

Rural Road Resilient Right-of-Ways Vegetation Assessment
Town of Johnson Action Plan and Recommendations
Prepared by Joanne Garton, Vermont Urban & Community Forestry Program
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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 spring of 2018, the town of Johnson 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.

Joanne Garton presented in front of the Johnson selectboard on April 16, 2018 to pitch the Resilient Right-of-Ways project. The selectboard agreed that the town would participate,. The town was then asked to form a Resilient ROW project advisory committee made up of individuals knowledgeable about, and invested in, the future of healthy and resilient roadside vegetation communities. The liaison to Johnson's volunteers is Sue Lovering. Members of the committee are:

Noel Dodge, Tree Warden
Lois Fey, Conservation Commission
Brian Krause, Road Foreman
Sue Lovering, Tree Board
Rob Maynard

Resilient Right-of-Ways project coordinator lead Joanne Garton and VT UCF summer intern Beth Bannar met with the Resilient Right-of-Ways project advisory committee (except Brian Krause) on June 19, 2018, to scope the extent of the project and address the town's roadside vegetation practices, concerns, and ideas. Sue Lovering and Joanne Garton completed and signed the Letter of Collaboration on June 19, 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 Johnson, 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 July and August of 2018 by Joanne Garton and Beth Bannar. Field routes covered approximately 21 miles of the 44 miles of unpaved roads in Johnson. 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 Johnson Work Plan (Appendix B).

The assessed routes are drawn in red on Maps 1 through 11. All plot locations are displayed on Map 1: Right-of-Way Vegetation Type. A draft report was submitted to the committee on May 1, 2019.

On October 2, 2019, Joanne met with Sue Lovering, Noel Dodge, and Lois Fey at the Johnson Library to review the draft report and discuss some roadside operations such as roadside mowing techniques, EAB and ash tree management in light of the discovery of EAB in Vermont, invasive species management, risk tree management, and tree clearing by utilities. A follow up email date Nov. 6, 2019 is included as Attachment F.

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 any vegetation regrowth 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 actually 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 Johnson'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 99% of ash trees (if not chemically treated); those along public roads can then pose a risk to safety when diseased or dying.

Johnson is almost equidistant to the two [known infested areas](#)⁴ in Vermont. As of the writing of this report, EAB has not been detected in Johnson or within 10 miles of its borders.

The Resilient Right-of-Ways survey of ash tree counts in assessed plots along Johnson’s rural roads show that ash trees are common in forested or treed roadside communities and are densely congregated in some areas (for example, along Foote Brook Road and much of Upper French Hill). This survey agreed with the ash tree density map created in 2013 by the RIPT volunteers, which counted 2,470 single ash trees located with town right-of-ways and identified other private ash trees within 75 feet of the road.

Recommendations

- Continue to plan for the arrival of emerald ash borer. Work with the Regional Invasive Insect Preparedness Team (RIIPT) and review the recommendations created in the 2014 Town of Johnson EAB Preparedness Plan.

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=cfda013ad1464b7b9103a3d7806f0cc5>

- The Preparedness Plan already states that “Ash trees near wires with the lowest condition rating and the shortest distance from the road can be considered the most hazardous”. 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.
- Review the Urban & Community Forestry Program’s other [on-line resources](#)⁵ regarding EAB management.

3. Address hazard trees with the tree warden

Johnson’s current tree warden, Noel Dodge, serves as an 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 must be a hazard, not its placement. If a roadside tree is close to the road edge but not damaged or infected, 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](#)⁶. 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](#)⁷ (last amended in 1969) still apply. They are included in this report in Appendix C: Selected Resources for Tree Wardens.

Recommendations

- 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.
- Consult the Vermont Urban & Community Forestry Program’s [Resources for Tree Wardens](#)⁸ webpage, including the [Guidelines for Public Hearings for Tree Removals](#).

⁵ Emerald Ash Borer Management. Vermont Urban & Community Forestry: <https://vtcommunityforestry.org/community-planning/tree-pests>

⁶ Proposed Tree Warden Statutes Amendments. Vermont Urban & Community Forestry Program. <https://vtcommunityforestry.org/resources/vermont-tree-wardens-0/proposed-tree-warden-statutes-amendments>

⁷ Vermont Tree Warden Statutes. Title 24, Chapter 033. http://vtcommunityforestry.org/sites/default/files/pictures/tree_warden_statutes-1.pdf

⁸ Resources for Tree Wardens. Vermont Urban & Community Forestry Program: <https://vtcommunityforestry.org/resources/vermont-tree-wardens-0/resources-tree-wardens>

4. Develop a tree ordinance or policy

Well-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 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.

Recommendation:

- Review the existing tree warden statutes as listed in section 3, above.
- Learn more about [tree ordinances](#)⁹ to determine if Johnson should develop its own tree ordinance or policy. If you choose to develop a tree ordinance, utilize the [Guide to Tree Ordinances and Policies for Vermont Municipalities](#)¹⁰.

5. Develop a mowing policy for the clear zone

Johnson is already aware of its common roadside invasive plants: Japanese knotweed (*Fallopia japonica*) and honeysuckle (*Lonicera spp.*). Poison parsnip (*Pastinaca sativa*), Dame's rocket (*Hesperis matronalis*) and Japanese barberry (*Berberis thunbergii*) were recorded in Johnson on iNaturalist at singular roadside locations and have the capacity to spread quickly. Although not invasive, poison ivy (*Toxicodendron radicans*) was recorded by one iNaturalist user on Railroad Street.

Buckthorn buckthorn (*Rhamus cathartica*), glossy buckthorn (*Frangula alnus*), wild chervil (*Anthriscus sylvestris*) and garlic mustard (*Alliaria petiolata*) are common invasive plants in other central and northern Vermont towns but they have not been recorded in Johnson on iNaturalist. However, the prevalence in Johnson of active agricultural fields, thin roadside hedgerows, and extensive forest edge creates a landscape prone to spreading invasive species.

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

⁹ Public Policy on Vermont Urban & Community Forestry Program: <https://vtcommunityforestry.org/resources/public-policy>

¹⁰ Guide to Tree Ordinances and Policies for Vermont Municipalities. Vermont Urban & Community Forestry Program. <https://vtcommunityforestry.org/sites/default/files/pictures/treeordinanceguide.pdf>

- 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 Johnson.
- 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 Johnson – 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. And, it spreads. Poison ivy has not been recorded in Johnson along Railroad Street.
- The most effective way to remove poison (wild) parsnip¹¹ (*Pastinaca sativa*) is by digging out the taproot of while wearing protective clothing. For larger 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.
- If detected, areas infested with wild chervil 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 (neither have been detected in Johnson) will flower again after mowing – repeat cutting before the plant seeds again to eradicate the plant population.
- If detected, 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.
- Clean mowing equipment between road segments. Note where there are currently few invasive plant species (Map 8: Invasive Plant Species) and make sure that all mowing equipment is thoroughly cleaned before mowing, digging or ditching in these locations (for example, along Plot Road, portions of Upper French Hill Road, Ben Ober Road, and Cemetery Road).
- 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 damage¹².

¹¹ Poison Parsnip is described at vtinvasives.org. More thorough management recommendations are outline in [this webpage](#) from Ontario. Note that bloom times may be different than in Vermont.

¹² Best Practices Handbook for Roadside Vegetation Management. Minnesota Local Road Research Board. <https://www.lrrb.org/pdf/200820.pdf>

- For more information on reducing the spread of invasive plants along roadsides, see Appendix D: [Best Management Practices for Roadside Invasive Plants](#)¹³, 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>.

CALENDAR OF COMMON INVASIVE PLANT SPECIES PHENOLOGY IN VERMONT

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

6. Understand the vegetation management goals of your utility companies

The Johnson town plan requires that utility companies do not interfere with the scenic quality and land value of towns. The town is served by two electrical utilities, Vermont Electric Cooperative (VEC) and Morrisville Water & Light.

