 6" diameter (at breast height, also called "DBH").
- **Street Trees:** Intentionally planted trees are within the ROW that are surrounded by an established herbaceous layer, mowed grass, or predominantly bare ground.



Mowed

- Frequently mowed (like a lawn).
- Seasonally mowed or harvested (like a hayfield or cornfield).



Wet

- Naturally wet due to ponds, rivers or lakes.
- Artificially made wet because of berms or ditches associated with the road.



Bare

- Due to hardscaped landscapes on the roadside, such as stone-lined ditches.
- Due to repeated disturbance such as scraping or trampling.

WHY

Identifying the type of vegetation in the right-of-way tell us:



The level of obligation the town currently has towards tree care, mowing, or effects of ice and roadside erosion due to stagnant or moving water.



How town residents may perceive their rural roadsides, sometimes independent of adjacent private land use.



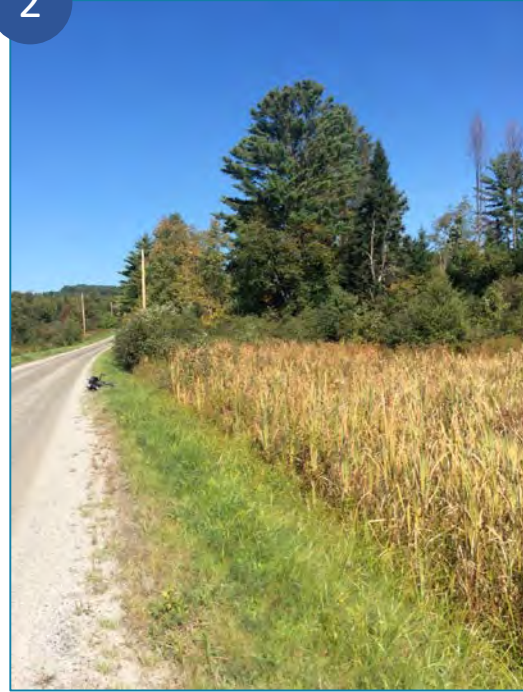
Where immature forests may become mature forests with appropriate forest management, or where mature forests may need yearly monitoring for risk trees.

1



A 9-foot wide strip of mature forest with established understory borders the cleared zone along this section of Holt Road.

2



Following recommended best practices for rural roads through wet areas is crucial along this section of Brook Road.

3



Grazing or mowing occurs into the right-of-way and to the edge of this section of Hollister Hill Road. One shade tree (ash) provides canopy cover for the road. The town may consider growing a vegetated buffer between the road and field.

4



The entire right-of-way along this section of Calais Road is taken up by a 22-foot wide road and a 14-foot wide seasonally mowed cleared zone. Trees are on neighboring private land.

STATISTICS IN MARSHFIELD

The right-of-way vegetation types on the **approximately 24 miles** of surveyed rural routes in Marshfield exhibited the following general characteristics:

- 72%** Tree-lined, forested, or future forest: (151 / 211)
- Emerging overstory: **8%** (16 / 211)
 - Immature overstory: **15%** (31 / 211)
 - Mature overstory: **49%** (103 / 211)
 - Street Trees: **< 1%** (1 / 211)

- 21%** Mowed:(44 / 211)
- Frequently: **5%** (11 / 211)
 - Seasonally: **16%** (33 / 211)

- 3%** Wet areas: (15 / 211)
- Riparian area, pond, lake edge, wetland: **2%** (5 / 211)
 - Wet ditch: **5%** (10 / 211)

- 1%** Bare: **< 1%** (1 / 211)

Resilient Right-of-Ways Project Data Marshfield, VT

1. Resilient Right-of-Way Community Types



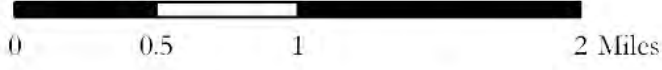
Vermont Department of
Forests, Parks & Recreation

1:43,000

Cartographer: Elizabeth Bannar

Date: 4/8/2019

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Legend

— 2018 Inventory Roads

Road Surface

- Paved
- Unpaved
- - - Other

Type

🌳 No overstory (shrubs & saplings)

🌳 Immature overstory ($\leq 6"$ dbh)

🌳 Mature overstory ($> 6"$ dbh)

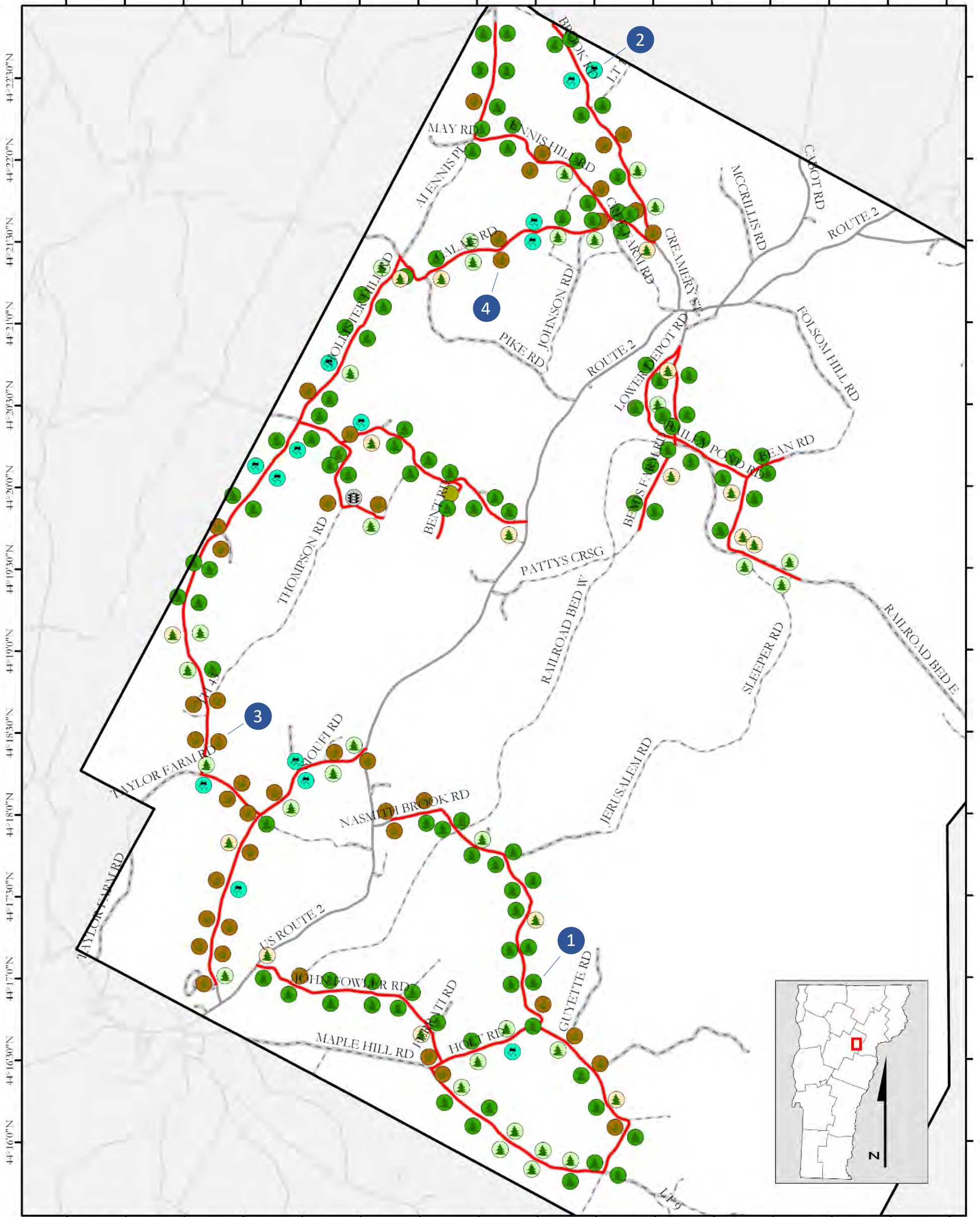
🌳 Bare

🌳 Mowed

🌳 Wet Area

🌳 Forest

🌳 Street Trees



Resilient Right-of-Ways Project Data Marshfield, VT

2. Manageable Vegetation Width



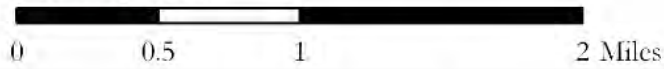
Vermont Department of
Forests, Parks & Recreation

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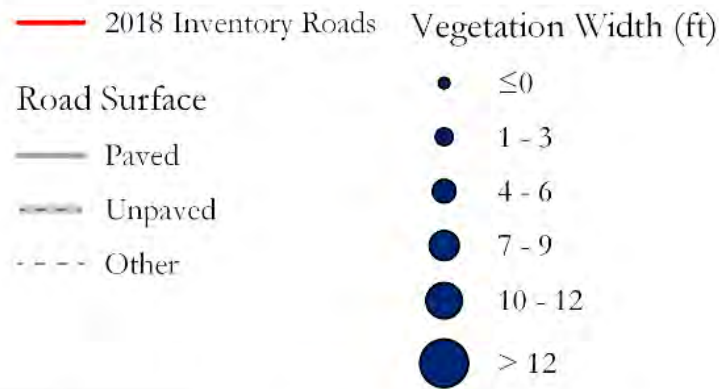
Cartographer: Elizabeth Bannar

Date: 4/8/2019

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Legend



WHAT

In most towns, the right-of-way spans 49.5 feet, or 24.25' in each direction from the centerline of the road. The travelled width of an unpaved road and the clear zone adjacent to the road can vary depending on topography, road erosion, road entrenchment, or neighboring land features. As such, the actual width of vegetation that the town can manage alongside its roads is often what is "leftover" after consideration of the width of the road and its associated infrastructure.

HOW

In this study, manageable vegetation width was calculated through a three-step process.



1. The road width was measured from travelled edge to travelled edge using a 25' tape measure.
2. The cleared zone (whether mowed, ditched, or bare) was measured on each side of the road using the same tape measure.
3. The manageable vegetation width was calculated for each side of the road by subtracting half the road width and the side-specific clear zone width from half of the right-of-way width, or, manageable vegetation width = (ROW width/2) - (Road width/2) - clear zone width.

WHY

Measuring the width of the road, the width of the clear zone on each side, and calculating the manageable vegetation width on each side of a rural road tells us:



Where opportunities exist to perform recommended silvicultural practices on significant swaths of publicly managed roadside forest.



Where wide roads and ditches or clear zones are impacting right-of-way vegetation, allowing the town to evaluate if these road widths are necessary or desired.



Where forest regeneration or replanting may be helpful to demarcate road edges, improve tree canopy to reduce dust, or increase a desired aesthetic (more trees, more fields, or selected trees) along designated scenic routes.

STATISTICS IN MARSHFIELD

The manageable vegetation width in the on the **approximately 24 miles** of surveyed rural routes in Marshfield exhibited the following general characteristics:

Road width (ft)

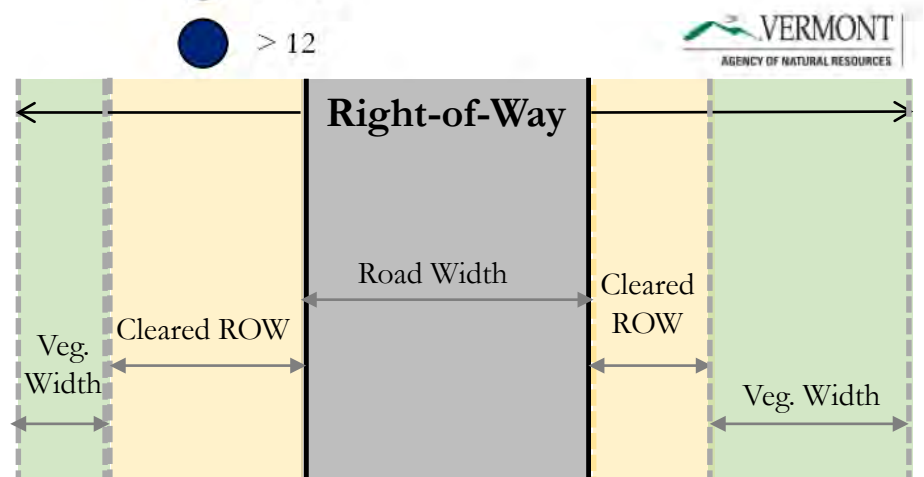
- Range: 10– 29
- Average: 18.0
- Median (or, middle value): 18
- Mode (or, most frequent value): 18

Clear zone width (ft)

- Range: 0 – 18
- Average: 8.0
- Median (or, middle value): 7
- Mode (or, most frequent value): 7

Manageable vegetation width (ft)

- Range: 0 – 17
- Average: 7.8
- Median (or, middle value): 8
- Mode (or, most frequent value): 8



Resilient Right-of-Ways Project Data Marshfield, VT

2. Manageable Vegetation Width



Vermont Department of
Forests, Parks & Recreation

1:43,000

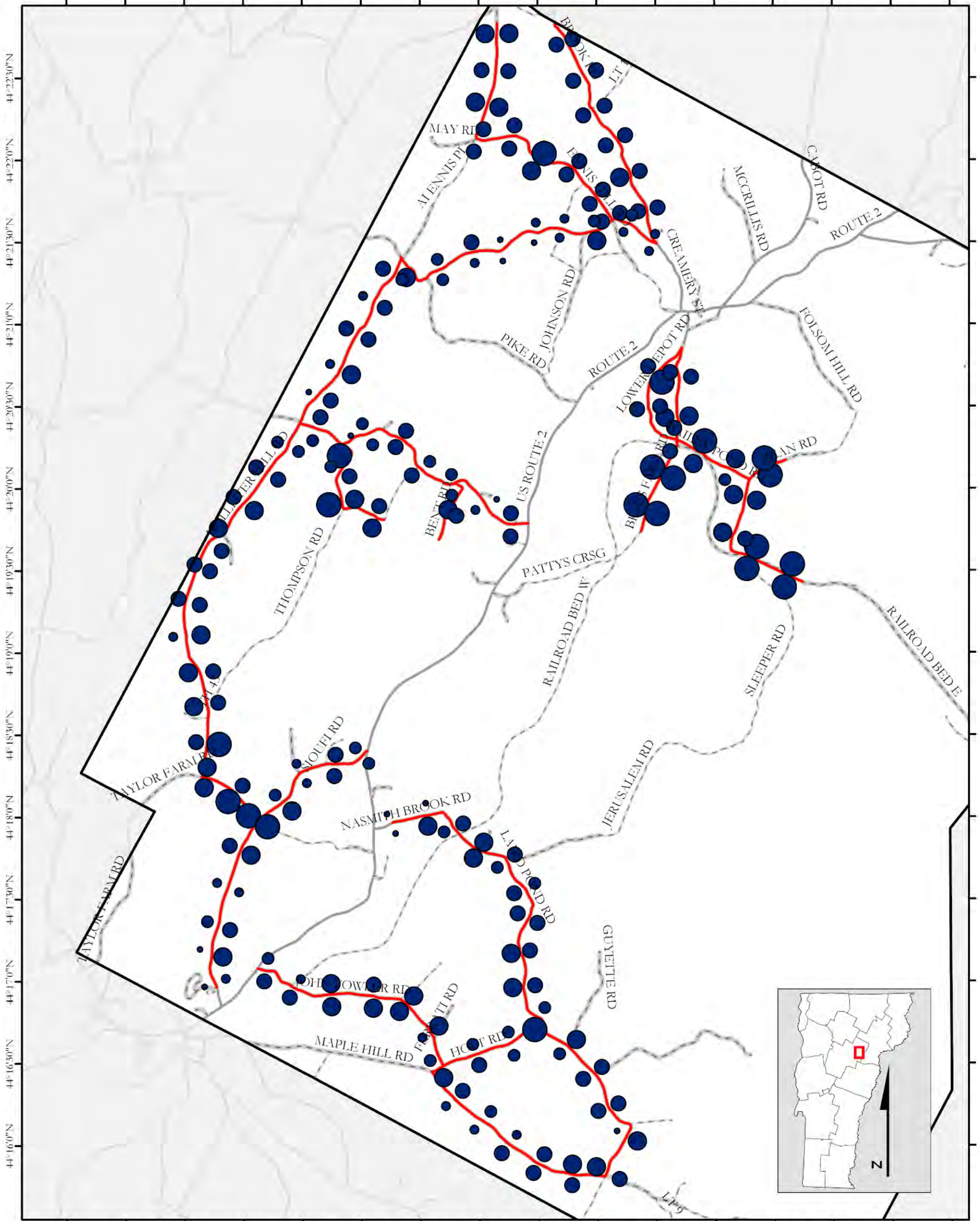
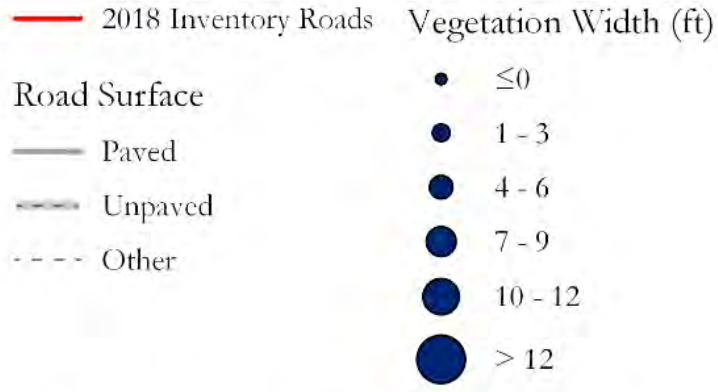
Cartographer: Elizabeth Bannar

Date: 4/8/2019

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Legend



Resilient Right-of-Ways Project Data Marshfield, VT

3. Roadside Ash Impact



Vermont Department of
Forests, Parks & Recreation

1:43,000

Cartographer: Elizabeth Bannar

Date: 4/8/2019

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Legend

2018 Inventory Roads	Roadside Ash Count
Road Surface	None
Paved	Low (1-2)
Unpaved	Medium (3-4)
Other	High (5+)



WHAT

Ash tree health is currently threatened by the arrival of emerald ash borer, a non-native and invasive insect that attacks all species of ash trees. Once infested, most ash trees will die within 3-5 years, posing a risk to all road users.

HOW

In this study, field staff tallied ash trees over 4" diameter at breast height (DBH) that would affect the road if portions or all of the tree weakened and fell. Tallies were counted within the right-of-way of each 100-meter plot and within adjacent areas on private land that host ash trees tall enough to fall on the road.

WHY

Identifying the presence and ash trees that may affect the road helps us:

- Understand how ash trees are distributed on the landscape surrounding survey roads.
- Estimate how many ash the town will need to manage when emerald ash borer is present.
- Identify where opportunities for replanting or forest regeneration may exist after ash die or are removed.

RECOMMENDATIONS

- Conduct an [ash tree inventory](#) to determine the location, distribution and size of ash trees along your rural roads. Note whether ash trees are located upslope or downslope of a road that crosses a steep slope.
- Plan to manage ash along rural roads as part of a [town-wide EAB Management Plan](#). Consider how to remove at risk or dead trees, or select trees for treatment. Plan to use ash wood locally.
- Work with neighboring landowners to anticipate the death or removal of roadside ash trees. Consider targeted planting efforts to improve roadside canopy, reduce road erosion, protect water quality, and increase landowner privacy, particularly where right-of-way vegetation is bordered by agricultural fields or lawn. The Urban & Community Forestry Program has several examples of in-state and out-of-state partnership documents between towns and private landowners that arrange funding and care of planted trees planted where right-of-way planting alone is challenging.
- Note the timing of invasive plant flowering and seed set when planning tree removal work. Monitor ash removal sites for invasive plants that often thrive on disturbed soil and with the increased sunlight resulting the new canopy breaks.

RESOURCES

- [Ash Tree Inventories](https://vtcommunityforestry.org/ash-inventory) on the Vermont Urban & Community Forestry Website: <https://vtcommunityforestry.org/ash-inventory>
- [Emerald Ash Borer Management](https://vtcommunityforestry.org/community-planning/tree-pests) on the Vermont Urban & Community Forestry Website: <https://vtcommunityforestry.org/community-planning/tree-pests>

1



1



Ash trees make up the majority of this portion of hedgerow along Eaton Cemetery Road. A dying ash sits next to a utility line and near a busy road intersection. The utility company should consider addressing this tree as part of its ash management plan.

2



Large, mature ash trees grow next to dying beech trees along this portion of Hollister Hill Road. Little to no herbaceous cover on the ground does little to reduce transport of sediment eroded from the road. Additionally, bare soil may easily host invasive plants that are established nearby.

3



These ash stand between a widening road and utility corridor. The town may consider narrowing the travelled lane by planting native grasses or shrubs or encouraging forest regeneration.

Resilient Right-of-Ways Project Data Marshfield, VT

3. Roadside Ash Impact



Vermont Department of
Forests, Parks & Recreation

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Cartographer: Elizabeth Bannar

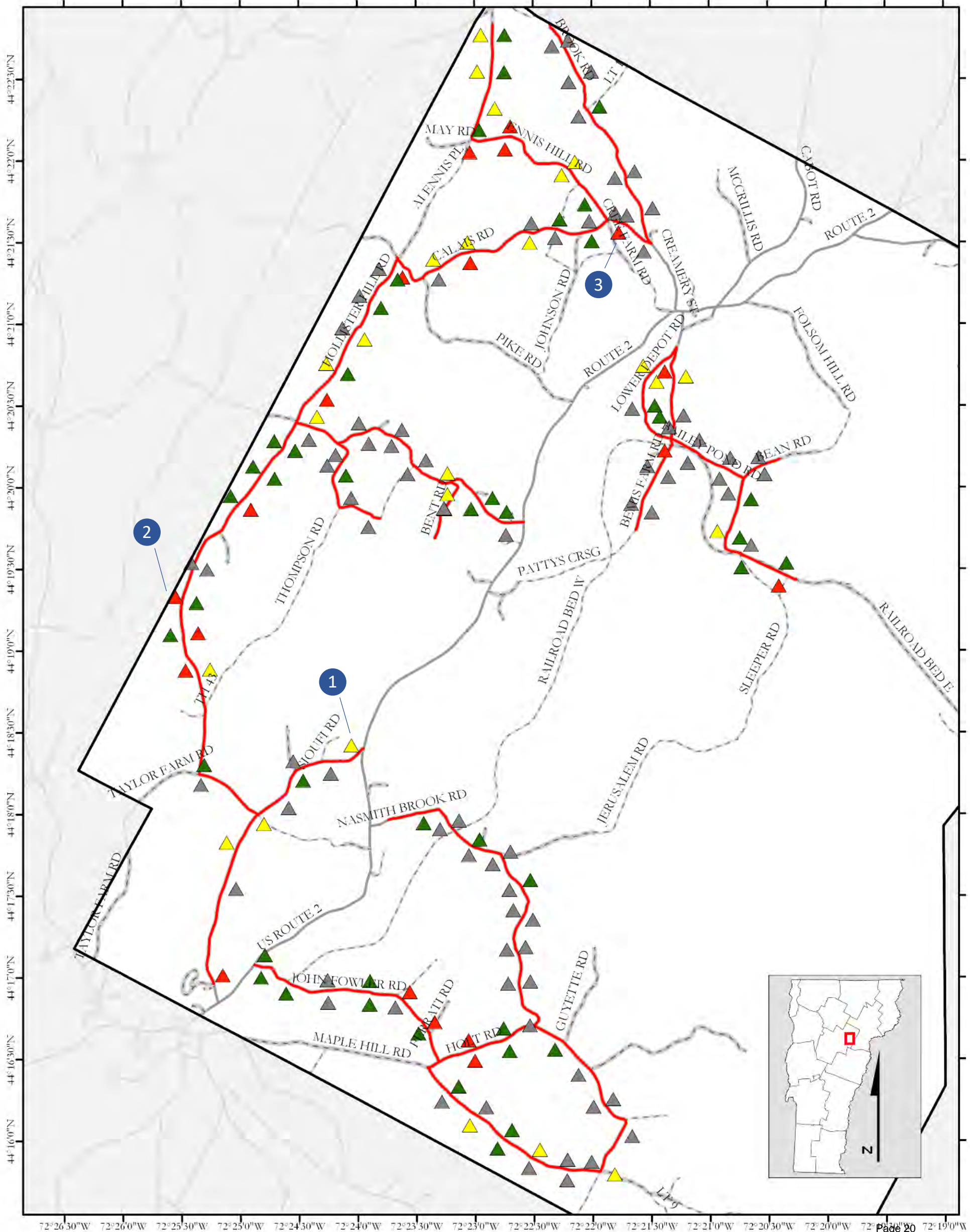
Date: 4/8/2019

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Legend

- | | |
|----------------------|---------------------------|
| 2018 Inventory Roads | Roadside Ash Count |
| Road Surface | None |
| Paved | Low (1-2) |
| Unpaved | Medium (3-4) |
| Other | High (5+) |



Resilient Right-of-Ways Project Data Marshfield, VT

4. Overhead Utility & Vegetation Regeneration Opportunities



Vermont Department of
Forests, Parks & Recreation

1:43,000

Cartographer: Elizabeth Bannar

Date: 4/8/2019

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Legend

- | | | | |
|--|----------------------|--|--------------|
| | 2018 Inventory Roads | | Road Surface |
| | Yes | | Paved |
| | Promote Regeneration | | Unpaved |
| | | | Other |



WHAT

Utility companies play a large role in deciding the composition and health of roadside vegetation. Understanding where your utility companies work and how they structure their roadside pruning and clearing rotations will help town residents plan for changes in their roadside vegetation structure and not be surprised by sudden pruning, clearing, or mowing.

HOW

In this study, the impact of an overhead utility on the right-of-way was recorded after visual assessment of the 100-meter plot. Recording a “yes” for a utility impact indicated the presence of the utility within the town’s 49.5-foot right-of-way or an impact on the town’s right-of-way vegetation if the utility was located outside of the town’s 49.5-foot right-of-way. Also noted are locations where the town can consider promoting regeneration of vegetation within the guidelines of the utility company.

WHY

Identifying the presence or impact of overhead utilities within the right-of-way tells us:

- Where towns can partner with utility companies to manage unique vegetation that is hindered by the utility company’s standard procedure.
- Where landowners can be alerted to the practices implemented by the utility company servicing their road.
- Where the town should rely on the utility company for assistance removing downed trees.
- Where there are roads not impacted by overhead utilities, offering more opportunity for established forestry practices.

RECOMMENDATIONS

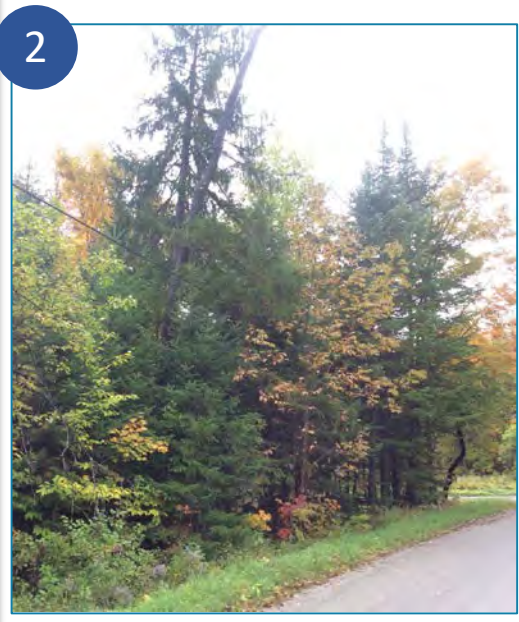
- Work with the local utility companies to understand their clearing rotation. Identify where town and utility company priorities overlap. Preserve some structurally sound trees near utility lines, including woody shrubs and small trees such as dogwoods or hophornbeam. Ensure that site-lines remain clear as understory become dense.
- Promote vegetated buffers of grasses and ensure that disturbed areas are revegetated with native seed mixtures.
- Keep yourself and your equipment at least 10-feet away from overhead utility lines. Treat all power lines as energized. Never cut or prune trees within 10 feet of an overhead utility and never attempt to remove trees or limbs from a utility line.
- Call 888-DIG-SAFE at least 48 hours before you dig. Dig Safe a free and legally-required service that alerts you of any underground utilities in the area you may need to dig.

RESOURCES

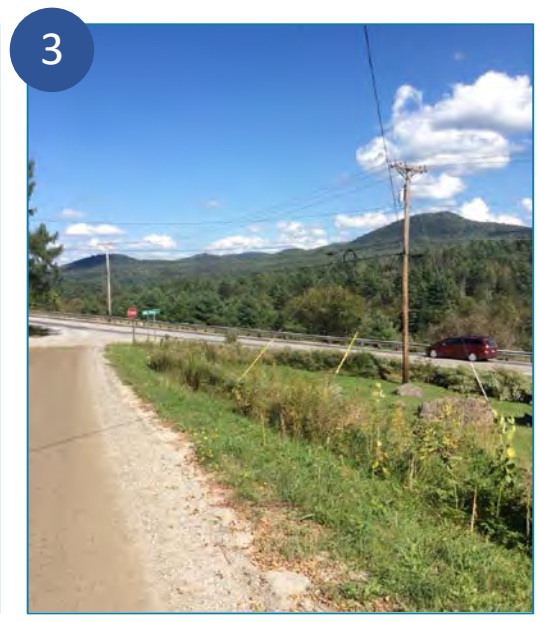
- [Safety Guide](https://greenmountainpower.com/learn/safety-guide/) on the Green Mountain Power website.
- [Trees & Utilities: Cooperative Management Strategies for Success.](https://njaes.rutgers.edu/pubs/publication.php?pid=FS1006) Rutgers University website:



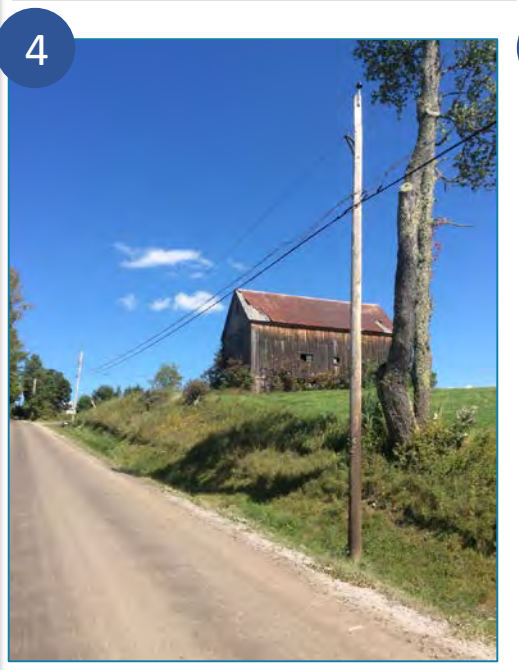
1 A 10-foot wide mowed zone next to the travelled portion of Beaver Meadow road keeps vegetation away from the utility line. However, the road and utility corridor passes directly through a wetland and pond. Examine why the mowed zone is wide here and if the utility company can do more to promote regeneration and preserve herbaceous buffer between the road and water body.



2 The town will generally not be responsible for trees that impact this utility line along Lower Depot Road. However, road crew and residents will want to monitor tree health along this road, particularly after pruning or clearing that may make neighboring trees more susceptible to wind damage.



3 Frequent mowing in the right-of-way keeps the utility line clear of hazards. However, the town may consider what low-growing plants and shrubs may help the filter runoff, increase plant diversity, delineate the road edge and increase visual interest along this section of Eaten Cemetery Road and Route 2.



4 The utility pole is now located in a shallow roadside ditch along Hollister Hill Road. Consider revegetating the area surrounding the utility pole to reduce the erosive power of stormwater runoff and to reestablish a buffer between the road and utility pole.

Resilient Right-of-Ways Project Data Marshfield, VT

4. Overhead Utility & Vegetation Regeneration Opportunities



Vermont Department of
Forests, Parks & Recreation

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Cartographer: Elizabeth Bannar

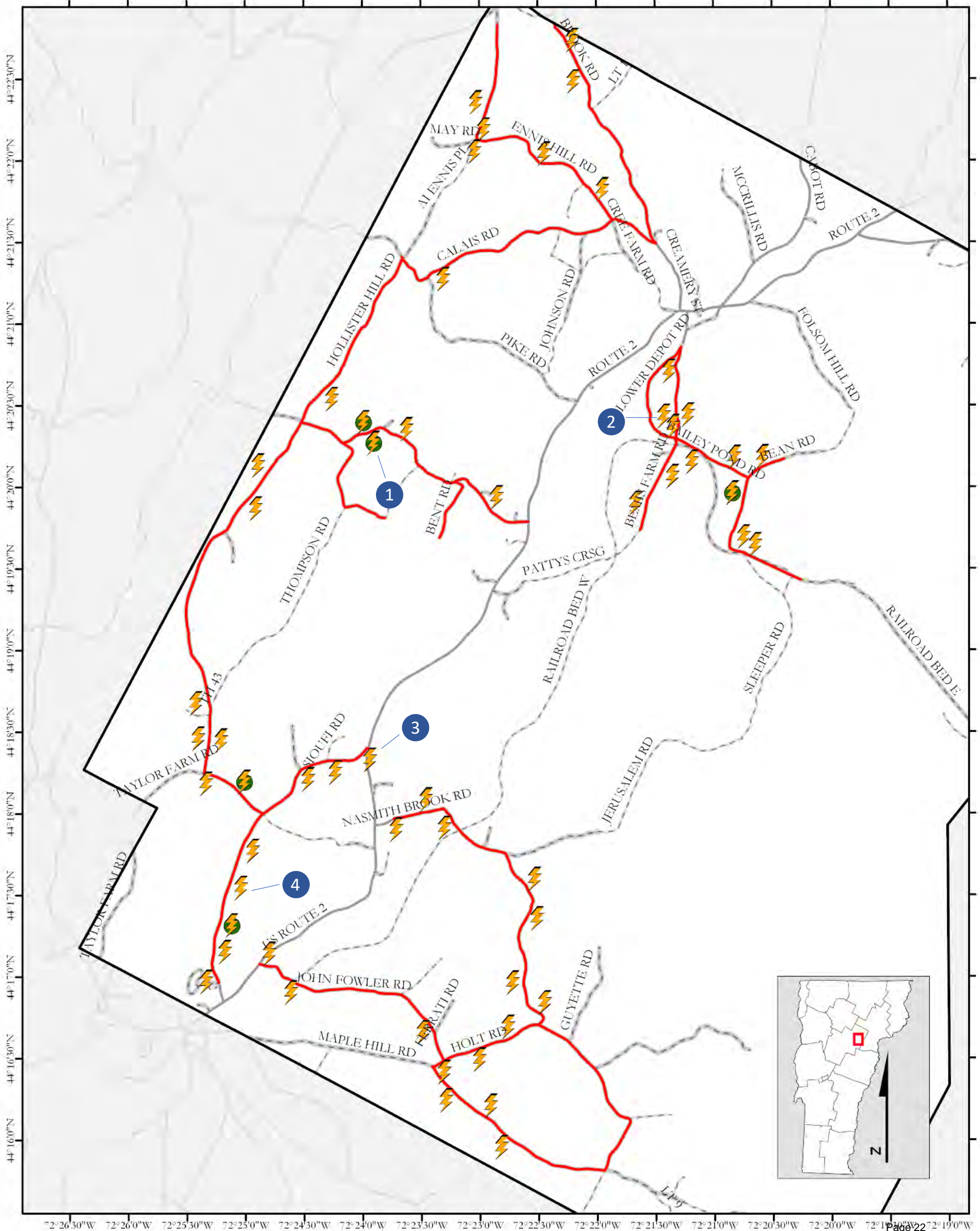
Date: 4/8/2019

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Legend

- | | | | |
|--|----------------------|--|--------------|
| | 2018 Inventory Roads | | Road Surface |
| | Yes | | Paved |
| | Promote Regeneration | | Unpaved |
| | | | Other |



Resilient Right-of-Ways Project Data Marshfield, VT

5. Hedgerow Locations



Vermont Department of
Forests, Parks & Recreation

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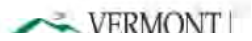
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Date: 4/8/2019

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Legend

2018 Inventory Roads	Roadside Community Type
Road Surface	No overstory (shrubs & saplings)
Paved	Immature overstory (≤6" dbh)
Unpaved	Mature overstory (>6" dbh)
Other	Bare
Hedgerow	Mowed
	Wet Area
	Forest



WHAT

For the purposes of this study, hedgerows are defined as narrow strips of trees and shrubs that border a road on one side and a field, lawn, or body of water on the other. For a traveler on the road, hedgerow trees create defining characteristics of the road's environment, demarcate the road edge, provide canopy cover for small mammals and birds, create a wind breaks and shade, filter stormwater, and provide beauty and enjoyment.