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.
 - Vermont Electric Coop has a [Vegetation Management Plan for Vermont Electric Cooperative, Inc. Transmission and Distribution Systems](#)¹⁴ available online. Review *Appendix D: Specifications for Vegetation Management on Transmission and Distribution Lines* to understand VEC's practices. This document outlines the basic 10-

¹³ Best Management Practices for Roadside Invasive Plants. The Nature Conservancy. <https://vtinvasives.org/sites/default/files/Best%20Management%20Practices%20for%20Roadside%20Invasive%20Plants.pdf>

¹⁴ Vegetation Management Plan for the Vermont Electric Cooperative, Inc. Transmission and Distribution Systems. Vermont Electric Co-op, Inc.: https://www.vermontelectric.coop/images/2014_VECVgtMgmtPlan_Rev03-20-14.pdf.

year maintenance cycle completed by outside contractors on distribution lines and describes right-of-way widths between 30 and 50 feet. Landowners cannot build structures, place obstructions, or change the grade of land within 25 feet of the pole line. The document also specifies that wood from felled trees “remain the property of the landowner and shall be left on site” at the edge of the right-of-way. The Town of Johnson may want to notify landowners about the need to keep ash wood local and note whether the utility company is performing work on their road that would result in felled ash. Lastly, the document specifies that some vegetation in the right-of-way is compatible with utility lines, namely “low growing plants and shrubs such as lilac, serviceberry, dogwood, hawthorns, and [native] honeysuckle”.

- According to their [website](#)¹⁵, Morrisville Water & Light (MW&L) can help landowners take down trees near a power line or in danger of falling on a power line. The website states that “MW&L crews may be able to take down these trees for you at no cost if you are willing to clean up the debris”. The emergency number for MW&L is 802-888-2162. [The Morrisville Water & Light Department: Vegetation Trimming and Cutting Plan](#) is included as Appendix E of this report.

7. Understand updated stormwater regulations and standards

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 will need to complete a Road Stormwater Management Plan by December 31, 2020 that outlines a multi-year plan to correct drainage patterns along eroding roads that are hydrologically connected to streams, ponds, and other water bodies. More information on the [Municipal Roads General Permit](#)¹⁶ can be found on the [Municipal Roads webpage](#)¹⁷ of the Vermont Department of Environmental Conservation.

However, trees and other vegetation play a role in controlling erosion and protecting water quality. Deciduous canopy cover can reduce rainfall intensity by 15-21%¹⁸, coniferous canopy by 21-52%¹⁹. On rural roads, this translates into a reduced impact of water droplets on dusty roads and less erosive power of running water during rainfall events. Additionally, tree and plant root systems reinforce the shear strength of soil and extract water from the soil for plant growth, reducing soil erosion and its causes. Independent of social and cultural concerns surrounding the desire for or against roadside trees, towns will need to carefully consider whether road widening, straightening and/or ditching at the expense of existing vegetation is the best or most efficient way to reduce the effects of stormwater runoff.

¹⁵ Public Safety: Keeping You Out of Harm’s Way: Tree Felling. Morrisville Water & Light. <https://www.mwlv.com/public-safety> accessed on March 11, 2019. <https://www.Johnsonelectric.com/about/vegetation-mgt>

¹⁶ Municipal Roads General Permit.

https://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/Permitinformation/MunicipalRoads/sw_FinalMRGP.pdf

¹⁷ Municipal Roads Program on the Vermont Department of Environmental Conservation webpage:

<https://dec.vermont.gov/watershed/stormwater/permit-information-applications-fees/municipal-roads-program>.

¹⁸ Trimble & Weitzman, 1954. [Effect of a hardwood forest canopy on rainfall intensities](#) as referenced in [Give Me the Numbers: How Trees and Urban Forests Really Affect Stormwater Runoff](#). Eric Kuehler, USDA Forest Service.

https://www.fs.fed.us/research/docs/webinars/urban-forests/give-me-the-numbers/UFCFeb2017_KuehlerSlides.pdf

¹⁹ Keim and Skaugset, 2003. [Modeling effects of forest canopies on slope stability](#). As referenced in [Give Me the Numbers: How Trees and Urban Forests Really Affect Stormwater Runoff](#). Eric Kuehler, USDA Forest Service.

https://www.fs.fed.us/research/docs/webinars/urban-forests/give-me-the-numbers/UFCFeb2017_KuehlerSlides.pdf

There are many good strategies to direct surface runoff into existing vegetation while retaining trees and plants that may have taken years to establish. Some techniques include stone turnouts (as pictured below from the Better Roads Manual), the filling of incision ditches with gravel and stone armor (also pictured below), the installation of dry wells or French drains to capture or transport runoff, or the use of [bioretention areas](#)²⁰. The new [Town Road and Bridge Standards](#)²¹ (released June 2019) outline many construction standards that towns may choose to adopt to reduce stormwater runoff and improve the resiliency of town roads.

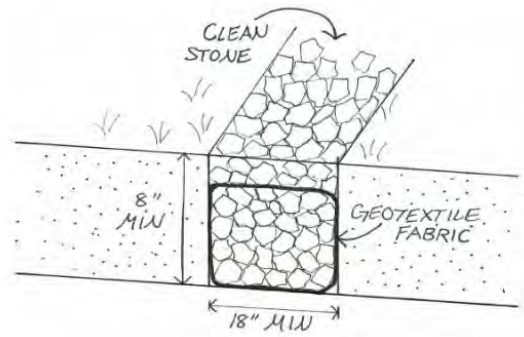
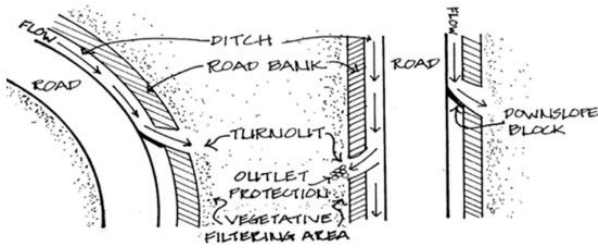


Figure 18: Infiltration Trench

Stone Turnouts and Infiltration Trench. Drawing from p. 33 and p. 21 of the Vermont Better Backroads Manual, 2019. Stone turnouts direct water away from road edges into existing forest cover or other vegetation. Infiltration trenches catch runoff and allow infiltration before the water travels down the road surface. These trenches should be installed with a vegetative filter strip to reduce clogging of the trench.

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. Maintain backroads and ditches to their specifications

From farmhouses surrounded with sugar maples-lined to pockets of deep woods, Vermont’s unpaved roads take us through the unique areas of the state that make Vermont so attractive. While the view from the road changes around each bend, many of the elements of a good road should not. The crown, slope, radius of curves, mowed or cleared zone width, and even speed limits are based on the landscape of the road, the topography it covers, and the traffic it receives. Gravel road construction is an art and science in itself (see the [Vermont Better Roads Manual](#) and the [Vermont State Design Standards for Roads](#)²³ offer views of classic Vermont. Grader berms

²⁰ The Vermont Rain Garden Manual. Winooski NRCd, UVM Extension, Lake Champlain Sea Grant. <http://winooskinrcd.org/wp-content/uploads/VTRainGardenManual.pdf>

²¹ Town Road and Bridge Standards, Municipality of _____, Vermont (fillable form). Vermont Agency of Transportation, 2019. <https://www.vlct.org/news/municipal-road-and-bridge-standards-summary>

²² Vermont Better Backroads Manual, January 2019: <https://vtrans.vermont.gov/sites/aot/files/highway/documents/ltf/Better%20Roads%20Manual%20Final%202019.pdf>

²³ Vermont State Design Standards 1997. Vermont Agency of Transportation, 1997. <http://54.172.27.91/transportation/standards/VermontStateDesignStandards1997.pdf>

- If ditching, an increase in line of site, or road widening is the most viable and effective option along a town road, design clearing to occur on only one side of the road, leaving as many mature trees and native plants as possible. Mature trees provide more stormwater reduction (20 ft³ per tree) than newly planted trees (10 ft³ per tree)²⁴.
- Ensure that clearing work occurs when invasive plants are not in seed and that soil containing invasive plant fragments is not moved to a site that is free of invasive plants.
- Once woody vegetation in a roadside ditch becomes large enough, it may begin to pose a safety or vision hazard to drivers. Brush hogging or mowing the ditch itself may be necessary to maintain the ditch shape or to access and replace the stone within a stone-lined ditch, but the backslope, or uphill slope next to a ditch, should not be cleared -- plant roots in this soil keep the slope in place. Additionally, examine what height of stone in a stone-lined ditch is necessary and revegetate any exposed slope above this minimum height.
- Remove grader berms. These mounds of gravel, dirt, leaves and sticks are left behind after the grader passes and ultimately impede the flow of stormwater into naturally vegetated areas.