HOW

When a survey plot included trees, field staff evaluated whether or not the trees were part of a hedgerow located either within the right-of-way or spreading from the right-of-way onto private property. Locations on the map marked with green squares mark where trees were part of hedgerow.

WHY

Identifying the presence of hedgerows helps us:

- Evaluate where wildlife may be traveling through otherwise unforested landscapes.
- Highlight areas where landowners may be particularly sensitive to roadside tree cutting (hedgerows create a privacy screen that many homeowners value).
- Highlight areas where hedgerows bordering agricultural fields may conflict with the goals of the farmer.
- Address whether scenic views are being impeded by hedgerows.

RECOMMENDATIONS

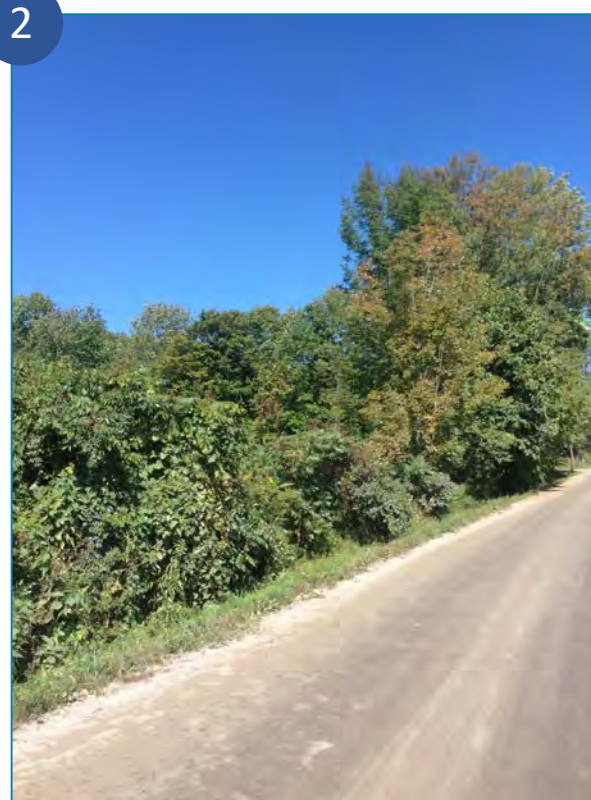
- Identify where ash trees make up a large portion of the trees in a hedgerow. Consider targeted replanting or interplanting in these areas to mitigate canopy loss when ash trees die.
- Identify landowners who may be willing to monitor for invasive species in hedgerows border their property.
- Identify where hedgerows may be unintentional. Some hedgerow trees and shrubs grow only when animals stop grazing fields or land use changes. Utilize the expertise of the tree warden or another forester to plan for targeted and thoughtful tree pruning and/or removal of some trees according to recommended best practices.
- To mitigate road erosion without cutting trees, utilize best management practices outlined in the recently updated [Better Roads Manual](#) to direct surface runoff off the road in either directed outlets or through ditching that extends into the existing travel lane. Recommendations about construction of turnouts is included in the Better Roads Manual on page 33.

RESOURCES

- [Better Roads Manual](https://vtrans.vermont.gov/sites/aot/files/highway/documents/ltf/Better%20Roads%20Manual%20Final%202019.pdf). Northern Vermont & George D. Aiken Resource Conservation and Development Councils, updated January 2019.



Mature forest and established understory create a hedgerow forest along John Fowler Road. Road crews need to ensure that stormwater can flow into neighboring vegetated land and may consider turnouts instead of ditching when necessary.



These shrubs and saplings along Hollister Hill Road will one day become overstory vegetation if left undisturbed. They serve as a visual barrier between the road and a farm.



Many hedgerows like this one on Lower Depot Road separate a road from a field, lawn or home. The hedgerow may have grown unintentionally but now retains a roadside bank and creates privacy. The town may consider these trees particularly important to preserve as they grow into mature roadside canopy trees.

Resilient Right-of-Ways Project Data Marshfield, VT

5. Hedgerow Locations



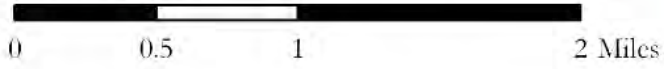
Vermont Department of
Forests, Parks & Recreation

1:43,000

Cartographer: Elizabeth Bannar

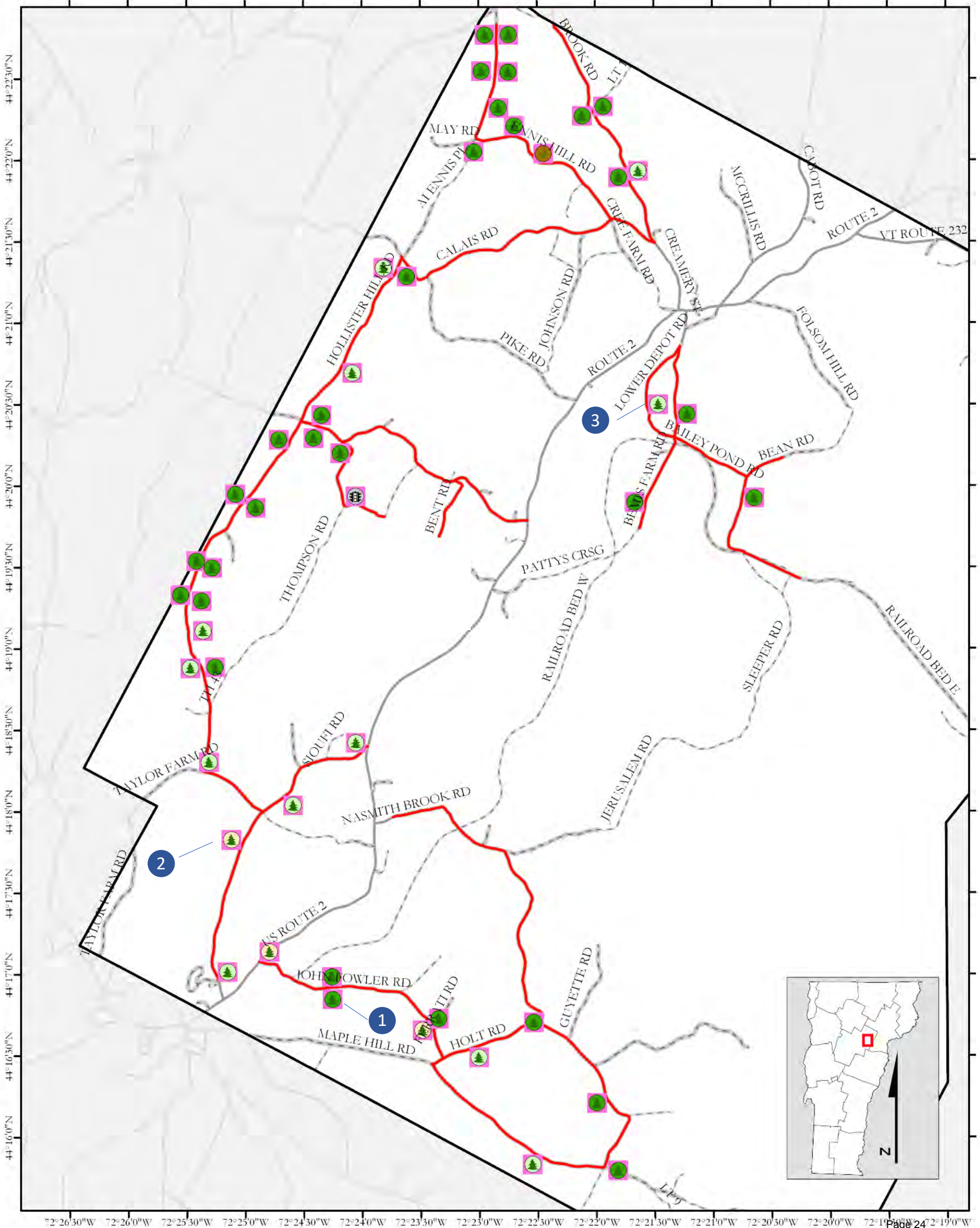
Date: 4/8/2019

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Legend

- | | |
|----------------------|----------------------------------|
| 2018 Inventory Roads | Roadside Community Type |
| Road Surface | No overstory (shrubs & saplings) |
| Paved | Immature overstory (≤6" dbh) |
| Unpaved | Mature overstory (>6" dbh) |
| Other | Bare |
| Hedgerow | Mowed |
| | Wet Area |
| | Forest |
| | Street Trees |



Resilient Right-of-Ways Project Data Marshfield, VT

6. Overstory Health & Mechanical Damage



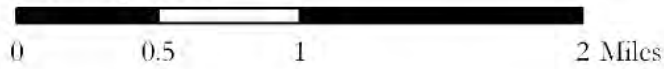
Vermont Department of
Forests, Parks & Recreation

1:43,000

Cartographer: Elizabeth Bannar

Date: 4/8/2019

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Legend

- 2018 Inventory Roads
- Health, Damage
- Poor, high
- Poor, low
- Fair, high
- Fair, low

- Road Surface
- Paved
- - - Unpaved
- - - - Other

Health

- Poor



WHAT

Yearly visual examination of the health of overstory trees in the right-of-way is an efficient and low-tech field method to help towns form their roadside forest management priorities. Trees may be in decline because of their age, surrounding soil conditions, disease, or pests. However, some roadside trees decline because of repeated damage from equipment strikes by mowers and plows or from acute damage inflicted during ditching, a vehicle collision, or branch clearing with a raised flail mower. Any trees with documented fair or poor overstory health that also exhibit mechanical damage may be particularly susceptible to breaking or falling.

HOW



Overstory health of trees within the right-of-way was assessed visually in the field using reference guides such as [The Vermont Tree Inventory Guide](#) (p. 16-18). The level of mechanical damage to trees within the right-of-way was also assessed visually in the field. This map displays co-locations rated with “fair” or “poor” overstory health and “high” or “low” mechanical damage.

WHY

Identifying locations exhibiting declining tree health and notable mechanical damage helps us:



Describe sample locations where roadside forest management can be proactive, promoting healthy canopy trees and reducing possible risk posed by dead or dying trees.



Identify locations where road-tree conflicts exist, then determine if road crews should use narrower or alternate road maintenance equipment, or if a tree should be removed.



Identify where trees may be in decline due to environmental stressors, allowing towns to prioritize replanting, interplanting, or forest regeneration.



Determine if future road construction sites should also involve roadside forest management.

RECOMMENDATIONS



Note roads where the road foreman expresses concerns about using the plow or grader. Work with the tree warden, conservation commission, and/or neighboring landowners to address tree preservation or removal.



Where roadside trees border lakes and ponds, consult the [Municipal Roads General Permit: A Guide for Lakeshore Roads](#) to understand best practices for managing vegetation along lakeshores and important exemptions to the Municipal Roads General Permit.



Where road-tree conflicts occur on steep banks, review the **Bank Stabilization Section** in the [Vermont Better Roads Manual](#) (p. 36 – 45).

RESOURCES



Tree Characteristics: The Vermont Tree Inventory Guide (p.16-18). Created by the Vermont Urban & Community Forestry Program. http://vtcommunityforestry.org/sites/default/files/pictures/vt_inventory_guide_2014_0.pdf



Municipal Roads General Permit (MRGP): A Guide for Lakeshore Roads. Lake Wise Program, Vermont Department of Environmental Conservation. https://dec.vermont.gov/sites/dec/files/wsm/lakes/Lakewise/docs/lp_MRGP_GuidelinesForLakeRoads.pdf.

1



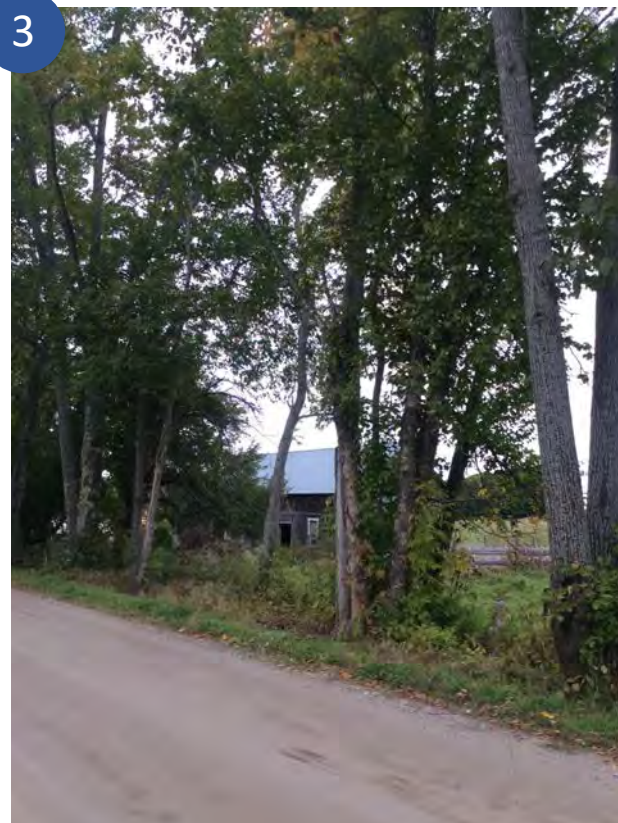
Trees along the downhill side of Beaver Meadow Road are in fair health and exhibit only low levels of mechanical damage. However, they delineate the road edge and grow in areas that will be hard to revegetate once trees die. Consider how close the road needs to be to these trees and how they can be preserved for further damage.

2



The poor health of the tree canopy along this section of Beaver Meadow road is especially concerning because of their location within a utility corridor and upslope from a river. Work with the utility company and Better Roads to plan for vegetation replanting.

3



The town manages 12 feet of hedgerow trees and herbaceous cover in the right-of-way along this section of John Fowler Road. Many trees are in fair health and exhibit high current or historic mechanical damage to their trunks. Additionally, many trees are ash. The town and neighboring landowners can monitor tree health here and plan for planting or preserving the next generation of roadside canopy trees.

Resilient Right-of-Ways Project Data Marshfield, VT

6. Overstory Health & Mechanical Damage



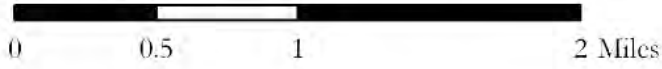
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Cartographer: Elizabeth Bannar

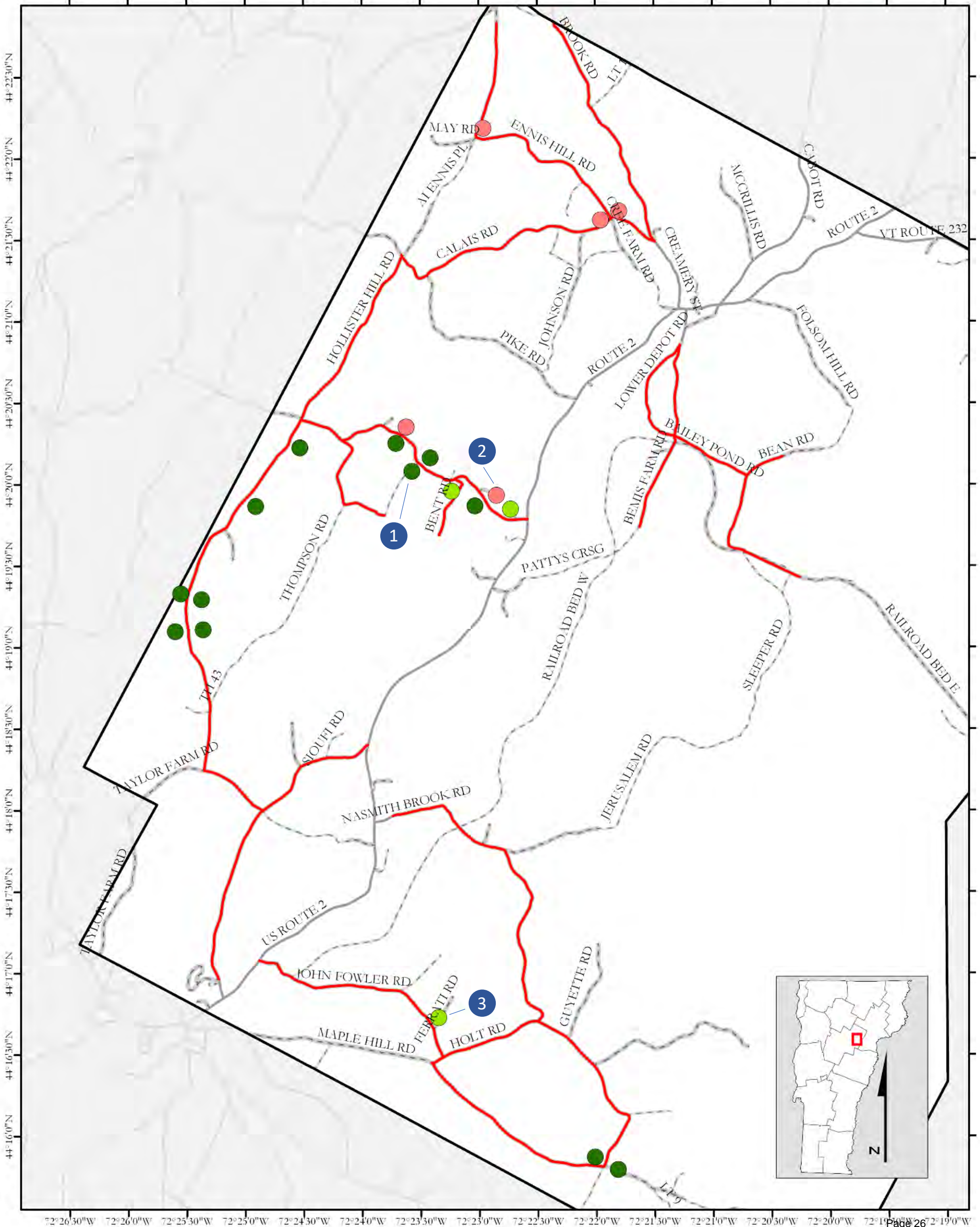
Date: 4/8/2019

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Legend

- 2018 Inventory Roads
- Health, Damage: Poor, high
- Poor, low
- Fair, high
- Fair, low
- Road Surface: Paved
- Unpaved
- Other
- Health: Poor



Resilient Right-of-Ways Project Data Marshfield, VT

7. Invasive Species Locations (data source: iNaturalist)



1:43,000

Cartographer: Elizabeth Bannar

Date: 4/8/2019

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Legend

Species

- Barberry, spp.
- Common buckthorn
- Cow parsley
- Garlic mustard
- Japanese knotweed
- Morrow's honeysuckle; northern bush honeysuckle

● Multiflora rose

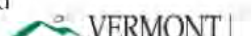
● Wild parsnip

— 2018 Inventory Roads

Road Surface

— Paved

— Unpaved



WHAT

The consistent disturbance to the roadside edge provides ample space for invasive species to take root, flower, and spread. Additionally, road construction equipment, mowers, car tires, and even pedestrians and bicyclists can easily carry the seeds or root fragments of invasive plants down the road.

Because the roadsides are public spaces, no one person may feel entirely responsible for the management and control of these roadside plants. As such, slowing the spread of invasive roadside plants must be a persistent effort requiring consistent monitoring, management, and public outreach.

HOW



In this study, observations of invasive plant species were recorded on iNaturalist, a citizen science data collection application. The Resilient Right-of-Way map displays invasive plant species locations as noted by the Resilient ROW field staff in addition to other iNaturalist users. It does not offer a comprehensive picture of all invasive plants. More on iNaturalist can be found at <https://www.inaturalist.org/>.

WHY

Identifying the location and species of common invasive plants along rural roads tells us:



Where we should implement specific treatment practices found on vtinvasives.org.



How to educate landowners about the spread of invasive species, including from and to their private property.



How to help road crews identify new infestations of invasive plants, particularly if the small plants can be treated.



Where to exercise extreme caution when performing roadwork or mowing so as to avoid spreading invasive plant seeds or roots on equipment or in fill.

RESOURCES



[Gallery of Terrestrial Invasive Plants](https://vtinvasives.org/gallery-of-terrestrial-plants) on the Vermont Invasives website:



[Best Management Practices for the Prevention and Treatment of Terrestrial Invasive Plants in Vermont Woodlands](http://www.vermontwoodlands.org/documents/FinalBMPinvasivesmanual.pdf). The Vermont Chapter of the Nature Conservancy:



Morrow's honeysuckle (*Lonicera morrowii*)



Poison/wild parsnip (*Pastinaca sativa*)



Common buckthorn (*Hesperis matronalis*)



Garlic mustard (*Alliaria petiolate*)



Wild chervil/cow parsley (*Anthriscus sylvestris*)



Japanese knotweed (*Fallopia japonica*)



Japanese barberry (*Berberis thunbergii*)

RECOMMENDATIONS



Follow all BMPs related to roadside invasive plants, making sure to clean equipment before and after roadside work. The "Best Management Practices for Roadside Invasive Plants" from the Nature Conservancy is included in this report in Appendix D.



As you are able, treat isolated existing patches of invasive species in roadside ditches by mechanical or chemical means (as appropriate).



Preserve trees and shrubs that provide shade on roadsides. Invasive plants, like many plants, are less likely to thrive in shady areas.



Know where your invasive species are... and where they aren't. Mow first in areas without invasive species, then mow area with known infestations (except for knotweed, phragmites, or purple loosestrife). Follow best practices to keep mowing and ditching equipment clear of invasive plant fragments and seeds.



Do not mow invasive plants after seeds have set. Knowing when invasive plants bloom will let you use mowing to your advantage to reduce the spread of invasive seeds.

Resilient Right-of-Ways Project Data Marshfield, VT

7. Invasive Species Locations (data source: iNaturalist)



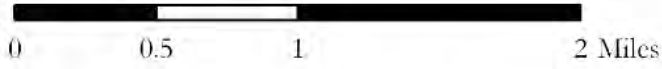
Vermont Department of
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Cartographer: Elizabeth Bannar

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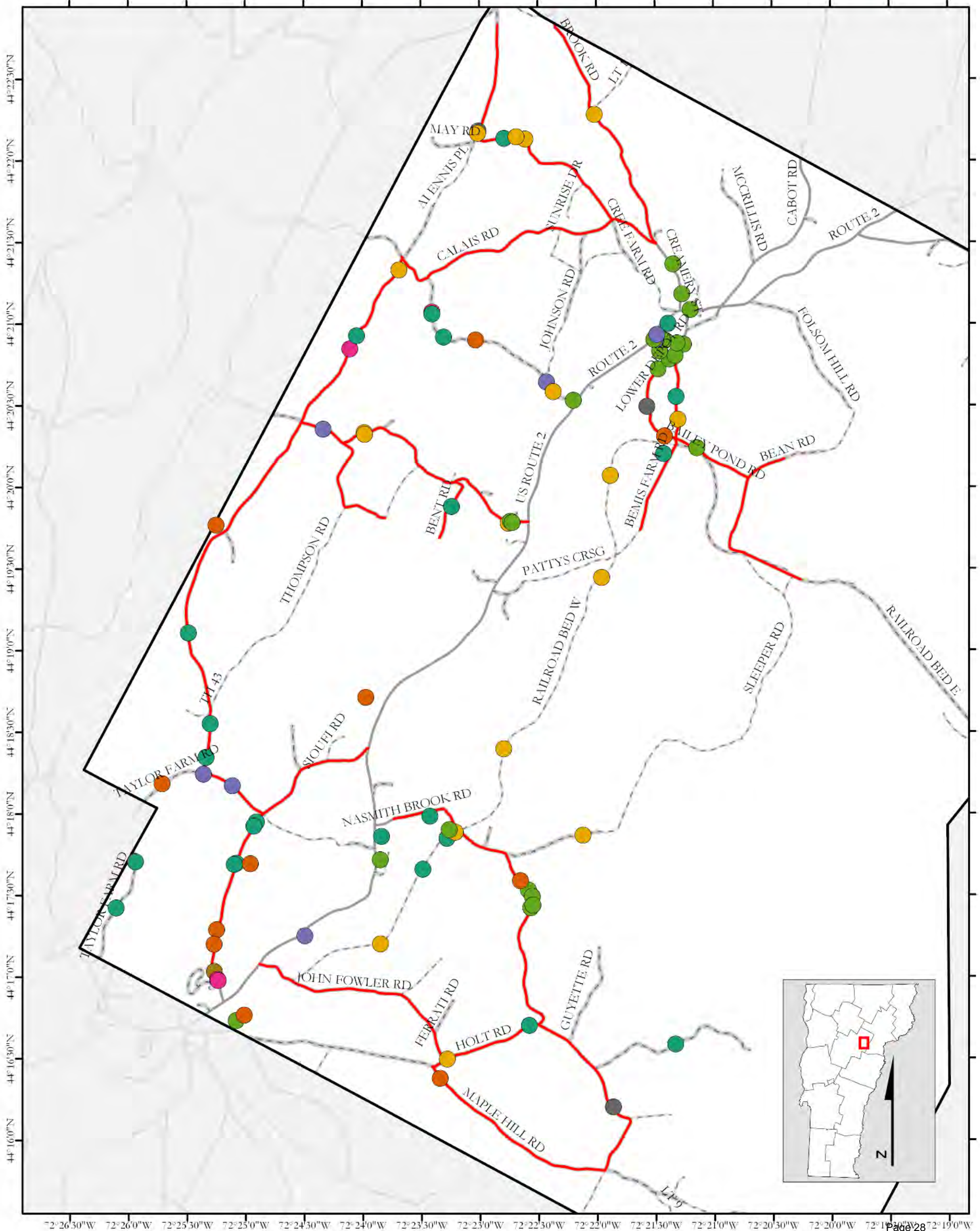


Legend

Species

- Barberry, spp.
- Common buckthorn
- Cow parsley
- Garlic mustard
- Japanese knotweed
- Morrow's honeysuckle; northern bush honeysuckle
- Multiflora rose
- Wild parsnip

- 2018 Inventory Roads
- Road Surface
- Paved
- - - Unpaved
- - - Other



Resilient Right-of-Ways Project Data Marshfield, VT

8. Vegetation Preservation Opportunities



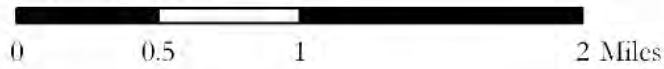
Vermont Department of
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Legend

— 2018 Inventory Roads Steep Slope

Road Surface

— Paved

--- Unpaved

- - - Other

▽ Down

▲ Up

Preservation Opportunities

● Preserve Herbaceous Buffer

● No Cut (trees)



WHAT

Preserving trees, shrubs, or other herbaceous vegetation can reduce soil erosion, demarcate the edge of the road, create visual interest and beauty, and provide privacy for homeowners. In particular, preserved [tree canopy](#) helps intercept rainfall that would otherwise damage road surfaces, provide shade that reduces road dust on hot days, promote infiltration of rainwater into the soil, and reduce pollutants in stormwater that heads downstream.

HOW



While conducting field assessments, the Resilient ROW team made recommendations regarding opportunities to preserve existing vegetation, including “No cut” recommendations where trees should remain (often for the purposes of controlling erosion on slopes) and “Preserve herbaceous buffer” recommendations where grasses, herbaceous plants, or low shrubs should not be cleared. Field teams also noted if the land in or immediately adjacent to the right-of-way exhibited a significant slope up or down and may therefore be more susceptible to erosion if vegetation is cleared.

WHY

Identifying where trees and herbaceous (grassy) cover should be preserved helps us:



Describe sample locations where trees, shrubs, or other herbaceous vegetation are helping maintain safe and passable roads.



Plan to protect trees during future road construction events, particularly near steep slopes or water bodies.



Balance the need to remove trees in some places with the ability to preserve trees in other places.



Plan tree removal and preservation priorities from a town-wide perspective and avoid “knee-jerk” reactions when some trees are marked for removal.

RECOMMENDATIONS



In mature forests with an established understory, avoid cutting trees that do not pose a risk to travelers. In particular, note where roadside vegetation is stabilizing steep slopes. Have a forester evaluate whether a tree lean occurred recently (and may pose a risk of falling) or if it occurred many years ago and has been self-corrected. Remember that hardwood trees are “phototrophic” and can lean naturally to grow towards the light. Softwood trees, however, are “geotrophic” and grow straight up, leaning only when tilted at ground level.



Preserve herbaceous buffer along roads in heavily forested areas. Do not increase the clear zone without specific reason. Consider hydroseeding or planting [live stakes](#) (Vermont Better Roads Manual, p. 41) on bare soil that borders ditches.



Review the best practices of road maintenance through wet areas, particularly where [bank stabilization](#) (Vermont Better Roads Manual, p. 36) is needed between the base of a slope and a wet area. Retain [buffer zones](#) (Vermont Better Roads Manual, p. 45) between roads and sensitive areas such as streams, wetlands and lakes.



When mowing the clear zone, consider leaving vegetation at a height of at least 6 inches.



The [Vermont Rivers Program](#) recommends a 50-foot wide buffer of native woody vegetation surrounding streams. Ensure that woody buffers extend to roadsides.

1



This section of John Fowler Road cross cuts a steep slope. Vegetation on both sides of the road preserve bank stability. Except for hazard trees, this vegetation can be left intact to reduce erosion risk.

2



3



Preserve the herbaceous buffer between Knob Hill Pond and Calais Road. Almost all vegetation in the right-of-way has been removed or mowed.

4



Softwood grow on a steep slope along Lower Depot Road. Their geotrophic nature causes them to grow straight up despite the fact that their roots are leaning. Except for hazard trees, this vegetation can be left intact to reduce uphill erosion risk.

RESOURCES



Trees and Stormwater. Vermont Urban & Community Forestry Program. https://vtcommunityforestry.org/sites/default/files/pictures/trees_and_stormwaterv2.pdf



[Bank Stabilization: Vegetation – Shrubs and Trees](#) (p.40), [Live Stakes](#) (p. 41), and [Buffer Zone](#) (p. 45), Vermont Better Roads Manual, 2019. <https://vtrans.vermont.gov/sites/aot/files/highway/documents/ltf/Better%20Roads%20Manual%20Final%202019.pdf>



[River Corridor Protection](#) on the Vermont Department of Environmental Conservation website: <https://dec.vermont.gov/watershed/rivers/river-corridor-and-floodplain-protection/protection>

Resilient Right-of-Ways Project Data Marshfield, VT

8. Vegetation Preservation Opportunities



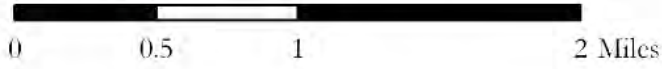
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Legend