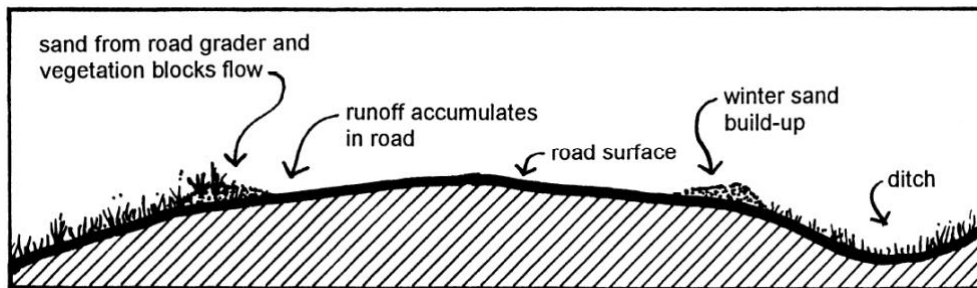


Image from the *Gravel Road Maintenance Manual*, 2016.

https://www.maine.gov/dep/land/watershed/camp/road/gravel_road_manual.pdf

- Consult the [Vermont State Design Standards](#) for minimum widths of lanes and shoulders for Rural Local Roads, including Table 6.3 from the Standards pictured below. Consider carefully if or why a backroad should have a width greater than the minimum before proceeding to widen a road beyond the designed minimum width.

²⁴ Stormwater Management Benefits of Trees. Stone Environmental, 2014.

<https://vtcommunityforestry.org/sites/default/files/pictures/waterqualitytreebenefits.pdf>

Table 6.3**Minimum Width of Lanes And Shoulders
for Rural Local Roads**

Design Traffic Volume	ADT ^(a) 0-25	ADT 25-50	ADT 50-100	ADT 100-400	ADT 400- 1500	ADT 1500- 2000	ADT Over 2000
Design Speed (mph)	Width of Lane/Shoulder (ft)						
25	7/0	8/0	9/0	9/2	9/2	10/3	11/3
30	7/0	8/0	9/0	9/2	9/2	10/3	11/3
35	7/0	8/0	9/0	9/2	9/2	10/3	11/3
40	7/0	8/0	9/2	9/2	9/2	10/3	11/3
45	—	—	9/2	9/2	9/2	10/3	11/3
50	—	—	9/2	9/2	10/2	10/3	11/3

(a) Minimum width of 8/0 whenever there is guard rail.

9. Create and maintain a public relations plan

Although the road foreman, road crew, and town Selectboard make many of the decisions regarding road and roadside vegetation maintenance, all people in a town can play a role in deciding how funds are used to manage and maintain their town roads. Raising public awareness about roadside maintenance will help road crews interact positively with the public while conducting roadwork, mowing, pruning, tree clearing, or erosion control.

A successful public relations plan will also outline appropriate channels for submitting and responding to complaints from adjacent landowners and road users. Public hearings surrounding tree removal are one method to manage expectations about roadside canopy. Additionally, a public relations plan should outline how road crews, town officials, and local residents should respond to a crisis such as a downed tree, fuel spill, or road washout.

Lastly, a public relations plan can outline the town's media relations and expected channels of communication regarding upcoming roadwork, dust control, mowing, tree clearing, and other roadside vegetation initiatives. Local media can help share information about reducing the spread of invasive plants, managing ash trees and monitoring for EAB, and identification of both positive and problematic roadside scenarios.

10. 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 Johnson as it moves forward with vegetation planning in public spaces, including in the road right-of-way. Below is a list of key grants that may be available to Johnson, particularly if it has a roadside vegetation plan already in place. To stay current on grant opportunities, subscribe to the [Clean Water Grant Opportunities Notification List](#)²⁵.

²⁵ Subscription form for the Vermont Clean Water Grant Opportunities newsletter, Vermont Department of Environmental Conservation: <https://us11.list-manage.com/subscribe?u=c6b92b591e58d2c3dcd90daf6&id=78ab4a4b2e>.

**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. 2020 awardees will receive \$1,000 - \$5,000 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, 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
Ecosystem Restoration Program	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	Annually, January
Clean Water Initiative Program Grant Opportunities	Construction of clean water improvement projects, administered by statewide partner(s), including stormwater management and natural resources restoration projects	Funding changes annually and depends on the grant in question.	Rolling

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) 	Max. Award: Category A: \$8,000 Category B: \$20,000 Category C: \$40,000 Category D: \$40,000 Match Requirement: 20% local	Annually, November or December

	<ul style="list-style-type: none"> • Correction of road related erosion and/or construction of stormwater management projects (Category B) • Correction of streambank and/or slope related problems (Category C) • Roadway structures and culvert upgrades (Category D) 		
Transportation Alternatives Program	<ul style="list-style-type: none"> • Includes environmental mitigation activities such as stormwater and water pollution prevention, management, and control related to highway construction or highway runoff 	Maximum Award: \$300,000 Match Requirement: 20% for scoping, design and construction	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.	Maximum Award: \$100,000 in 2019 Match Requirement: 50%	Annually, March
Better Connections	A partnership between ACCD and AOT, this grant 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.	

Resilient Right-of-Ways

Field data for the Town of Johnson, Vermont

Part of the Resilient Right-of-Ways Action Plan and Recommendations : Town of Johnson

Prepared by Joanne Garton, Vermont Urban & Community Forestry Program

March 25, 2019, revised November 6, 2019



Resilient Right-of-Ways Project Data Johnson, VT

1. Resilient Right-of-Way Community Types



Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

1:40,000

The map is for illustrative purposes only. The accuracy of the data layers shown on the map are limited by the accuracy of the source materials. No warranty as to the accuracy or the usefulness of the data is expressed or implied.

0 0.38 0.75 1.5 Miles

Legend

— 2018 Inventory Roads

Type



Emerging overstory (shrubs & saplings)



Immature overstory ($\leq 6"$ dbh)



Mature overstory ($> 6"$ dbh)



Mowed



Wet Area



Street Trees



Bare

Road Surface

— Paved

--- Unpaved

--- Other



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. Assessing right-of-way vegetation alone helps towns understand the categories of trees and plants that exist at present along their roads.

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.

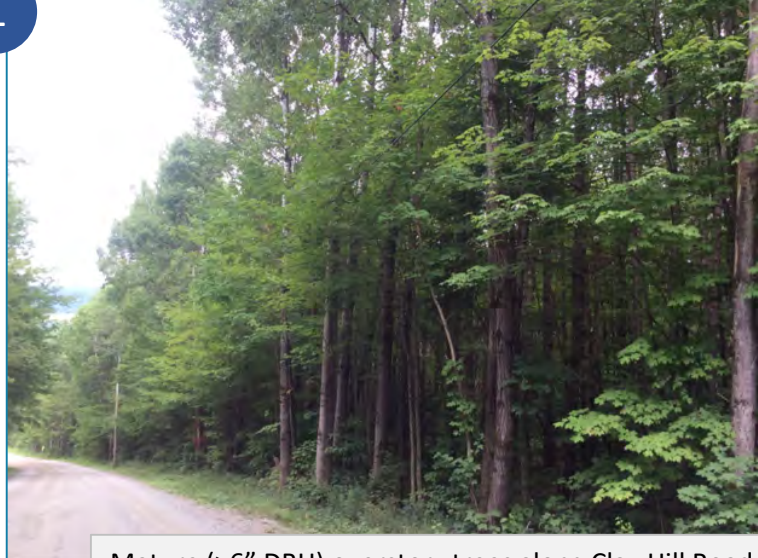


How town residents may perceive their rural roadsides, sometimes independent of adjacent private land use.



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

1



Mature ($> 6"$ DBH) overstory trees along Clay Hill Road.

2



Emerging overstory, or forest edge, along Hoag Road.

3



Riparian Zone and wet area along Foote Brook Road.

4



Seasonally harvested corn along River Road.