— 2018 Inventory Roads Steep Slope

Road Surface

— Paved

--- Unpaved

--- Other

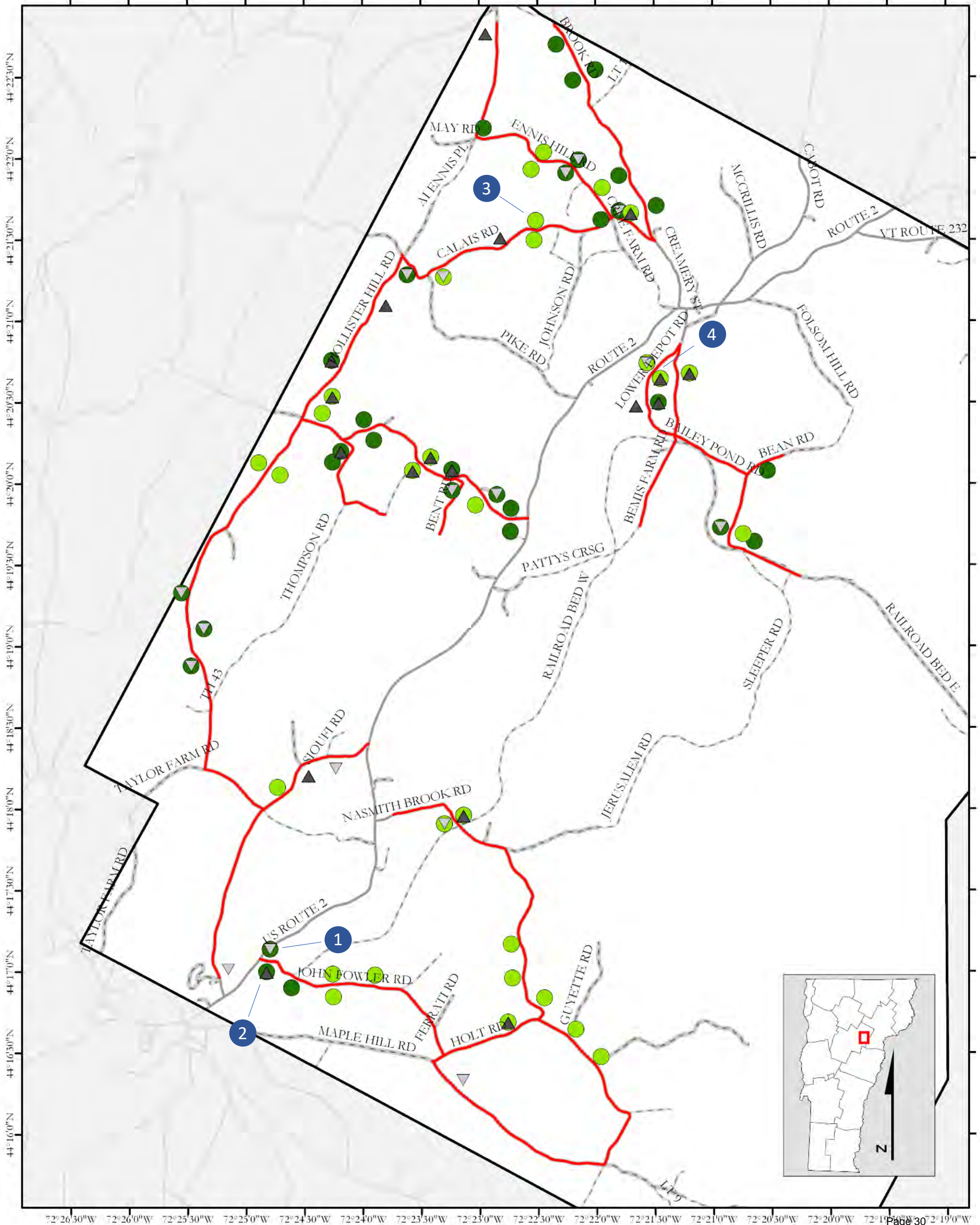
▽ Down

▲ Up

Preservation Opportunities

● Preserve Herbaceous Buffer

● No Cut (trees)



Resilient Right-of-Ways Project Data Marshfield, VT

9. Planting & Regeneration Opportunities in Roadside Communities



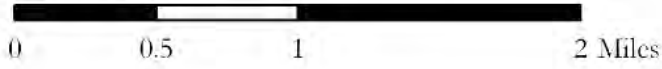
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Legend

Planting Opportunities

- Other
- Trees
- Promote Regeneration

Roadside Community

- Field (Ag)
- Field (Hay)

- Forest
- Hedgerow to Field/Water
- Lawn
- Other
- Riparian Zone
- Street Trees/Lawn
- Tree Plantation
- Water Edge

- Wetland
 - 2018 Inventory Roads
- Road Surface
- Paved
 - Unpaved
 - Other




WHAT

In many towns, clear zones may extend from the edge of the road to edge of the right-of-way. Agricultural practices may extend to within a few feet of the road, driving habits of large trucks or drivers avoiding road obstacles may tamp down roadside grasses, or private landowners may mow their lawns all the way to the road edge to keep their property neat or because they thought they were responsible for managing this corridor of land.




Acknowledging the opportunities for more vegetation in the town's right-of-ways may improve road conditions, tree health, water quality and traffic patterns for all road users. As with agriculture in the right-of-way, anyone wishing to change current land use practices in the right-of-way must certainly consider the relationship of the town's governing board with its private landowners (a.k.a. its constituents) and reflect on the "way things are done" over time.

HOW


 In this study, the land use adjacent to the right-of-way was classified into one of 11 categories. Field staff visually assessed whether there was opportunity for tree planting, shrub or grass planting, or forest regeneration. Opportunities were identified based on physical landscape characteristics only, not based on landowner or town willingness to participate.

WHY

Identifying the neighboring land use and opportunities for new vegetation in or near the right-of-way helps us:

-  Identify patterns in the landscape where vegetation has been eliminated.
-  Identify common roadside scenarios that may benefit from targeted revegetation and weigh this opportunity against road safety and maintenance concerns and the preferences of town residents.
-  Create a statewide picture of how land uses next to the public right-of-way complement or conflict with vegetation in the right-of-way.

RESOURCES

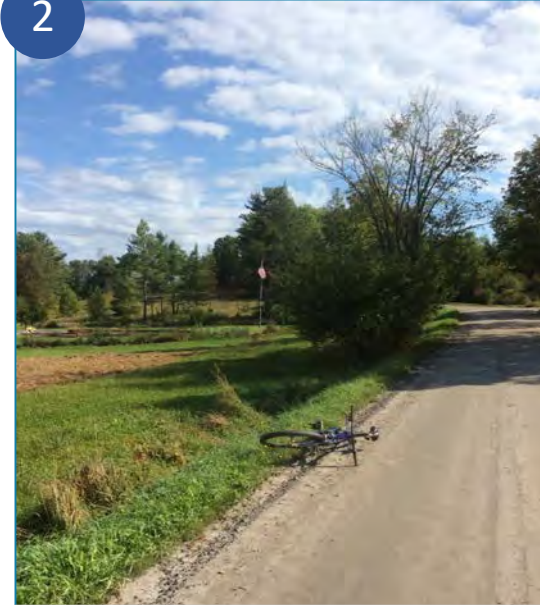
-  [Living Snow Fences Control Blowing and Drifting Snow. Minnesota's Best Practices Handbook for Roadside Vegetation Management.](http://www.dot.state.mn.us/environment/livingsnowfence/)

1



Portions of Ennis Hill Road are widening. Additionally, an overhead utility limits possible vegetation options. Work with the utility company to understand clearing rotations and allow for planting or regeneration of low-growing species.

2



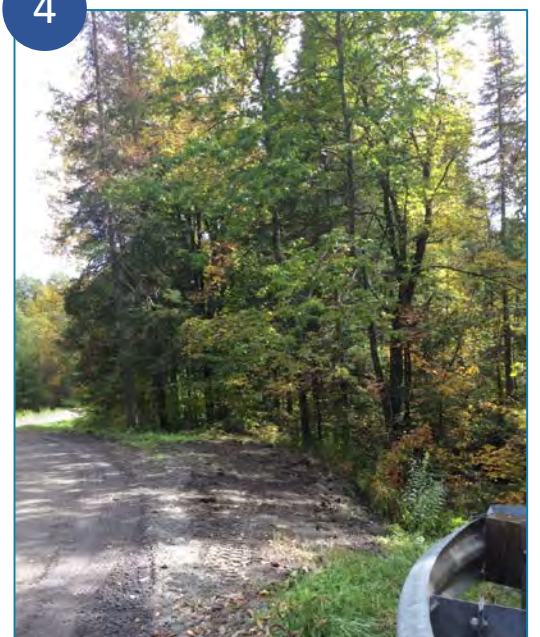
Frequent mowing to the edge of the travelled road presents **opportunities for planting** tree, shrub or wildflower planting. The lack of overhead utilities is an advantage.

3









This section of Calais Road has likely widened over time and is now graded up to the trees. Consider **promoting forest regeneration** by reducing the road width or consider another buffer that protects tree trunks and roots from impact and compaction.

4



Bare soil extends to the edge of the right-of-way bordering this stream on Beaver Meadow Road. Consider the opportunity for planting shrubs, grasses or wildflowers or partnering with a water quality organization to examine the road-river conflict. Learn more about river-road conflicts through the [Vermont Better Roads](#) program.

RECOMMENDATIONS

-  Consider what type of planting may best fit a roadside: trees to form future canopy, a mixture of low trees and bushes, native grasses, or a wildflower mix.
-  Identify opportunities to promote regeneration of vegetation through reduced mowing or other forestry practices that encourage resilient tree growth.
-  Identify places where a landowner may be open to planting or promoting more vegetation on private land adjacent to the right-of-way. Consult with the Urban & Community Forestry Program for examples of public-private collaboration for roadside planting.
-  To determine locations where planting or regeneration may be well-received by landowners and road users, identify if existing vegetation on private land is non-native, at risk from pests or disease, or is declining due to old age.
-  Consult the road foreman and neighboring landowner to understand concerns or expectations regarding mowing grass into the right-of-way. Share these expectations through the town's public relations outlets.
-  Where seasonal changes in the right-of-way (such as harvesting of agricultural fields) impact wind and snow drift, design or manage [living snow fences](#).

Resilient Right-of-Ways Project Data Marshfield, VT

9. Planting & Regeneration Opportunities in Roadside Communities



Vermont Department of
Forests, Parks & Recreation

1:43,000

Cartographer: Elizabeth Bannar

Date: 4/8/2019

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0 0.5 1 2 Miles

Legend

Planting Opportunities

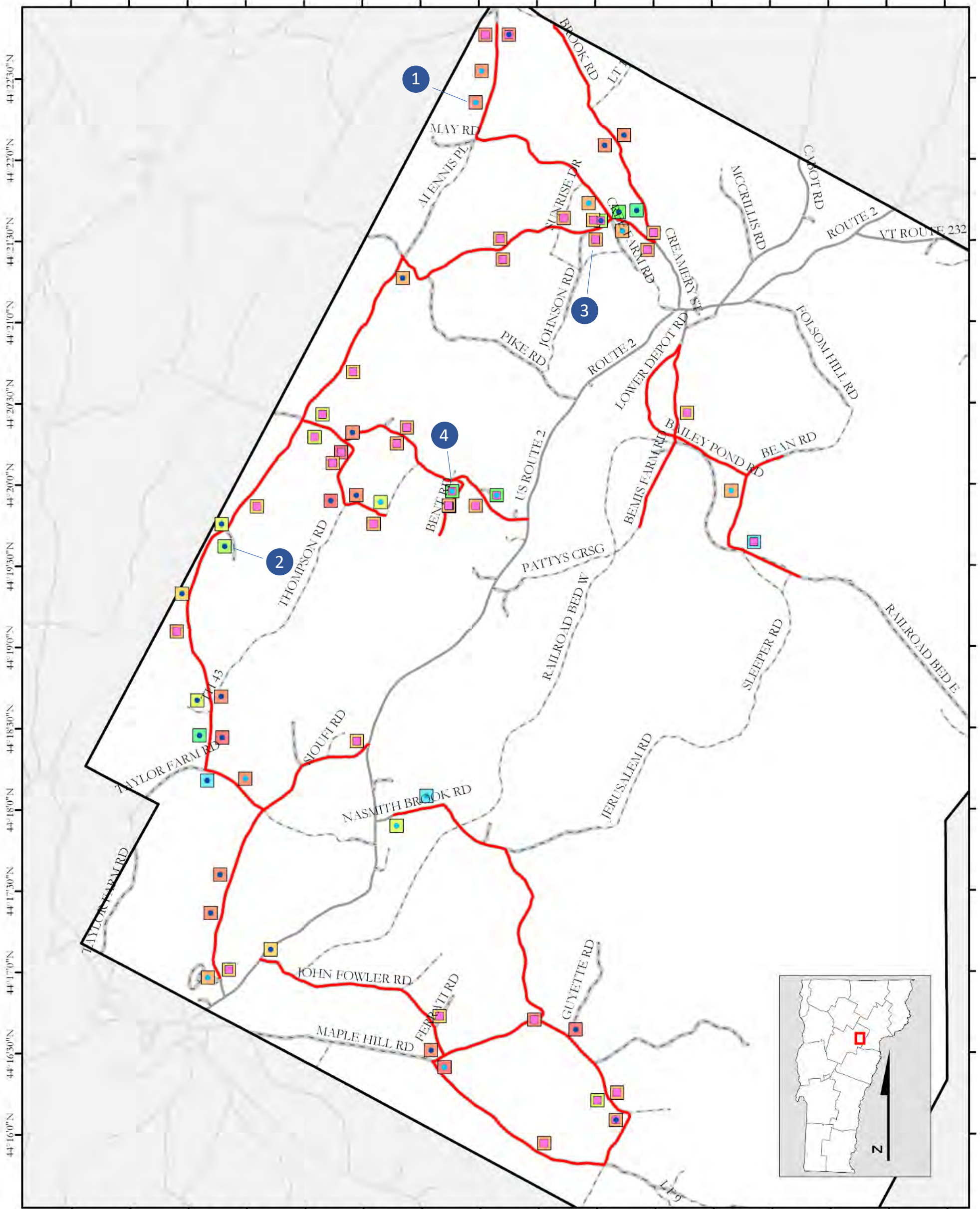
- Other
- Trees
- Promote Regeneration

Roadside Community

- Field (Ag)
- Field (Hay)

- Forest
- Hedgerow to Field/Water
- Lawn
- Other
- Riparian Zone
- Street Trees/Lawn
- Tree Plantation
- Water Edge

- Wetland
- 2018 Inventory Roads
- Road Surface
 - Paved
 - Unpaved
 - Other



Resilient Right-of-Ways Project Data Marshfield, VT

10. Thinning Opportunities & Mature Short-lived Trees



Vermont Department of
Forests, Parks & Recreation

1:43,000

Cartographer: Elizabeth Bannar

Date: 4/8/2019

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0 0.5 1 2 Miles

Legend


- 2018 Inventory Roads
- Mature Early Species
- Road Surface
- Paved
- - - Unpaved
- - - Other
- Thinning
- Other
- Trees



WHAT



Many of our roadsides were pasture only a generation ago. As such, some roadside forests can be crowded with thin trees and unstable forest “pioneers” such as boxelder, pin cherry, and poplar. When done properly, tree removal may encourage growth of selected trees by reducing competition for sunlight, water, and nutrients. Selecting for windfirm and long-lived roadside canopy trees lays the groundwork for a resilient and functional roadside forest in the future.

HOW






 The Resilient Right-of-Ways field staff identified plot locations during field assessments where tree removal may encourage growth of selected trees by reducing competition from less desirable species or species prone to structural problems. Also recorded was the presence of mature short-lived trees (such as paper birch or poplars) within a survey plot.

WHY


Identifying locations that may benefit from tree thinning, the removal of mature, short-lived trees, or thinning of understory brush helps us:

-  Learn about how established silvicultural practices (like selective thinning, also called “[treescaping](#)”) can benefit our roadside forests.
-  Identify species of trees that can become weak within a short time frame (decades) and select for long-lived species for mature roadside canopy trees.

RECOMMENDATIONS

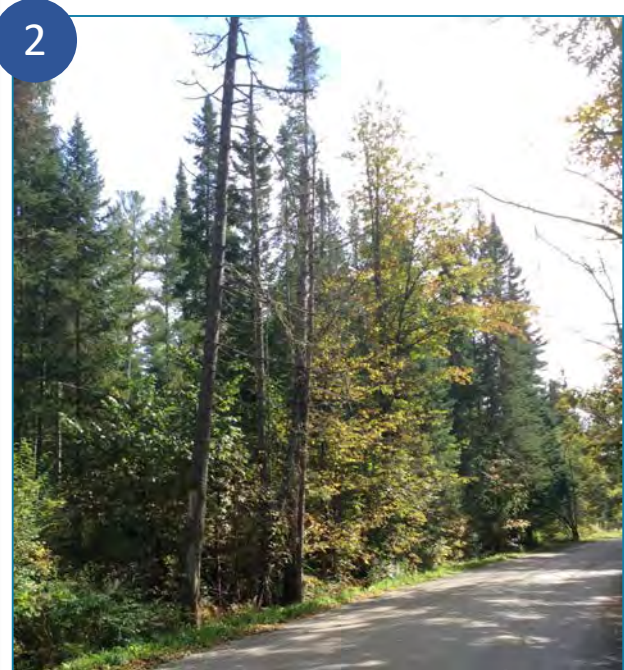
-  Consult a forester to identify scenarios where the removal of some trees may benefit the growth of others. Consider performing this work while addressing road construction.
-  Identify immature tree canopy dominated by small, thin beech trees (often called beech “thickets”). Work with the neighboring landowner and a forester to identify trees for thinning and trees for preservation.
-  Note where mature, short-lived trees are located along steep road curves. Monitor their health and/or plan for removal. Simultaneously, consider thinning around emerging canopy trees to promote regeneration and to select for the next generation of tree canopy.
-  Ensure that trees do not block a clear line of sight for drivers utilizing the road at the posted speed limit.
-  Consider creating a municipal tree ordinance that specifies which trees can be removed without a hearing, particularly with regard to tree diameter, health, and placement on the road.

RESOURCES

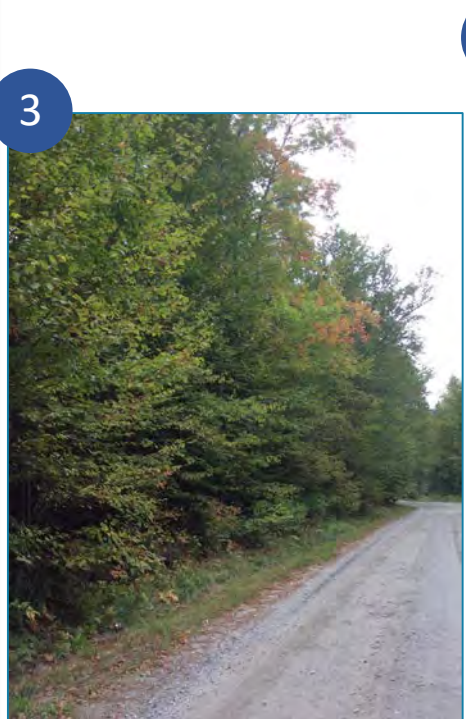
-  [Treescaping](https://vtcommunityforestry.org/sites/default/files/pictures/roadside_vegetation_management_manual_for_rural_road_crews.pdf) (p. 11-13) in The Roadside Vegetation Management Manual for Rural Road Crews. Harry Chandler, Vermont Woodlands Association. 2000.



1 Select for resilient roadside tree species when removing ash and aging maples along this portion of Ennis Hill Road. Follow best practices to eliminate importing invasive plant seeds or fragment.



2 Poor overstory health, high mechanical damage to trees from road equipment or vehicle strikes and prevalent softwood canopy that shades the road combine to make this section of Beaver Meadow Road a good candidate for risk tree removal, tree thinning, and forest regeneration.



3 An old stone wall 10-feet from the edge of this portion of Laird Hill Road marks a historic right-of-way boundary. Dense and “sticky” forest regeneration can be thinned to select for future roadside canopy trees.

Resilient Right-of-Ways Project Data Marshfield, VT

10. Thinning Opportunities & Mature Short-lived Trees



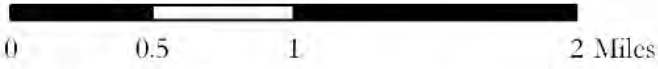
Vermont Department of
Forests, Parks & Recreation

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Cartographer: Elizabeth Bannar

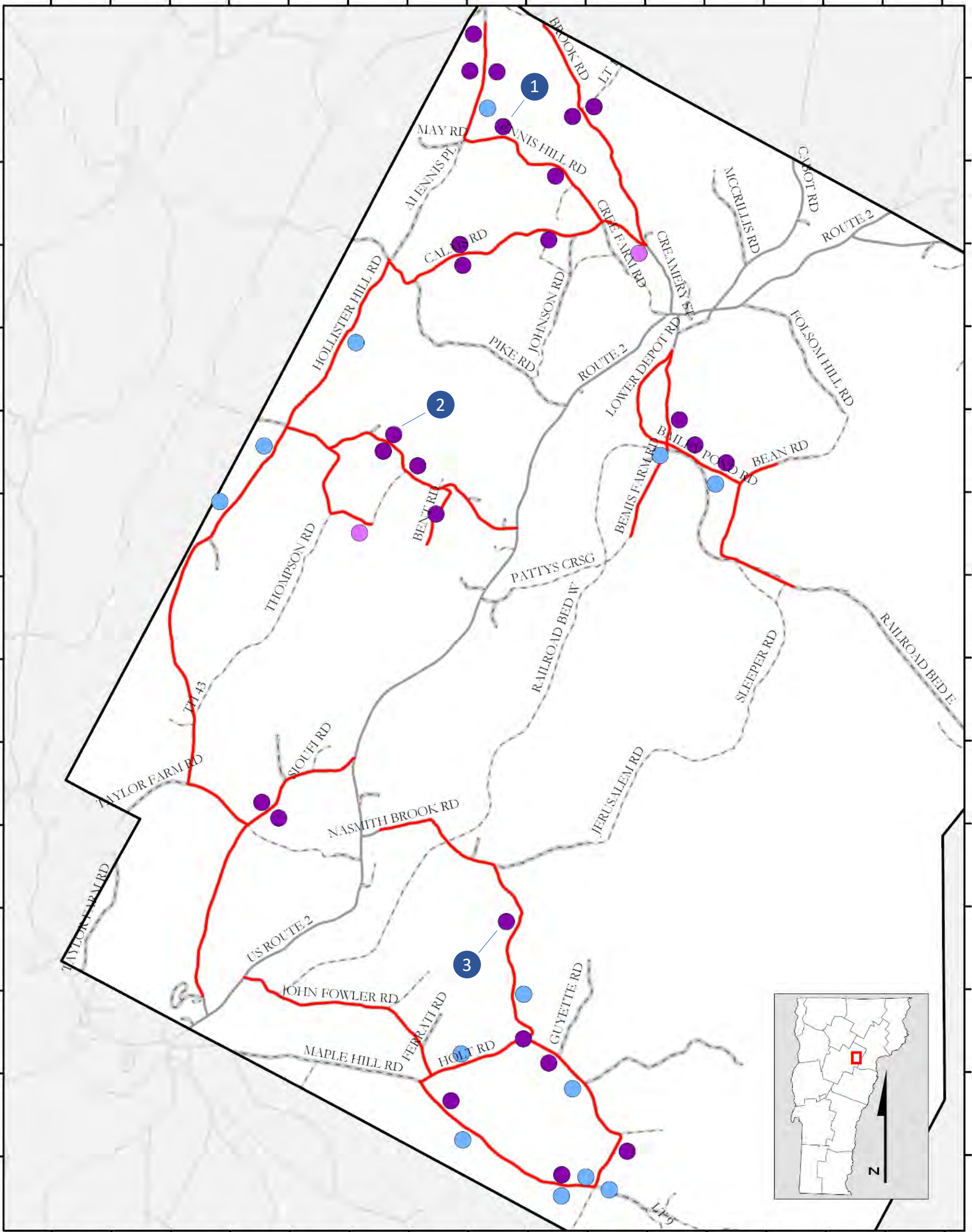
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Legend

- 2018 Inventory Roads
- Mature Early Species
- Road Surface**
- Paved
- Unpaved
- Other
- Thinning**
- Other
- Trees



Conclusion

Roadside vegetation management requires a thoughtful, cooperative, and integrated approach. In most towns, there are dozens of stakeholders in rural road vegetation management: road foreman, road crews, selectboard members, conservation commission members, outdoor enthusiasts, landowners, truck and school bus drivers, new residents wishing to build, and farmers, to name a few.

There are also tens of miles of unpaved road in even the smallest Vermont towns that are often maintained by three- or four-person crews. Town highway budgets remain limited and towns must keep financial reserves for managing emergency weather events. Furthermore, populations in some small towns are shrinking, limiting towns' tax base to fund important infrastructure changes. Executing and building on existing rural road maintenance practices is no small job.

As such, towns should view vegetation management as an iterative process and take a step-by-step approach to identify, and act upon, roadside vegetation priorities. After reading this report and reviewing the accompanying maps, decide which action items someone in your town may wish to pioneer. Like any community process, timing is everything, and some initiatives make take more time to come to fruition. The Vermont Urban & Community Forestry Program and Vermont Forests, Parks & Recreation can provide resources that help you plan to accomplish your town's top priorities, one piece at a time.

For more information on any topic in this report, contact:

Joanne Garton, Resilient Right-of-Ways Project Coordinator
Vermont Urban & Community Forestry Program
1 National Life Drive, Davis 2
Montpelier, VT 05620
(802) 249-4217
joanne.garton@vermont.gov

Additionally, visit our website, vtcommunityforestry.org for resources, ideas, and many examples of urban and community forestry in action.

Appendix A:

Rural Road Resilient Right-of-Ways Project
Town of Marshfield Letter of Collaboration
August 9, 2018

RESILIENT RIGHT-OF-WAYS

PLANNING FOR SAFE AND HEALTHY RURAL ROADSIDE VEGETATION

LETTER OF COLLABORATION

This letter summarizes the collaborative work to be completed by the Urban and Community Forestry Program of the Vermont Department of Forests, Parks and Recreation (FPR) and the Town of Marshfield.

PROJECT DESCRIPTION

The Resilient Right-of-Way projects connects ten communities in Vermont with resources and processes that advance understanding of the role of rural roadside vegetation in supporting local environmental, economic, and cultural values. Through an on-the-ground vegetation assessment and analysis of town priorities, Vermont FPR staff will work alongside the Town of Marshfield to develop recommendations for long-term resilience of its roadside forests, hedgerows, and other vegetated landscapes. Work will focus on the role of vegetation to manage stormwater runoff, provide wildlife habitat, and create scenic and cultural roads that preserve the rural nature of Vermont's backroads. The Resilient Right-of-Ways project also prioritizes the necessary physical requirements of safe and well-maintained roads and the importance of cost-efficient and effective solutions that maximize road safety, comply with new stormwater regulations, maintain scenic sections of canopy roads, and are sensitive to the environmental concerns of landowners in each town. Funded by the US Forest Service, this research and outreach initiative will also feed into updated educational material and technical assistance to be offered state wide beginning in 2018.

DELIVERABLES

Deliverables will be tailored to the town of Marshfield's specific needs and may include, but are not limited to:

- 1) a roadside vegetation assessment (both desk- and field-based) of at least 50% of the unpaved roads;
- 2) a report, interactive tool, or map summarizing assessment results;
- 3) identification of best practices and management priorities that maximize public benefits from safe and healthy roadside vegetation; and
- 4) facilitation of a public meeting to share results of the assessment.

PARTNER AGREEMENT

The Town of Marshfield will:

- Determine membership of a Project Advisory Committee.
- Provide a point of contact responsible for communication between FPR and the town.

- Convene meetings of the Project Advisory Committee with FPR staff and any interested members of the public to:
 - outline the project scope;
 - review assessment results;
 - review the draft vegetation management recommendations; and
 - receive a final presentation on the results and facilitate discussion about how to advance resilient roadside vegetation management.
- Notify the public of key steps in the project development and invite and manage public comment.

FPR will:

- Meet with the Marshfield Project Advisory Committee to develop a tentative schedule for the roadside vegetation assessment, management recommendation development, and any public meeting(s).
- Conduct the roadside vegetation assessment.
- Work with the Marshfield Project Advisory Committee and other key stakeholders to develop integrated recommendations and best practices to care and plan for Marshfield’s rural roadside vegetation.
- Provide agreed upon deliverables including the vegetation assessment summary report.

REPRESENTATIVES

- Joanne Garton will be the primary point of contact for FPR.
 - (802) 249 - 4217; joanne.garton@vermont.gov
- Rich Baker will be the primary contact for the Town of the Marshfield
 - Phone number; baker_rt@hotmail.com

MONETARY OUTLINE

No money will be exchanged during this project.

TERMINATION CLAUSE

Either party may terminate this working relationship at any time, seven days after notifying the other party in writing.

EFFECTIVE DATE AND SIGNATURES

This scope of work will be effective from _____ to the end of the grant period in September 2019.

Both parties agree to the conditions as described above.

Joanna Gasta 8/9/19
Signature Date

Joanna Gasta
Name

Vermont Department of Forests, Parks and
Recreation
1 National Life Drive
Montpelier, VT 05620

Richard Baker 8/9/19
Signature Date

Richard Baker
Name

Town of Marshfield
Address

Appendix B:

Rural Road Resilient Right-of-Ways Project
Town of Marshfield Work Plan
August 30, 2018

Rural Road Resilient Right-of-Ways Vegetation Assessment

Town of Marshfield Work Plan - DRAFT

August 30, 2018

Town priorities

Maintain healthy forests and roadside vegetation along Marshfield's rural roads by planning for vegetation management practices appropriate to the types of right-of-way roadside communities found in the town. Through this rural roadside vegetation assessment and resulting action plan, the town will examine:

- management of roadside forests to promote healthy and long-lasting tree canopies that, in part, define the rural nature of Marshfield's roads;
- areas likely to be highly affected by emerald ash borer and declining ash tree health;
- areas at higher risk from storm damage (e.g. trees falling on or across the road (including areas with high concentrations of ash trees);
- areas influenced or defined by hedgerows in the public ROW;
- areas defined by scenic views or influenced by pedestrian or bicycle traffic;
- areas affected by utility lines;
- areas that are relatively free of invasive plant species and those areas that are heavily infested with invasive plant species;
- areas in conflict with road maintenance equipment; and
- areas that merit preservation of vegetation for environmental or cultural reasons.

Additional deliverables will explore ways to:

- promote relevant discussion among the Marshfield road crew, conservation commission, and select board to discuss best practices for preserving healthy and safe vegetation and fostering the next generation of resilient public roadside trees;
- promote relevant communication between the Marshfield Tree Warden Ron Smith, the road foreman Tim Ksepa, the conservation commission and the select board regarding public hearings and roadside tree removal;
- reduce the spread of roadside invasive species, specifically by addressing mowing practices that may facilitate migration and/or reproduction of these species;
- provide outreach and education regarding emerald ash borer, the town EAB preparedness plan, and ash tree management along rural roads, including the hiring of contractors to cut roadside trees; and
- establish best practices regarding town communication with utility companies and land developers.

In addition, Vermont Forests, Parks and Recreation staff will facilitate exploration of a **field walk** that outlines on-the-ground management techniques recommended for a specific road segment within the town. This may include marking of trees to be preserved or cut within the right-of-way, and/or location of potential locations for forest regeneration or planting. The pilot project will serve

to highlight site-appropriate species composition for improved forest health in roadside environments. If the town of Marshfield would like to pursue this, the location will be chosen at the completion of the road assessment.

Priority Roads

The road assessment will likely begin on September 11th, 2018 and continue throughout the middle of September. The assessed routes aim to cover half of the unpaved road miles in Marshfield, or approximately 24 miles of unpaved roads.

Currently, the roadside vegetation assessment focuses on 100-foot long road plots assessed approximately every quarter mile of road. Plots register data for both the left- and right-hand side of the roads as travelled S-N and W-E. Selected plots will convey a typical representation of the roadside environment at or near that quarter-mile marker.

A sketch of the following routes is located [here](#) on Google MyMaps.

Route 1 – Approx. 9 miles

Calais Road – Hollister Hill Road to Route 2 – Eaton Cemetery Road to Route 2

Route 2 – Approx. 5 miles

Brook Road – west on Ducharme Road – Ennis Hill Road

Route 3 – Approx. 4 miles

Lower Depot Road – Bennis Farm Road – Bailey Pond Road – Bean Road – Upper Depot Road

Route 4 – Approx. 7 miles

John Fowler Road – Maple Hill Road – Holt Road – Laird Pond Road – Nasmith Brook Road

Route 5 – Approx. 3 miles (if time allows)

Beaver Meadow Road – Bent Road

Data Collection

Collected data consists of:

- Survey Data
- Direction of Travel
- Road side
- Road width and cleared or mowed ROW width
- Width of municipally managed vegetation in ROW
- ROW community type (Forest or forest edge, Street Trees, Wet Areas, Mowed, Bare)
- ROW community sub-type (further defines community type listed above, e.g. mature forest with established understory, seasonally mowed area, pond)

- Roadside community (e.g. lawn, forest, water body, street trees, hay field, agriculture)
- Roadside ash > 6' dbh (0, Low = 1-2 trees, Medium = 3-4 trees, High = 5+ trees)
- Overstory Health (Good, Fair, Poor)
- Mechanical damage to trees (None, Low, High)
- Steep slope in ROW (Up, Down, None)
- Utility Present?
- Softwood > 25% canopy cover?
- Trees are part of a hedgerow?
- Historic Trees?
 - Historic Tree Health (Good, Fair, Poor, Dead)
- Agriculture in ROW?
- Field Recommendation
 - No cut?
 - Preserve herbaceous buffer?
 - Promote regeneration?
 - Watch for mature short-lived trees?
 - Planting opportunity (trees or other)?
 - Thinning opportunity (trees or other)?
- Comments

Also, representative data of invasive species present along roadsides recorded as point data using the Mapping for Healthy Forests Vermont Project in [iNaturalist](#), as integrated with existing Marshfield invasive plant surveys.

Appendix C:

Rural Road Resilient Right-of-Ways Project
Selected Resources for Tree Wardens



Guidelines for Public Hearings for Tree Removals

In each Vermont town, a tree warden shall be appointed by the selectboard to be responsible for the protection, care, planting, and removal of public shade and ornamental trees on town property and along the public right-of-ways. Tree wardens evaluate whether and when aging or damaged trees need to be removed, and also approve requests for removal of trees on town property by town officials. The public has the right to appeal tree warden decisions for public tree removal. According to the Vermont Tree Warden Statutes:

A public shade tree within the residential part of a municipality shall not be felled without a public hearing by the tree warden, except that when it is infested with or infected by a recognized tree pest, or when it constitutes a hazard to public safety, no hearing shall be required. In all cases the decision of the tree warden shall be final except that when the tree warden is an interested party or when a party in interest so requests in writing, such final decision shall be made by the legislative body of the municipality.
 (Amended 1969, No. 238 (Adj. Sess.), § 6.)

It is therefore the responsibility of the tree warden to hold a public hearing prior to the removal of a public ornamental or shade tree, unless the tree is diseased or dying or constitutes a hazard to public safety. Failure to hold a public hearing means that the tree warden acted outside the scope of their authority and, as seen in the example of the Holland Case below, could lead to legal action if pursued by landowners.

WHEN IS A PUBLIC HEARING NECESSARY?

Tree Warden's Decision to Remove a Public Tree.

Is the tree diseased, infected with a pest, or a hazard to public safety?

YES

A public hearing is **NOT** necessary.

No

Is the tree located in the **residential* part of town?

YES

A public hearing is necessary.

No

A public hearing is **not** necessary.

THE LAW IN ACTION: The Holland Case



In 2001, the Town of Holland sought to widen a Class 3 Town Highway in a residential area to accommodate large vehicles. The plan for the road expansion called for removal of approximately 30 trees and additional tree cutting, among other things.

Before the work began, an adjoining landowner brought suit in Orleans Superior Court to prevent the Town from cutting down the trees. The Town filed for summary judgment, arguing that the tree warden was not required to hold a public hearing prior to felling the trees because they contributed to the narrowness of the road, and thus created a public safety hazard.