STATISTICS IN JOHNSON

The right-of-way vegetation types on the **approximately 21 miles** of surveyed rural routes in Johnson exhibited the following general characteristics:

- 70%** Tree-lined, forested, or future forest: (119 / 170)
- Emerging overstory: **9%** (15 / 170)
 - Immature overstory: **14%** (23 / 170)
 - Mature overstory: **44%** (75 / 170)
 - Street Trees: **3%** (6 / 170)

26%

Mowed: (30 / 228)

- Frequently: **11%** (18 / 170)
- Seasonally: **15%** (26 / 170)

3%

Wet areas: (5 / 170)

- Riparian area, pond, lake edge, wetland: **2%** (3 / 170)
- Wet ditch: **>1%** (2 / 170)

1%

Bare: **< 1%** (1 / 170)

Resilient Right-of-Ways Project Data Johnson, VT

1. Resilient Right-of-Way Community Types



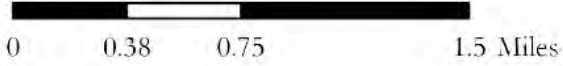
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

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Legend

— 2018 Inventory Roads

Type

- Emerging overstory (shrubs & saplings)
- Immature overstory ($\leq 6"$ dbh)
- Mature overstory ($> 6"$ dbh)
- Mowed

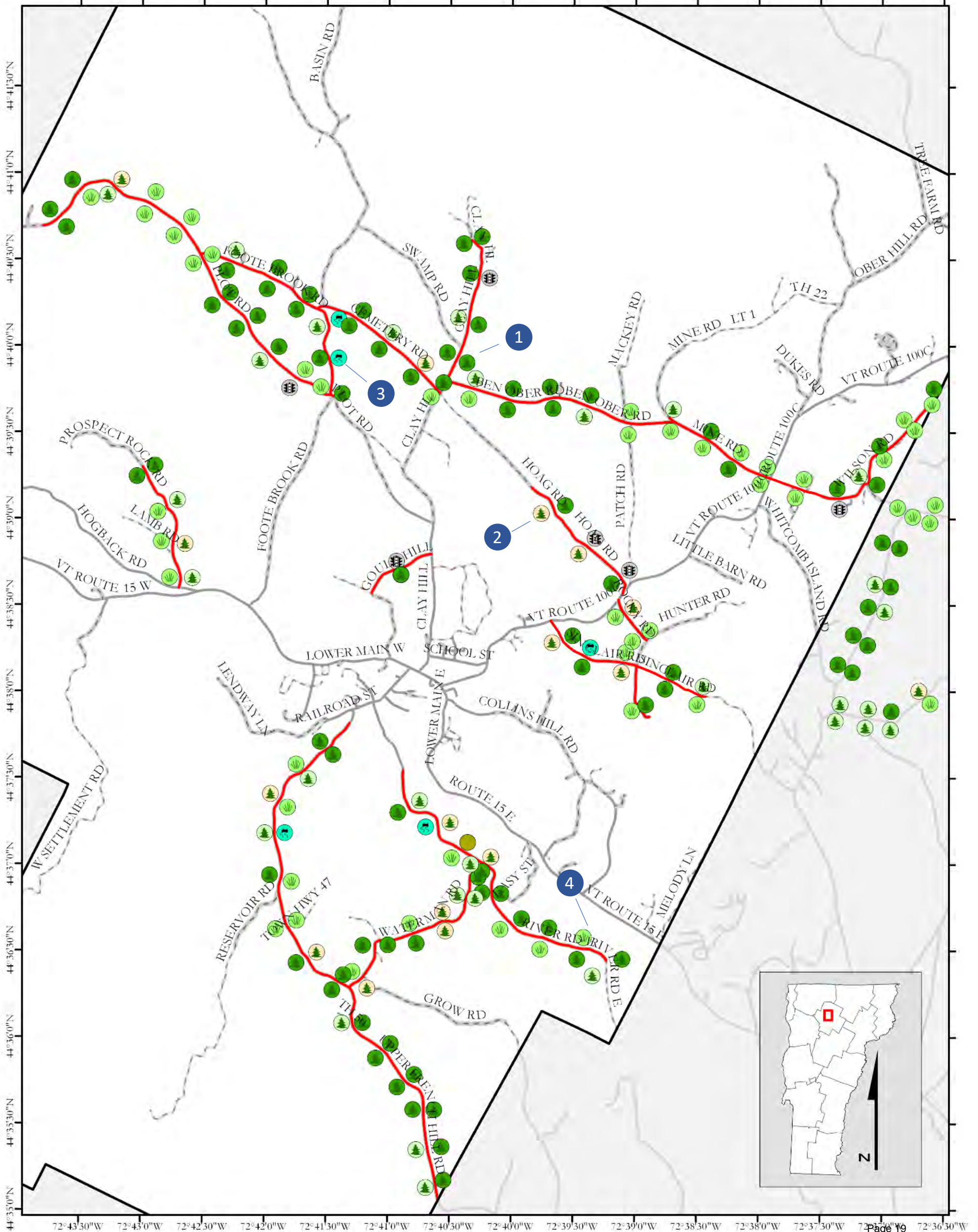
Wet Area

Street Trees

Bare

Road Surface

- Paved
- Unpaved
- Other



Resilient Right-of-Ways Project Data Johnson, VT

2. Manageable Vegetation Width



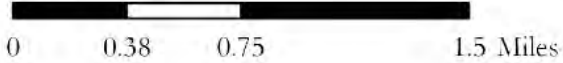
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

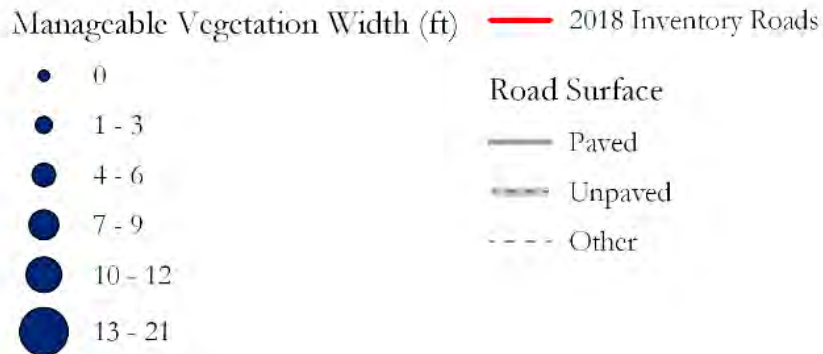
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Legend



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 ROW (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 = $(\text{ROW width}/2) - (\text{Road width}/2) - \text{clear zone width}$.

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:



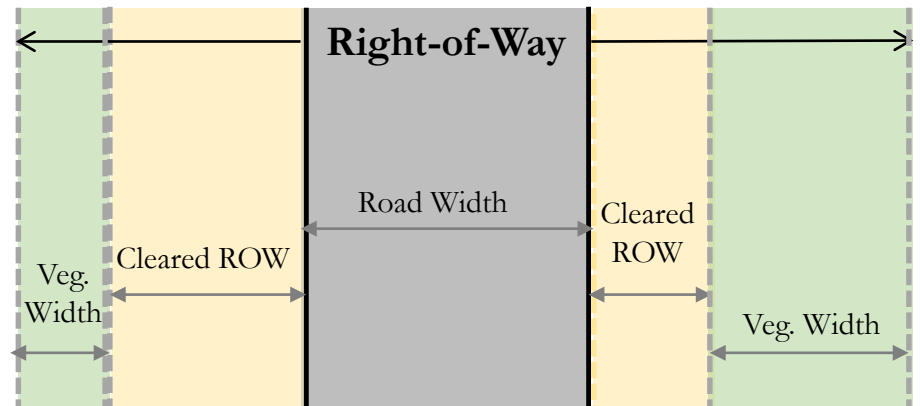
Where opportunities exist to perform recommended silvicultural practices on significant swaths of publicly managed roadside forest.