In the end, the Court agreed with the landowner. The tree warden had no authority to remove the trees without first holding a public hearing. The public hearing must be warned by the tree warden for the discrete purposes of considering the removal of the tree.

EIGHT STEPS TO HOLDING PUBLIC HEARING FOR TREE REMOVAL*

Step 1: Determine where and when the public hearing will take place. The tree warden should provide direct notification by mail to the affected property owner(s), as well as posting a public notice in a minimum of three public places in town, at least 15 days before the hearing. The public notice should include the time, date, location, and purpose of the hearing.

Step 2: Before the hearing begins, make sure that someone is designated to take good notes and, if possible, record the proceedings of the hearing.

Step 3: At the beginning of the hearing, identify the parties that will be involved in the proceedings. Only those affected are parties: i.e., the landowner, the neighbors, town officials. Inform others in attendance that they have no official role in the hearing.

Step 4: At the public hearing, a notary, clerk, assistant clerk, of Justice of the Peace affirms everyone who will speak before the evidence is taken. An example of an affirmation used is: "Do you solemnly affirm, in the cause now under consideration before the tree warden, to tell the whole truth and nothing but the truth under the pains and penalties of perjury?"

WHAT DOES A WRITTEN DECISION LOOK LIKE?

After the public hearing, the tree warden needs to write up a brief decision along these lines and send a copy to each of the parties who attended the hearing:

On _____, 2014, at ___ p.m., I, _____, Tree Warden for the Town of _____, held a hearing at the _____ Town Office to consider removal of trees from a portion of the right-of-way for Town Highway No. __, also known as _____ Road. Present at the hearing were _____, Road Foreman for the Town of _____. Also present were _____, and _____ (list all attendees).

The parties offered the following testimony: _____

Based on the testimony provided at the hearing, authority is (or is not) granted to _____, Road Foreman for the Town of _____ to remove trees from the following portion of the right-of-way for Town Highway No. __: _____ for the following reasons: _____

In accordance with 24 V.S.A. 2509, Persons interested in this decision may appeal the decision in writing within ___ days from the date of the decision to the _____ select board.

Signed,
_____, Tree Warden for the Town of _____

Step 5: Ask the party requesting that the tree be removed to speak first and to describe the details and their views on the removal, in as logical an order as possible. Make sure everyone who speaks gives his or her name first, every time, to make a clean transcript later on if one is needed.

Step 6: Allow the other parties to ask questions of the first speaker and those called to assist the first speaker.

Step 7: Repeat steps 5 and 6 for the other parties, one at a time, allowing them to give their reasons, and allowing them to be questioned by the other parties.

Step 8. Adjourn, and then issue a written decision (see example at left) within a reasonable period of time, starting with findings of fact, then applying the facts to the law, then a decision, and finally a notice of a right to appeal. Send copies by certified mail to each party, and have one copy for the town clerk for public record.

ADDITIONAL RESOURCES

Vermont Urban & Community Forestry Program's Tree Warden Resources: www.vtfrp.org/urban/tree_wardens.cfm
Vermont League of Cities & Towns, Municipal Assistance Center: www.vlct.org/municipal-assistance-center/overview/
The Law of Trees, compiled by Paul Gillies, Vermont Attorney: www.uvm.edu/crs/resources/citizens/trees.pdf

* Based on recommendations provided by Vermont Attorney Paul Gilles.

Vermont Tree Warden Statutes

TITLE 24: Municipal and County Government

CHAPTER 033: MUNICIPAL OFFICERS GENERALLY

§ 871. Organization of selectmen; appointments

Forthwith after their election and qualification, the selectmen shall organize and elect a chairman and, if so voted, a clerk from among their number, and file a certificate of such election for record in the office of the town clerk. Such selectmen shall thereupon appoint from among the legally qualified voters the following officers who shall serve until their successors are appointed and qualified, and shall certify such appointments to the town clerk who shall record the same:

1. Three fence viewers;
 2. A poundkeeper, for each pound; voting residence in the town need not be a qualification for this office provided appointee gives his consent to the appointment;
 3. One or more inspectors of lumber, shingles and wood;
 4. One or more weighers of coal; and
 5. A tree warden. (Amended 1963, No. 74, § 2.)
-

TITLE 24: Municipal and County Government

CHAPTER 067: PARKS AND SHADE TREES

§ 2502. Tree wardens and preservation of shade trees

Shade and ornamental trees within the limits of public ways and places shall be under the control of the tree warden. The tree warden may plan and implement a town or community shade tree preservation program for the purpose of shading and beautifying public ways and places by planting new trees and shrubs; by maintaining the health, appearance and safety of existing trees through feeding, pruning and protecting them from noxious insect and disease pests and by removing diseased, dying or dead trees which create a hazard to public safety or threaten the effectiveness of disease or insect control programs. (Amended 1969, No. 238 (Adj. Sess.), § 1.)

§ 2503. Appropriations

A municipality may appropriate a sum of money to be expended by the tree warden, or if one is not appointed, by the mayor, aldermen, selectmen or trustees for the purpose of carrying out this chapter. (Amended 1969, No. 238 (Adj. Sess.), § 2.)

§ 2504. Removal of trees, exception

The tree warden may remove or cause to be removed from the public ways or places all trees and other plants upon which noxious insects or tree diseases naturally breed. However, where an owner or lessee of abutting real estate shall annually, to the satisfaction of such warden, control all insect pests or tree diseases upon the trees and other plants within the limits of a highway or place abutting such real estate, such trees and plants shall not be removed. (Amended 1969, No. 238 (Adj. Sess.), § 3.)

§ 2505. Deputy tree wardens

A tree warden may appoint deputy tree wardens and dismiss them at pleasure.

§ 2506. Regulations for protection of trees

A tree warden shall enforce all laws relating to public shade trees and may prescribe such rules and regulations for the planting, protection, care or removal of public shade trees as he deems expedient. Such regulations shall become effective pursuant to the provisions of chapter 59 of this title. (Amended 1969, No. 238 (Adj. Sess.), § 4.)

§ 2507. Cooperation

The tree warden may enter into financial or other agreements with the owners of land adjoining or facing public ways and places for the purpose of encouraging and effecting a community wide shade tree planting and preservation program. He may cooperate with federal, state, county or other municipal governments, agencies or other public or private organizations or individuals and may accept such funds, equipment, supplies or services from organizations and individuals, or others, as deemed appropriate for use in carrying out the purposes of this chapter. (Amended 1969, No. 238 Adj. Sess.), § 5.)

§ 2508. Cutting shade trees; regulations

Unless otherwise provided, a public shade tree shall not be cut or removed, in whole or in part, except by a tree warden or his deputy or by a person having the written permission of a tree warden.

§ 2509. - Hearing

A public shade tree within the residential part of a municipality shall not be felled without a public hearing by the tree warden, except that when it is infested with or infected by a recognized tree pest, or when it constitutes a hazard to public safety, no hearing shall be required. In all cases the decision of the tree warden shall be final except that when the tree warden is an interested party or when a party in interest so requests in writing, such final decision shall be made by the legislative body of the municipality. (Amended 1969, No. 238 (Adj. Sess.), § 6.)

§ 2510. - Penalty

Whoever shall, willfully, mar or deface a public shade tree without the written permission of a tree warden or legislative body of the municipality shall be fined not more than \$50.00 for the use of the municipality. Any person who, willfully, critically injures or cuts down a public shade tree without written permission of the tree warden, or the legislative body of the municipality shall be fined not more than \$500.00 for each tree so injured or cut, for the use of the municipality. (Amended 1969, No. 238 (Adj. Sess.), § 7.)

§ 2511. Control of infestations

When an insect or disease pest infestation upon or in public or private shade trees threatens other public or private trees, is considered detrimental to a community shade tree preservation program or threatens the public safety, the tree warden may request surveys and recommendations for control action from the commissioner of agriculture, food and markets. On recommendation of the commissioner of agriculture, food and markets, the tree warden may designate areas threatened or affected in which control measures are to be applied and shall publish notice of the proposal in one or more newspapers having a general circulation in the area in which control measures are to be undertaken. On recommendation of the commissioner, the tree warden may apply measures of infestation control on public and private land to any trees, shrubs or plants thereon harboring or which may harbor the threatening insect or disease pest. He may enter into agreements with owners of such lands covering the control work on their lands, but the failure of the tree warden to negotiate with any owner shall not impair his right to enter on the lands of said owner to conduct recommended control measures, the cost of which shall be paid by the municipality. (Amended 1969, No. 238 (Adj. Sess.), § 8.)

§ 2512. Repealed. 1969, No. 238 (Adj. Sess.), § 9.

TITLE 32: Taxation and Finance

CHAPTER 017: FEES AND COSTS

§ 1680. Tree warden

When a town or incorporated village fails to fix the compensation of a tree warden or his deputies, they shall receive such compensation as the selectmen or trustees determine.

Other Statutes Related to Trees

TITLE 30: Public Service

CHAPTER 071: TELEGRAPH, TELEPHONE AND ELECTRIC WIRES

§ 2506. Trees not to be injured; exception; penalty

A tree within a street or highway shall not be cut or injured in constructing, maintaining or repairing a line of wires, without the written consent of the adjoining owner or occupant, unless the transportation board or the selectmen of the town in which the tree is situated, after due notice to the parties and upon hearing, shall decide that such cutting or injury is necessary. A person or corporation cutting or injuring such trees shall pay the damages, if any, awarded on such hearing, before cutting or injuring the trees. A person or corporation that violates a provision of this section shall be fined not more than \$50.00 nor less than \$5.00 for each tree so cut or injured. (Amended 1989, No. 246 (Adj. Sess.), § 31.)

TITLE 13: Crimes and Criminal Procedure

CHAPTER 077: TREES AND PLANTS

§ 3606. Treble damages for conversion of trees or defacing marks on logs

If a person cuts down, destroys or carries away any tree or trees placed or growing for any use or purpose whatsoever, or timber, wood, or underwood standing, lying or growing belonging to another person, without leave from the owner of such trees, timber, wood, or underwood, or cuts out, alters or defaces the mark of a log or other valuable timber, in a river or other place, the party injured may recover of such person treble damages in an action on this statute. However, if it appears on trial that the defendant acted through mistake, or had good reason to believe that the trees, timber, wood, or underwood belonged to him, or that he had a legal right to perform the acts complained of, the plaintiff shall recover single damages only, with costs. (Amended 1959, No. 61, eff. March 26, 1959.)

TITLE 19: Highways

CHAPTER 009: REPAIRS, MAINTENANCE AND IMPROVEMENTS

§ 901. Removal of roadside growth

A person, other than the abutting landowner, shall not cut, trim, remove or otherwise damage any grasses, shrubs, vines, or trees growing within the limits of a state or town highway, without first having obtained the consent of the agency for state highways or the board of selectmen for town highways. (Added 1985, No. 269 (Adj. Sess.), § 1.)

§ 902. Penalty for removal

A person who willfully or maliciously cuts, trims, removes or otherwise damages grasses, shrubs, vines or trees within highway limits in violation of section 901 of this title shall be fined not more than \$100.00 nor less than \$10.00, for each offense. (Added 1985, No. 269 (Adj. Sess.), § 1.)

§ 903. Agreements for planting

The agency or the board of selectmen may enter into agreements with individuals or organizations who wish to plant grasses, shrubs, vines, trees or flowers within highway limits. (Added 1985, No. 269 (Adj. Sess.), § 1.)

§ 904. Brush removal

The selectmen of a town, if necessary, shall cause to be cut and burned, or removed from within the limits of the highways under their care, trees and bushes which obstruct the view of the highway ahead or that cause damage to the highway or that are objectionable from a material or scenic standpoint. Shade and fruit trees that have been set out or marked by the abutting landowners shall be preserved if the usefulness or safety of the highway is not impaired. Young trees standing at a proper distance from the roadbed and from each other, and banks and hedges of bushes that serve as a protection to the highway or add beauty to the roadside, shall be preserved. On state highways, the secretary shall have the same authority as the selectmen. (Added 1985, No. 269 (Adj. Sess.), § 1.)

Appendix D:

Rural Road Resilient Right-of-Ways Project
Best Management Practices for Roadside Invasive Plants
The Nature Conservancy

Best Management Practices for Roadside Invasive Plants

SOIL DISTURBANCE & STABILIZATION	MOVEMENT & MAINTENANCE OF EQUIPMENT
<ol style="list-style-type: none"> 1. Minimize soil disturbance. Monitor recent work sites for the emergence of invasive plants for a minimum of 2 years after project completion. 2. Stabilize disturbed soil as soon as possible. <ul style="list-style-type: none"> • Use clean mulch, hay, rip-rap, or gravel • Seed with native species where possible 3. Avoid using fill from invaded sites. When in doubt about the quality of fill, monitor work sites for the emergence of invasive plants for a minimum of 2 years. 	<ol style="list-style-type: none"> 1. When equipment needs to be moved, plan work flow so that equipment is moved from unaffected sites to affected sites. This is especially important during ditch cleaning and shoulder scraping. 2. Staging areas should be free of invasive plants 3. All equipment and tools should be cleaned of visible dirt and plant material before leaving affected project sites. Cleaning methods can include portable wash stations, high pressure air, brush, broom, or other hand tools. 4. If equipment will be used in infested areas, remove above-ground invasive plant materials such as purple loosestrife, phragmites, and Japanese knotweed prior to the start of work.
MOWING	HANDLING EXCAVATED MATERIAL & INVASIVE PLANT MATERIAL
<ol style="list-style-type: none"> 1. Avoid mowing areas infested with purple loosestrife, phragmites, and Japanese knotweed, as these can sprout from stem and root fragments. Stake roadside populations with “Do Not Mow”. 2. If mowing is necessary, mow these areas BEFORE seed maturation (approximately August 1st). 3. Clean mowing equipment daily, and prior to transport. This is particularly important if mowing is after seed maturation (August 1st) 	<ol style="list-style-type: none"> 1. Destroy removed plant material. Methods include: <ul style="list-style-type: none"> • Drying/Liquefying: <i>place on impervious surface and cover</i> • Brush piles: <i>not for plants with fruit or seed</i> • Burying: <i>minimum of 3 feet below grade</i> • Burning: <i>have a designated burn pile for invasive plants</i> • Herbicide: requires a <i>licensed applicator (VT Department of Agriculture)</i> 2. Cover invasive plant material when transporting. 3. Excavated materials taken from infested areas should only be used onsite, unless all plant material has been destroyed. Only use within exact limits of infestation. 4. Stockpile unused excavated materials on impervious surface, or bury a minimum of 3 feet below grade (5 feet for Japanese knotweed). 5. Excavation should be avoided in areas containing purple loosestrife, phragmites, and Japanese knotweed. 6. Cover soil from infested areas when transporting.

*Adapted from New Hampshire Department of Transportation's Best Management Practices for Roadside Invasive Plants
<http://www.nh.gov/dot/org/projectdevelopment/environment/units/technicalservices/documents/BMPsforRoadsideInvasivePlants.pdf>*

Vermont Chapter of The Nature Conservancy
 Montpelier, Vermont
 (802) 229-4425



For more information, go to www.vtinvasives.org.

Appendix E:

Rural Road Resilient Right-of-Ways Project
Washington Electric Co-operative
Vegetation Management Plan

**WASHINGTON ELECTRIC
COOPERATIVE, INC.**

VEGETATION MANAGEMENT PLAN

July 2006

I. Purpose

The primary purpose of this document is to provide guidance on methods to be used to manage vegetation within Washington Electric Cooperative's (WEC) rights-of-way (ROW) in a safe, efficient and environmentally sound manner. In providing this guidance, it is understood that all line clearing, maintenance and other vegetation management work shall be performed in strict conformance with all applicable federal, state and local government laws and regulations, including OSHA Rule 29 CFR 1910.269, Electric Power Generation, Transmission and Distribution Regulations.

II. Background

WEC currently serves approximately 10,000 members in 41 rural Vermont towns in the counties of Washington, Orange, Caledonia and Orleans. Today, WEC's electric system consists of 1,237 miles of distribution line and 18 miles of local transmission line, plus an additional 7.4 miles of transmission line in Coventry. Of those line miles, approximately 800 miles of distribution line and 10.47 miles of local transmission line require tree trimming.

The terrain in WEC's service territory is described as hilly, often rugged and for the most part heavily forested with various deciduous and coniferous species. While distribution lines were constructed across fields in the early years of the Co-op in order to minimize time and the cost of construction, WEC has been routinely relocating those lines nearer to roadsides during major rehabilitation projects whenever possible. However, in many cases, it is likely that landowners will be reluctant to allow WEC to relocate their lines due to aesthetic and environmental impacts.

For the last several years, the WEC Board of Directors has authorized increased funding of the annual ROW budget in an effort to improve reliability. The amount of money budgeted and spent on tree trimming in each of the past four years is as follows:

Distribution System and Danger Tree Removal

Year	2003	2004	2005	2006
Budgeted	\$351,000*	\$418,000	\$436,000	\$467,620
Actual	\$347,496	\$410,993	\$435,751	\$467,539

* Original 2003 budget was \$378,000, but funding had to be curtailed due to budget constraints.