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 JOHNSON

The manageable vegetation width in the on the **approximately 21 miles** of surveyed rural routes in Johnson exhibited the following general characteristics:

Road width (ft)

- Range: 9– 29
- Average: 20.4
- Median (or, middle value): 20
- Mode (or, most frequent value): 19

Clear zone width (ft)

- Range: 0 – 20
- Average: 8.0
- Median (or, middle value): 8
- Mode (or, most frequent value): 8

Manageable vegetation width (ft)

- Range: 0 – 20
- Average: 6.6
- Median (or, middle value): 7
- Mode (or, most frequent value): 6

Resilient Right-of-Ways Project Data Johnson, VT

2. Manageable Vegetation Width



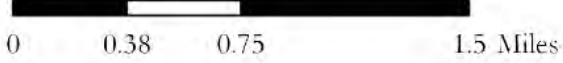
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

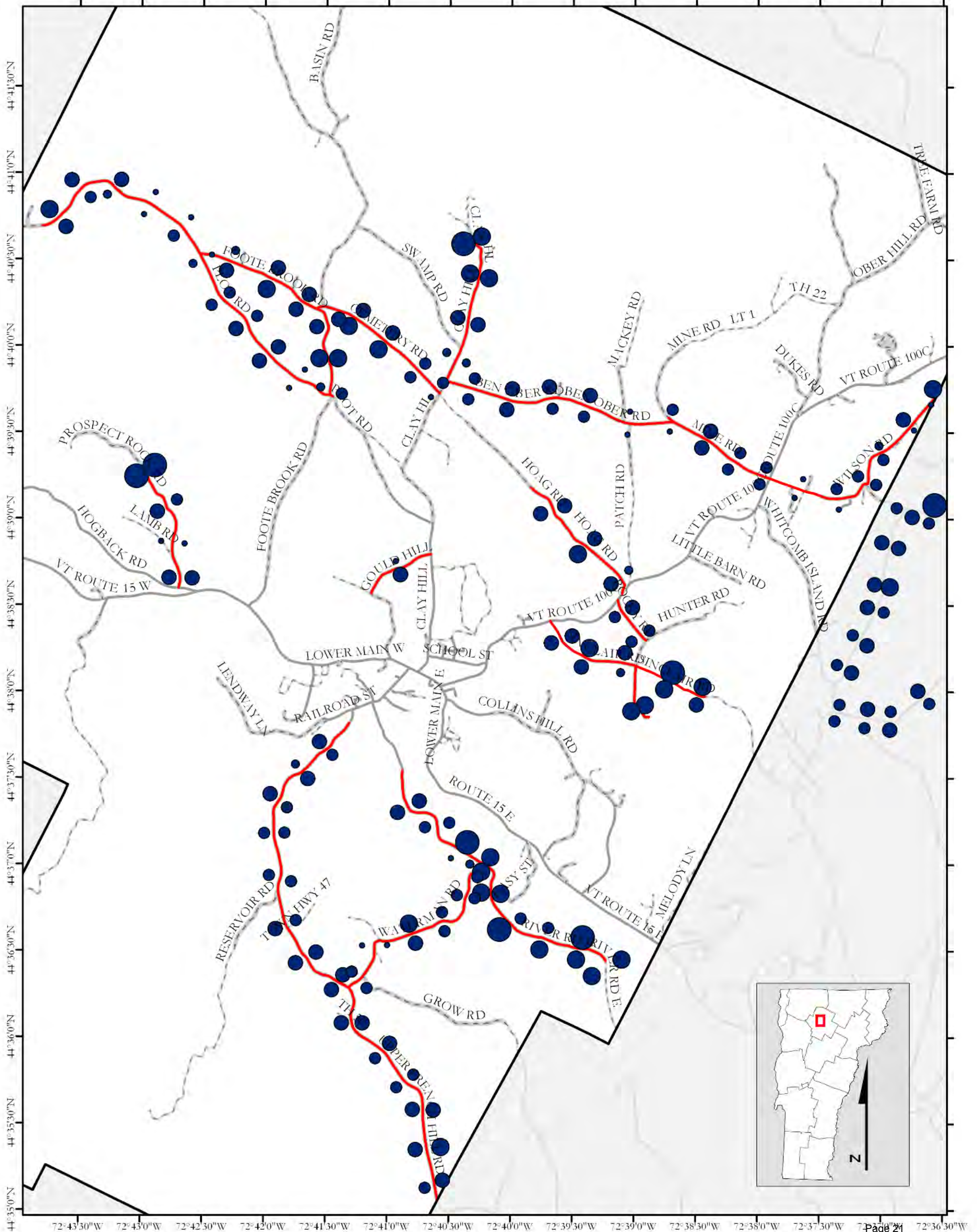
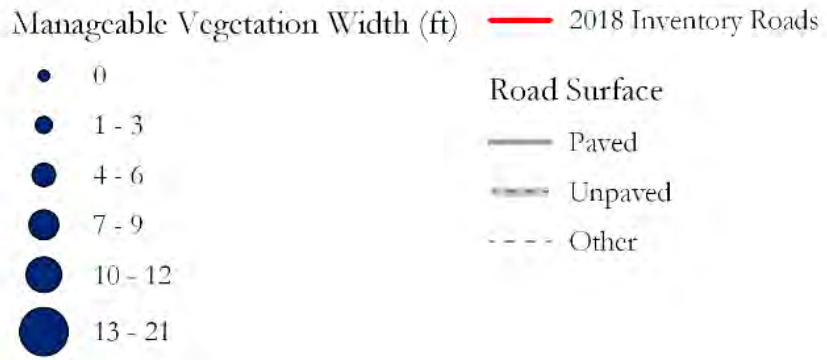
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Legend



Resilient Right-of-Ways Project Data Johnson, VT

3. Roadside Ash Impact



Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar


Date: 3/1/2019

1:40,000

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0 0.38 0.75 1.5 Miles

Legend


	2018 Inventory Roads	Roadside Ash Count per Plot
	Paved	 None
	Unpaved	 Low (1-2)
	Other	 Medium (3-4)
		 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

-  Johnson has already conducted an [ash tree inventory](#) to determine the location, distribution and size of ash trees along its rural roads.
-  Plan to manage ash along rural roads as part of Johnson's [town-wide EAB Management Plan](#). 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 on the Vermont Urban & Community Forestry Website: https://vtcommunityforestry.org/ash-inventory](https://vtcommunityforestry.org/ash-inventory)
-  [Emerald Ash Borer Preparedness Plan, Johnson Vermont. April, 2014 on the town of Johnson website: https://vtcommunityforestry.org/community-planning/tree-pests](https://vtcommunityforestry.org/community-planning/tree-pests)

1



Road users will notice a distinct loss of canopy cover when ash trees die along this section of Foote Hill Road. Ash trees along sections further west are small (<6" DBH) and may cause a less significant impact when dead.

2



Road erosion along Ben Ober Road may result in future ditching. Consider ash removal during this road construction.

3



Ash make up a part of this hedgerow between the road and a lawn on Upper French Hill Road.

Resilient Right-of-Ways Project Data Johnson, VT

3. Roadside Ash Impact



Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

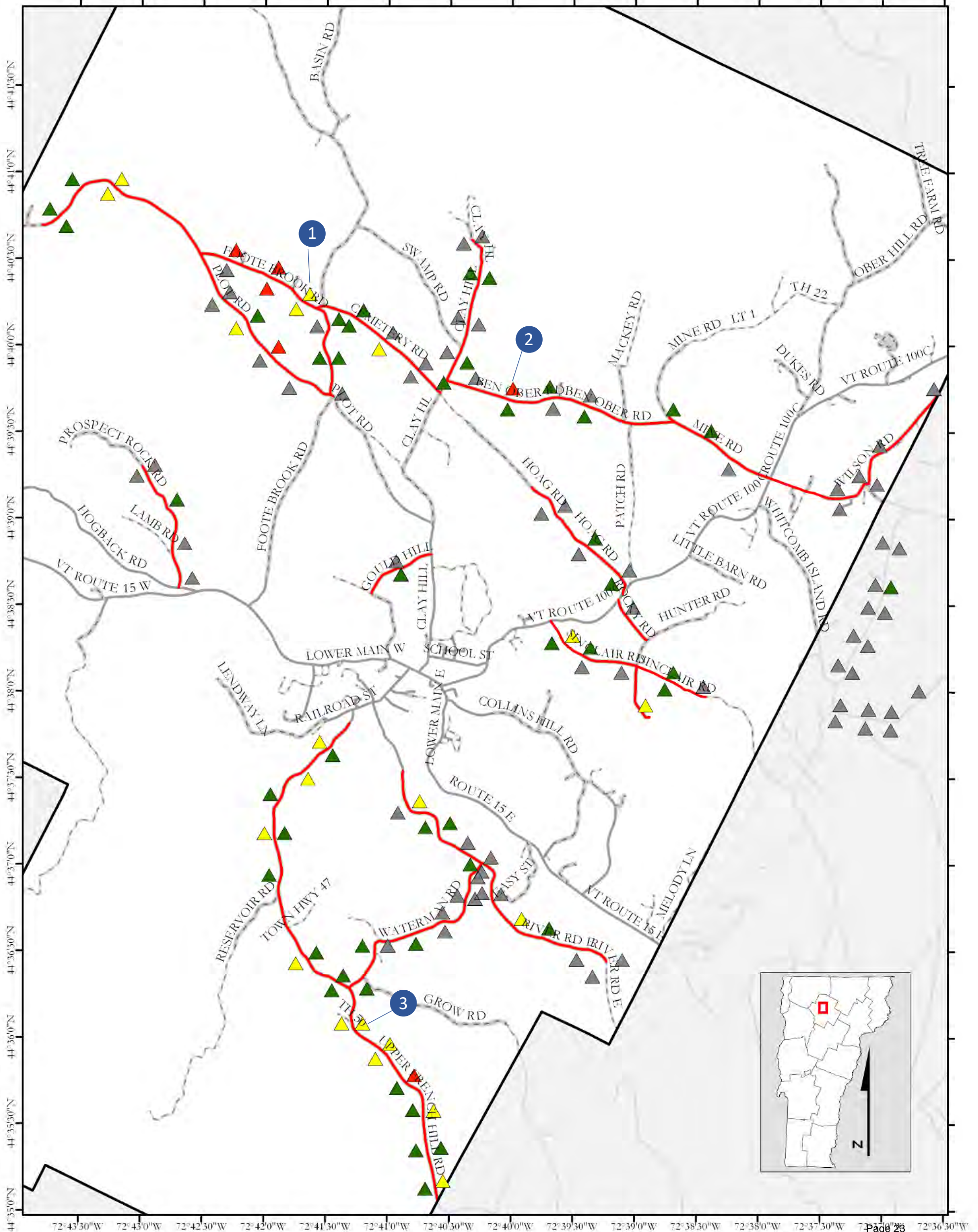
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0 0.38 0.75 1.5 Miles