Transmission System

Year	2003	2004	2005	2006
Budgeted	\$13,000	\$13,400	\$13,500	\$14,000
Actual	\$11,522	\$8,121	\$10,267	\$13,966

The number of miles of line that WEC has cleared and maintained, and the number of danger trees removed, in each of the last three years is as follows:

2003

Distribution Miles Cleared:	54.26	Distribution Miles Maintained:	83.48
Transmission Miles Cleared:	1.20	Transmission Miles Maintained:	2.03
Danger Trees Removed:	700		

2004

Distribution Miles Cleared:	59.94	Distribution Miles Maintained:	85.62
Transmission Miles Cleared:	.78	Transmission Miles Maintained:	1.30
Danger Trees Removed:	900		

2005

Distribution Miles Cleared:	55.12	Distribution Miles Maintained:	84.80
Transmission Miles Cleared:	.98	Transmission Miles Maintained:	1.51
Danger Trees Removed:	1,000		

III. Policy

WEC shall strive to maintain its transmission and distribution ROW corridors in accordance with Policy 80, attached hereto as Appendix A, as well as in the following manner:

- a. In a safe, professional, efficient and environmentally sound manner, while being sensitive to the concerns of property owners and the general public.
- b. In a manner that will provide reliable electrical service in conformance with the Electrical Safety Code;
- c. In a manner that protects all electrical system infrastructure necessary to transmit power between substations;
- d. In a manner that uses the services and knowledge of employees and contract ROW crews who are professionally trained and inherently concerned with proper ROW techniques in conjunction with safe work practices.

IV. ROW Management Practices

Inspections:

As part of WEC's annual pole inspection and treatment program, and in accordance with RUS operational planning requirements, a visual inspection of ten percent (10%) of WEC's electrical T&D system shall be conducted on an annual basis. In addition to noting the physical condition of the poles and wires, ROW vegetation growth conditions shall be noted.

Species:

It is the practice of WEC to control the following tree species the full width of the ROW:

Ash	Cherry	Locust	Pine
Basswood	Fir	Maple	Poplar
Beech	Hemlock	Oak	Spruce
Birch	Larch		

This practice of vegetation management control allows for safe passage by WEC employees and contractors within the ROW for maintenance purposes, and removes potential fire and safety hazards to humans and animals in the area.

In general, it is desirable to use or enhance existing natural vegetation that does not interfere with the distribution of electricity. Herbs, most shrubs and low maturing trees should be left in the ROW to suppress the invasion of tall-growing trees. Following is a partial list of some of the low shrubs and plants that are native to WEC's service territory:

Alpine Azalea	Juniper	Rhododendron
American Yew	Laurel	Serviceberry
Dogwood	Leatherwood	Steeplebush
Dwarf Willow	Meadowsweet	Virginia Creeper
Eastern Redbud	Partridge Berry	Wintergreen
Fern	Pussy Willow	Witch Hazel
Gooseberry	Raspberry/Blackberry	

Notification:

In general, the Cooperative membership and affected property owners will be notified prior to any ROW clearing or reclearing maintenance work, except during emergency restoration or if hazardous conditions exist. Such notification shall include one or more of the following:

- First: by a general article in *Co-op Currents* listing all ROW maintenance projects scheduled for the year
- Second: by a mailed postcard to the member, or to the property owner if different from the member and readily known, who will be affected by the ROW maintenance work
- Third: by either an automated or personal telephone call to the member, or to the property owner if different from the member and readily known, informing them that ROW maintenance work is about to commence

General Practices

A. The Removal of Trees by Manual Means (Chainsaws)

This method of control is primarily used for softwood and hardwood trees which have the potential for interfering with line reliability. The principal method of dealing with this type of vegetation is to cut it at ground level (flat cutting) using chainsaws and brush saws. Whenever trees are removed, all stumps are to be cut as close to the ground as practical so as to discourage multi-stemmed sprout regrowth. Side trimming and danger tree removal work are to be performed in conjunction with flat cutting.

B. Trimming/Pruning

It may not always be necessary, economically feasible or aesthetically acceptable to flat cut all trees within the ROW. This may be in response to a property owner's request, when the tree is a compatible, non-interfering vegetation variety, or it may be that while the tree itself is in the required clearance zone, only its branches immediately threaten the electric line. In these cases, it may be appropriate to prune or trim the tree.

Limbs to be removed are those that are dead, decayed, insect damaged, or structurally weak, including limbs which could break at weak points and strike conductors when swinging down in an arc. Pruning guidelines are as follows:

1. Tree Under Conductor – Under Trimming

Under-trimming is cutting back large portions of the upper crown of a tree. Under-trimming is required when a tree is located directly beneath a line. The main leader or leaders are cut back to a suitable lateral. (The lateral should be at least one-third the diameter of the limb being removed.) Most cuts should be made with a saw; the pole pruner is used only to trim some of the smaller lateral branches.

For the sake of appearance and the health of the tree, it is best not to remove more than one-third of the crown when under-trimming.

2. Tree at Side of Conductor – Side Trimming

Side trimming consists of cutting back or removing the side branches that are threatening the conductors. Side trimming is required where trees are growing adjacent to utility lines.

Limbs shall be removed to the trunk or to a lateral that is growing parallel to or away from the conductors.

Where possible, or as designated by WEC, the contractor shall eliminate all branches growing within 10 feet beneath and toward the conductors.

3. Tree Over Conductors – Overhead Trimming

Overhead trimming consists of removing limbs beneath the tree crown to allow wires to pass below. Most of the natural shape of the tree is retained in this type of trimming, and the tree can continue much of its normal growth. Overhanging limbs should be removed as dictated by the species of the tree, location, and the general condition of the tree. When trimming, remove all dead branches above the wires, since this dead wood could easily break off and cause an interruption.

The contractor shall remove all weakly attached overhanging limbs that are capable of hitting the conductor if the limb were to split at the point of attachment.

Where possible, all branches within ten (10) feet above conductors shall be removed as dictated by the species of the tree, location, and the general condition of the tree.

Overhead trimming must be performed in accordance with current VOSHA/OSHA trimming regulations.

4. Combination Trimming

It is often necessary to use judgment in combining several types of arboricultural trimming techniques in order to achieve a good looking job and provide adequate clearances.

5. Improper Trimming Techniques

a. Pollarding: This is done by stubbing off major limbs until the tree assumes the desired shape. The result is not only unsightly, but a multitude of fast-growing suckers will sprout from the stubs, resulting in a line clearance problem more serious than before. The stubs are quite likely to fall victim to decay and disease.

b. Rounding Over: Rounding over or shearing is done by making small cuts so that the tree top is sheared in a uniform line. This creates an unhealthy condition and results in rapid regrowth of suckers directly toward the electrical conductors.

c. Side Trim Stubbing: This is done by stubbing off portions of limbs along the side of the tree to obtain clearance. This method of trimming, like pollarding and rounding over, creates many fast growing suckers that become a serious line clearance problem. These trimming methods should be avoided.

d. Topping: Removing top and upright branches should be avoided. Where necessary, use natural or directional pruning methods.

C. Proper Trimming Techniques

Various trimming shapes were previously described. The following provides the details for WEC standard line clearance and can be used for overhead trimming, side trimming, under trimming, and combinations. Pollarding, rounding over and side trim stubbing shall be avoided.

All trimming shall be performed to direct the growth of a tree away from the conductors. Branches shall be cut back toward the center of a tree to a suitable lateral branch, parent limb or the tree trunk. This is commonly called drop crotch, lateral or natural trimming (see Figure 1). When cutting back to a lateral branch, the diameter of the lateral branch must be at least one-third of the diameter of the branch being removed in order to sustain growth. Almost all cuts are made with a saw and very little pruner work is required. If a proper lateral branch is not available, the branch shall be cut back to the parent limb or tree trunk.

Trimming shall be done in such a manner as to protect tree health and condition.

All saw and pruner cuts shall be made back to the branch collar at an angle equal to but opposite of the branch bark ridge on the parent limb or trunk in order to leave no stubs.

No damage by loosening or stripping of the bark or splitting of branches shall be caused during trimming.

All severed limbs and branches (hangers) shall be removed from trees after trimming.

C. Removal of Trees by Mechanical Means (Brontosaurus)

WEC shall utilize the Brontosaurus wherever possible to clear ROW. The Brontosaurus is an excavator on steel tracks that utilizes a hydraulically driven shearing mechanism that pulverizes the tree and root system. Having utilized this machine over the past several years, WEC's field observations indicate that it effectively reduces the rate of resprout in many species. The Brontosaurus effectively removes trees, shrubs and brush within a ROW, however, this method still requires contract ROW crews to revisit the ROW to do side trimming and danger tree removals which adds to the cost of this method of clearing. Use of the Brontosaurus is limited due to its inability to safely work in narrow ROWs, and near roadsides and members' homes.

D. Danger Tree Removal

A danger tree is any tree, due to its location, species and condition, which is tall enough to pose a threat to WEC's electric lines. Many of the trees at the edge of the ROW have crowns that are heavily grown in towards the line, and when they fall, are likely to make contact with the electrical conductors. Danger tree removal is most effective towards reducing outages associated with high wind storms, prolonged rain incidents and routine outages due to "rotten trees". This, in effect, targets short-term and long-term reliability while also reducing the duration of outages due to excessive damage. For every danger tree

that is targeted and removed, a future outage is avoided. (See Figure 2 for minimum clearances for danger tree removal.)

Since 2002, WEC has been aggressively targeting and removing danger trees in an effort to improve reliability. In 2005, approximately 1,000 danger trees were removed at a cost of \$96,333.

E. “Hot Spot” Clearing

Selective clearing of ROW line sections outside the normal reclearing schedule helps to improve reliability to those members located at the end of a single-phase line. Identification of these problem line sections normally comes from the members who are affected by poor reliability. Devoting resources to “hot spot” line sections improves reliability and/or power quality to specific problem areas, improves line crew access and outage restoration time, and improves overall reliability of a particular line. Hot spot trimming is the least efficient method of ROW clearing, but is essential to good member relations.

F. ROW Clearing During Emergency Restoration and When Hazardous Conditions Exist

In the best interests of employee and public safety, any tree making contact with WEC’s electric system conductors shall be immediately removed to mitigate the hazard. It is not reasonable to provide advance notification to property owners under these conditions.

In the event of a power outage caused by trees within or outside of WEC’s ROW, the trees shall be cut to the extent that is necessary to safely restore power. Advance notification to property owners is not possible under these conditions.

Under both of the above circumstances, a WEC employee shall coordinate with WEC’s ROW Management Coordinator to arrange for any necessary cleanup.

G. Clearing Within Municipal Street or Highway ROW

In situations where the Cooperative does not hold a valid ROW easement along a public street or highway, whether for a new service or for relocation of an existing line, no tree within that street or highway shall be cut in the construction, relocation, maintenance or repair of electric power lines without the written consent of the adjoining property owner(s) or occupant, unless the transportation board or selectmen of the town in which the tree is situated, after due notice to the parties and upon provision for a hearing, shall decide that such cutting is necessary (Title 30 VSA, § 2506), or unless such decision is made by the appointed municipal tree warden for the town (Title 24 VSA, § 67).

H. Clearing Within Wetlands

Wetlands are considered to be sensitive areas for vegetation management practices. These may include swamps, marshes and bogs, and other areas identified in the National Wetlands survey, and will be identified by WEC's representative prior to ROW management activities. Handcutting will be used near wetland areas where necessary to control undesirable vegetation. If extensive wetlands are encountered, WEC may elect to carry out the work in winter because of improved access. Vegetation in wetland areas will be managed according to the Vermont Department of Environmental Conservation's policy on wetlands.

I. Clearing Within Stream Corridors

Stream buffers are areas adjacent to streams requiring special vegetation management, and these areas shall generally be maintained to a minimum width of 75 feet on each side of the stream. Where distribution lines cross streams, standing woody vegetation, shrubs and low mature height trees will be allowed to grow within the ROW if consistent with the terrain and existing land use. This cover will protect fish habitat, service wildlife travel lanes, and control soil erosion.

Where the electric line spans a ravine, streamside vegetation may be allowed to grow taller as specified by WEC's representative. Where an undesirable woody species becomes taller than 12 feet, it will be removed to ensure protection of line conductors. In general, provision of the Vermont Agency of Environmental Conservation policy on river and stream bank management shall be followed.

J. Clearing Where Electric Lines Cross Roads

Electric lines that cross roads will be treated similarly to streams. Low woody shrubs, such as Sweet Gale and other compatible plant species identified on page 4, which have a low height at maturity, will be permitted and encouraged at road crossings in order to provide screening of the electric lines.

K. Clearing Within Wildlife Travel Areas

Wildlife travel areas shall be maintained to promote the movement of white-tail deer and other wildlife across the corridor of extended cross-country distribution and transmission lines. In general, WEC's objectives will be to favor vegetation that can support snow and thereby keep the snow depth on the ground shallow enough for deer to move about and to conceal wildlife as it crosses through wildlife travel lanes. Treatment will be similar to high visibility ROW areas, and preference may be given where practical to preserving a conifer canopy. WEC shall use the Vermont Agency of Natural Resources policy on wildlife management as a guide to maintaining wildlife travel lanes.

L. Stump Height

ROW clearing will be limited during winter months. Deep snow during winter months often results in unsightly ROWs because of excessive stump height, which oftentimes need to be recut in the spring, which adds to the cost. Excessive stump height

also encourages the regrowth of saplings. At other times of the year whenever trees are removed, all stumps will be cut as close to the ground as practical so as to discourage multi-stemmed regrowth of the original species.

M. Cherry Tree Disposal Precaution

Wilted leaves from cherry trees are poisonous to livestock. Therefore, in areas frequented by livestock, any cherry cuttings shall be disposed of immediately by removing any cuttings from the enclosed livestock grazing area.

V. Trees and Debris Removal

Disposal techniques for each ROW section will be determined by WEC's representative, taking into account federal, state and local regulations, the practicality of certain disposal methods, the potential for wood utilization, and the wishes of the property owner. Whenever roadside trimming is performed, all log length material shall be picked up by a log truck as soon as possible and disposed of in accordance with the property owner's request. All other brush and wood material shall be removed from the ditch and municipal ROW and appropriately chipped or stacked at the tree line. If the ROW maintenance area is located more than fifty (50) feet from a public road or highway, then the log or tree length wood shall be moved to the tree line. All brush shall be windrowed at the edge of the ROW in order to provide unobstructed access for maintenance purposes. All other wood material shall be cut in four foot lengths and stacked at the tree line (see Figure 3). There will be no brush left in stream beds, across fence lines, stone walls, paths or roadways.

VI. Prioritization of ROW Clearing

WEC's Vegetation Management Plan promotes the prioritization of ROW clearing as it statistically relates to reliability of service. In general, the focus of the ROW management program shall be as follows:

1. Transmission Lines

- Annually patrol 18 miles of local transmission line as well as 7.4 miles of 46 kV transmission line in Coventry for purposes of identifying potential equipment problems and marking danger trees for removal.
- Flatcut WEC's 10.47 miles of local transmission line as needed to ensure maximum reliability to WEC's substations.
- Flatcut WEC's 7.4 miles of Coventry transmission line as needed based on annual patrol to ensure 100% availability.

2. 3 Phase Lines

Three-phase circuits are critical links from substations to all members. Damage to one conductor of a three-phase line require the entire three conductors to be de-energized when repairs are made. WEC's three-phase lines are prone to greater damage for any given tree contact due to construction type and phase-to-phase voltage levels. The reliability of three-phase circuits, like substations, have a direct impact on the reliability of all single-phase lines. Improving the reliability of WEC's three-phase circuits is essential to achieving state mandated SAIFI and CAIDI indices.

3. Two-Phase Lines

Two-phase lines shall be treated similarly to three-phase lines as they serve a greater number of members than do single-phase lines.

4. Single-Phase Lines

Maintain single-phase line ROWs based on member density.

5. Worst-Performing Circuits

At the beginning of each year, WEC shall analyze circuit performance for the previous calendar year and identify the five worst performing circuits based on annual reliability. The reliability of the worst-performing circuits shall be further analyzed to determine if there are conditions that can be changed to improve the reliability of the circuits, including danger tree removals, flat cutting, line relocation and reconstruction if needed. In all cases, the circuit analysis shall take into consideration year-to-year fluctuations and longer-term trends to identify root causes of the reliability problems.

VII. CLEARANCE ZONE REQUIREMENTS

In general, single phase primary and/or secondary conductors shall be cleared of trees within 15 feet of each side of the pole line center. Three phase primary conductors shall be cleared 25 feet each side of the pole line center. (See Figure 4 for clearance zone dimension measurements.)

VIII. ROW Contractor Training and Requirements

ROW contractors hired by WEC are required to become familiar with the procedures and requirements of this plan and to utilize safe and proper ROW clearing techniques that are in compliance with state and federal laws and regulations. Each ROW crew must have two (2) qualified line clearance tree trimmers. Minimum qualifications include the following:

- Annual CPR and first aid training
- Annual electrical hazard awareness training
- Ability to perform an aerial rescue from a minimum height of 35 feet in four minutes or less. Aerial rescue must be practiced at least once a year.

- Knowledge of electric line voltages and minimum approach distances
- Annual inspection and dielectric testing of bucket trucks to be used for tree trimming
- *Need to add all references to OSHA 1910.269 material*

This plan has been prepared and adopted in order to provide a broad assessment of WEC's ROW vegetation management goals and policy objectives, and the operational methods and practices that shall be used in attaining those goals and objectives. The procedures outlined herein are designed to provide general guidelines for the safe operation and maintenance of electrical distribution and transmission lines, while minimizing visual and other environmental impacts within the communities served by WEC.