Legend

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



Resilient Right-of-Ways Project Data Johnson, VT

4. Overhead Utility & Vegetation Regeneration Opportunities



Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

1:40,000

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Legend

- 2018 Inventory Roads
- Road Surface
- Paved
- Unpaved
- Other
- Utility Wire
- Promote Regen



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



Japanese Knotweed is growing underneath this utility line in a riparian zone. Understand the utility company’s approach to managing knotweed and ensuring that mowing does not spread knotweed.

2



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 Wilson Road.

3



The town will generally not be responsible for trees that impact this utility line along Clay Hill 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.

Resilient Right-of-Ways Project Data Johnson, VT

4. Overhead Utility & Vegetation Regeneration Opportunities



Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

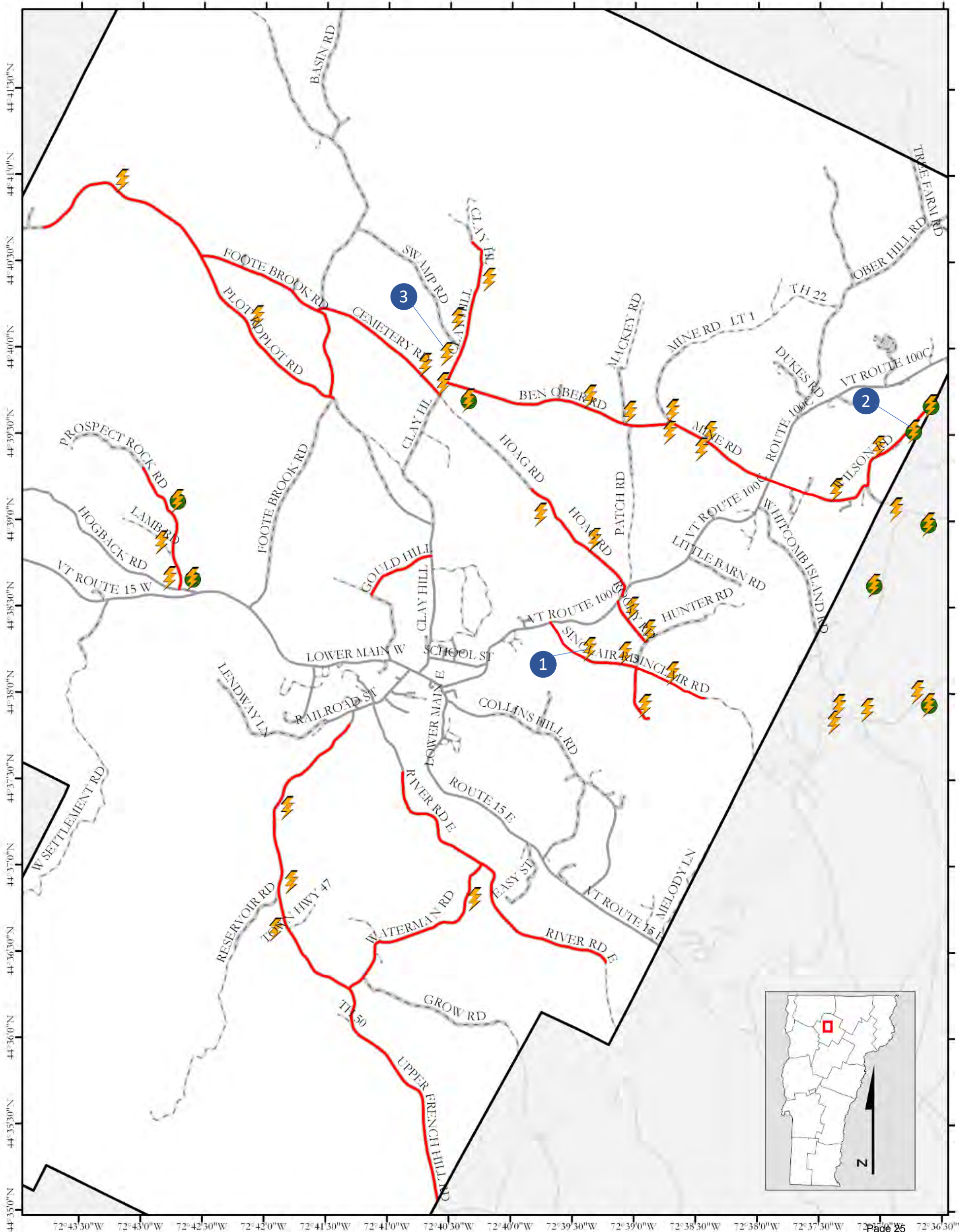
Date: 3/1/2019

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Legend

- 2018 Inventory Roads
- ⚡ Utility Wire
- Promote Regen
- Road Surface
- Paved
- Unpaved
- Other



Resilient Right-of-Ways Project Data Johnson, VT

5. Hedgerow Locations



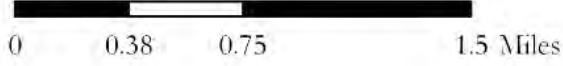
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Legend

2018 Inventory Roads	ROW Type
Paved	Emerging overstory (shrubs & saplings)
Unpaved	Immature overstory (≤6" dbh)
Other	Mature overstory (>6" dbh)
Hedgerow	Street Trees



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.



The vegetation in the utility right-of-way consists of even-aged shrubs and saplings that have grown since the last clearing. Neighboring mature trees, likely outside of the utility right-of-way and on private land, become particularly important to visually separate the road from the private field.



Street trees such as these were likely intentionally planted to create privacy. Regeneration of herbaceous cover underneath the trees may delineate the road edge. The town should work with the landowner if any tree removal is desired



Many hedgerows look like this one on Plot Road and separate a road from a field. The hedgerow may have grown unintentionally. The town may note where scenic views are now obscured by hedgerows of small, immature trees and consider selective thinning to promote healthy canopy trees.

Resilient Right-of-Ways Project Data Johnson, VT

6. Agriculture in the Right-of-Way



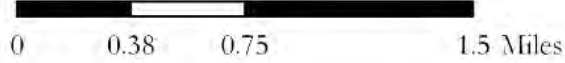
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

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Legend

- 2018 Inventory Roads
- Agriculture in ROW
- Road Surface**
- Paved
- Unpaved
- Other



WHAT

In many towns, corn, hay, or even livestock sometimes extend to within a few feet of the road, likely as result of a historical precedent or a handshake agreement between the landowner and the town.

Acknowledging the opportunities for trees or perennial shrubs in the town's right-of-way may improve road conditions, tree health, water quality and traffic patterns for all road users. However, operating farms have many requests, restrictions, and expectations that should be addressed by both the landowner and the town before any changes are proposed. Additionally, landowners should be aware that trees in the right-of-way should not be removed without approval of the tree warden and, if necessary, a public hearing held by the tree warden.

HOW

In this study, the presence of agriculture in the right-of-way was determined by noting the land use in the right-of-way width that remained after subtracting half of the road width and the width of the clear zone one each side of the road. The study assumed a right-of-way width of 49.5 feet.

WHY

Identifying agriculture in the right-of-way helps us:

- Identify if this is a common practice in a town.
- Consider how different forms of agriculture (corn, hay, livestock) affect the right-of-way and identify any proposed changes to best practices.

RECOMMENDATIONS

- Consult the road crew to understand and advantages or disadvantages posed by agriculture in the right-of-way in your town. Similarly, consult landowners if the town would like to propose changes in the right-of-way or establish best practices for the town right-of-way.
- When mowing the clear zone, particularly if the clear zone includes hay fields, consider leaving vegetation at a height of at least 6". Tall grasses act as a natural buffer between the road and agricultural field, infiltrating stormwater runoff, slowing its velocity, and filtering some of the sediment and pollutants in the runoff before it reaches the agricultural field.
- Current [Required Agricultural Practices](#) issued by the State of Vermont require 10' of non-tillable vegetated buffers between agriculture and ditches. This buffer helps filter and slow stormwater runoff before it reaches ditches. As such, consider a 10' buffer between roads and agricultural fields to allow a place for stormwater from the road to slow before reaching fields.
- If snow drift is a problem, consider designing a living snow fence in conjunction with the landowner.

- Understand the seasonal changes in the ROW and how planted vegetation height will change throughout the year.
- Snow fences immediately adjacent to the road (i.e. within the municipal ROW) can serve to make the problem worse because of the leeward pattern of snow deposits.
- Living snow fences work best when planted at least 100 feet from the centerline of the road. However, this distance places the snow fence on private property.
- Standing corn rows can act as a snow fence. Minnesota DOT pays farmers to leave 12-16 rows of standing corn set back at least 100 feet from the right-of-way.

1



Corn grows into the right-of-way along River Road.

2



Seasonal mowing continues into the right-of-way along Waterman Road.

3



A mowed clear zone yields to corn, some of which may be grown in the right-of-way along Rocky Road.

4



A fence line provides a physical boundary between the road and clear zone and the agricultural field to the south of Mine Road.

RESOURCES

- [Required Agricultural Practices](https://agriculture.vermont.gov/rap). Vermont Agency of Agricultural, Food & Markets. <https://agriculture.vermont.gov/rap>
- [Living Snow Fences Control Blowing and Drifting Snow](http://www.dot.state.mn.us/environment/livingsnowfence/). Minnesota's Best Practices Handbook for Roadside Vegetation Management. <http://www.dot.state.mn.us/environment/livingsnowfence/>
- Johnson, Ann M., P.E. Best Practices Handbook for Roadside Vegetation Management. Minnesota Department of Transportation and the Local Road Research Board. July 2008. <https://www.lrrb.org/pdf/200820.pdf>

Resilient Right-of-Ways Project Data Johnson, VT

6. Agriculture in the Right-of-Way



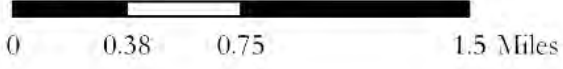
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

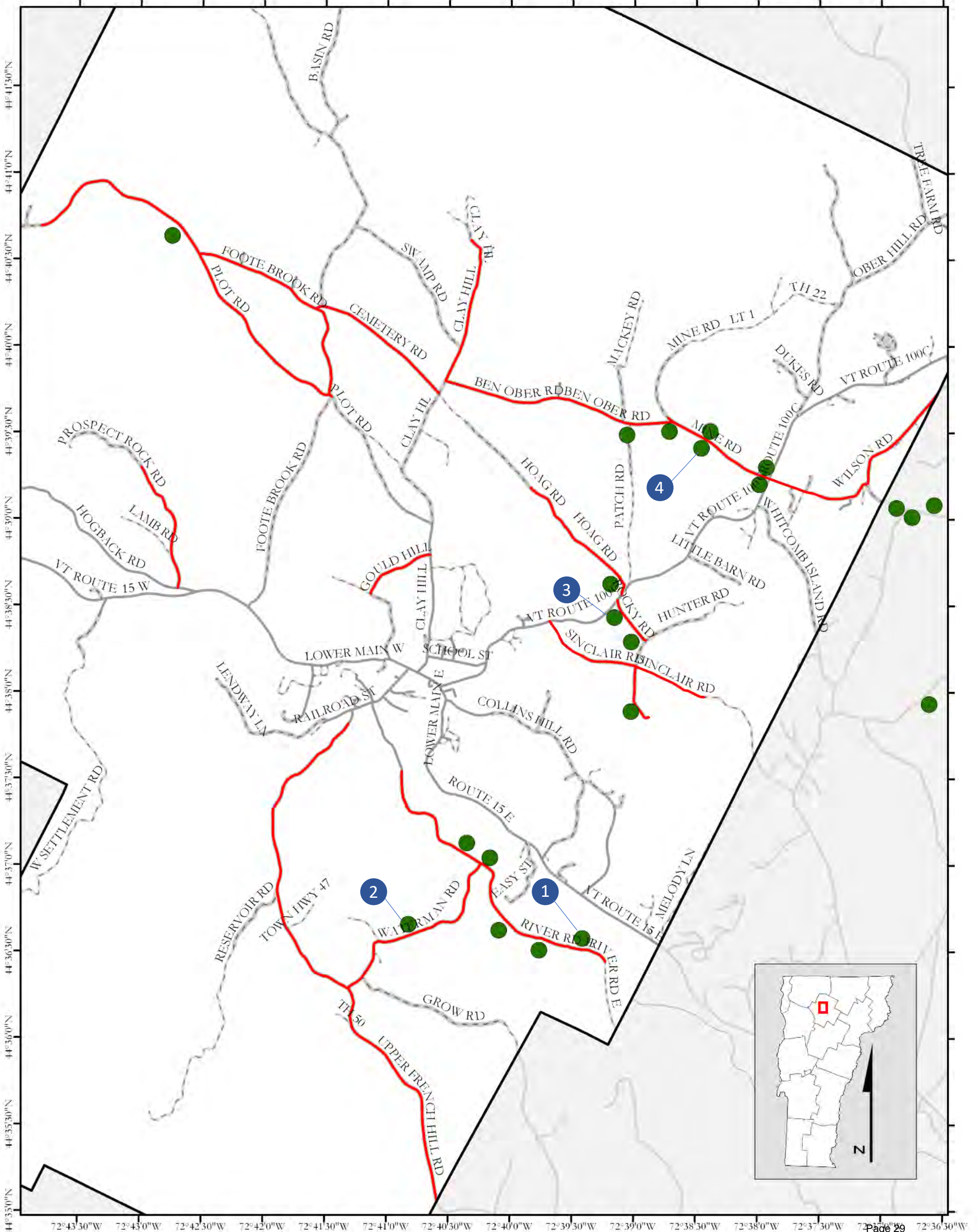
1:40,000

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Legend

- 2018 Inventory Roads
- Agriculture in ROW
- Road Surface**
- Paved
- Unpaved
- Other



Resilient Right-of-Ways Project Data Johnson, VT

7. Historic Tree Locations & Health



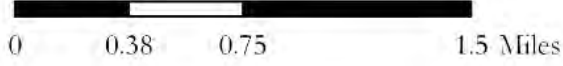
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

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Legend

- 2018 Inventory Roads
 - Road Surface
 - Paved
 - Unpaved
 - Other
- Historic Trees by Health
- Poor
 - Fair
 - Good



WHAT

Historic trees in the right-of-way are distinctly larger, broader, and older than surrounding trees. Often consistently spaced along a roadside, historic trees can be surrounded by mowed grass, herbaceous cover, bare soil, or a forest of young trees, shrubs, and edge species.

HOW



In this study, historic tree health was assessed by visual inspection of the trunk and canopy of any historic tree within the plot. An overall rating of “good”, “fair”, or “poor” was assigned to the of historic trees health of the plot.

WHY

Identifying the presence and health of historic trees within survey plots tells us:



Where roads may have a culturally important history.



Where large trees may be in decline and pose a safety risk to road users.



Where people may already be accustomed to seeing tree canopy over the road and value its presence.

RECOMMENDATIONS



Evaluate the health of the historic trees during a yearly “look up” drive conducted jointly by the tree warden and road foreman. Record observations on paper, using a GPS-enabled device, or by flagging trees that need maintenance or require removal each year. Create a plan to being removing risk trees, understanding the budgetary and equipment constraints of the town.



Review tree care best practices including [pruning](#). Make sure that your road crew, contracted mowers and contracted tree care specialists understand these best practices, too.



Consider thinning trees and shrubs around healthy young trees to promote regeneration and to select for the next generation of tree canopy.



Consider [planting](#) new trees between existing historic trees, particularly along roadsides without emerging forest. Sometimes called “interplanting”, this technique will grow a new generation of intentionally managed trees.

RESOURCES



[Pruning](https://vtcommunityforestry.org/resources/tree-care/pruning) on the Vermont Urban & Community Forestry website: <https://vtcommunityforestry.org/resources/tree-care/pruning>



[Tree Planting](https://vtcommunityforestry.org/sites/default/files/pictures/prTECTING_your_investment_tree_planting_maintenance.pdf) on the Vermont Urban & Community Forestry website: https://vtcommunityforestry.org/sites/default/files/pictures/prTECTING_your_investment_tree_planting_maintenance.pdf

1



A close-up of a historic tree surrounded by younger, immature trees along Clay Hill Road. Encroachment of the ditch and road on the tree roots may compromise the tree health in the future.

2



This large tree on Plot Road is in poor health. Its proximity to the utility line means that it is likely evaluated every 7-10 years for risk to the line, and by association, to road users.

3



Historic trees along this portion of Cemetery Road delineate the road edge, although they are subject to damage by road equipment and vehicles. Currently in fair health, it is clear that some of their neighbors have already died – the health of these trees should be noted in the yearly check by the tree warden and road foreman.

Resilient Right-of-Ways Project Data Johnson, VT

7. Historic Tree Locations & Health



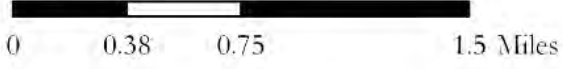
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

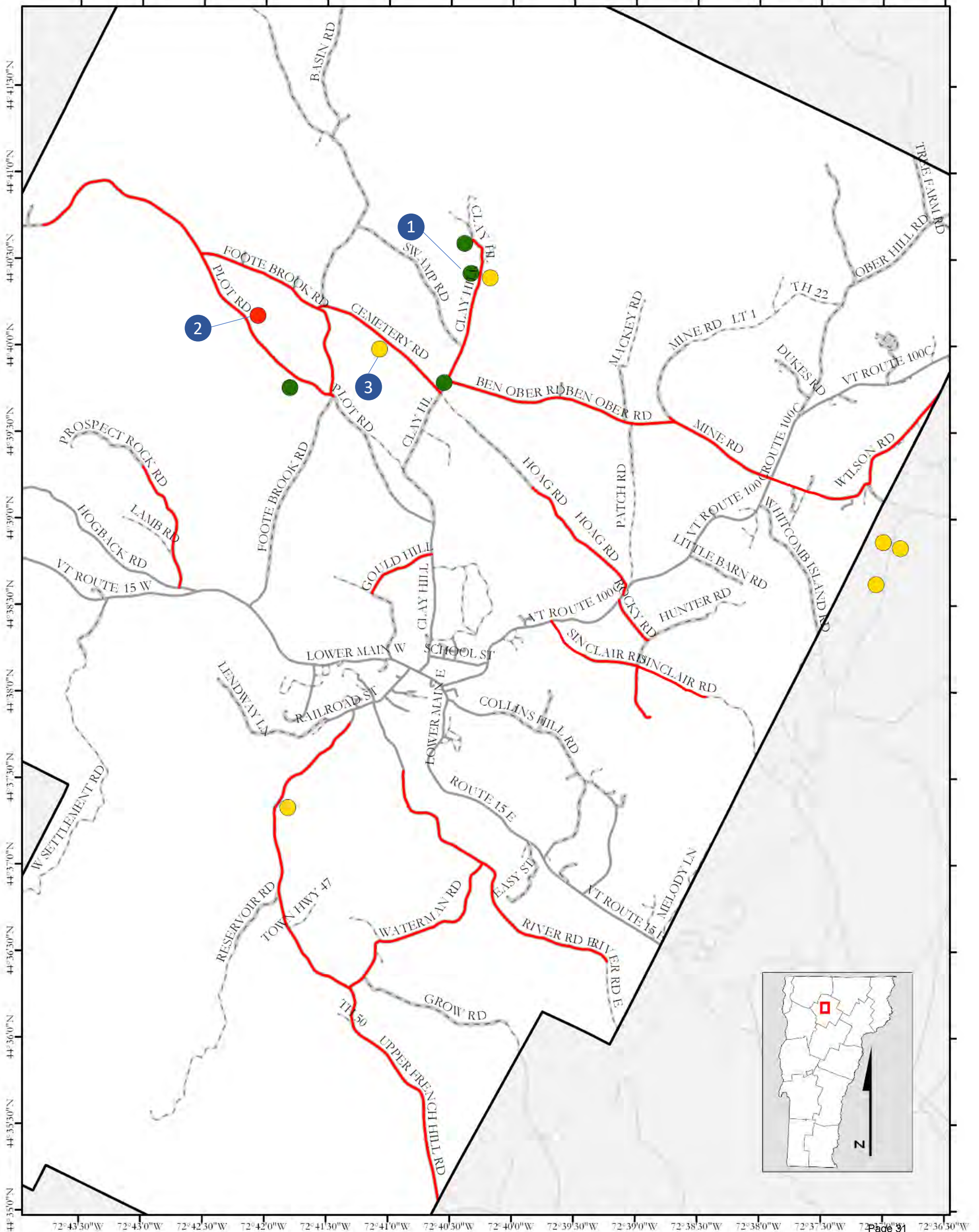
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Legend

- | | | | |
|--|----------------------|--|--------------|
| | 2018 Inventory Roads | | Road Surface |
| | | | Paved |
| | | | Unpaved |
| | | | Other |
| | Poor | | |
| | Fair | | |
| | Good | | |



Resilient Right-of-Ways Project Data Johnson, VT

8. Invasive Species Locations (data source: iNaturalist)



Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

1:40,000

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0 0.38 0.75 1.5 Miles

Legend

	2018 Inventory Roads	Invasive Species
	Road Surface	 Dame's rocket
	Paved	 Japanese barberry
	Unpaved	 Japanese knotweed
	Other	 Honeysuckle spp.
		 Poison ivy
		 Wild parsnip



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:



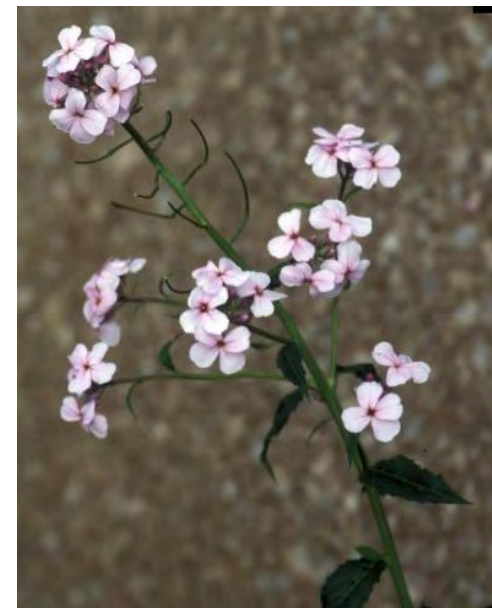
Morrow's Honeysuckle (*Lonicera morrowii*)



Poison/wild parsnip (*Pastinaca sativa*)



Garlic Mustard (*Alliaria petiolate*)



Dame's Rocket (*Hesperis matronalis*)



Wild Chervil (*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 Johnson, VT

8. Invasive Species Locations (data source: iNaturalist)



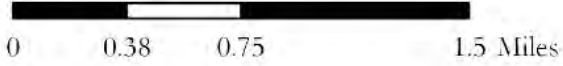
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

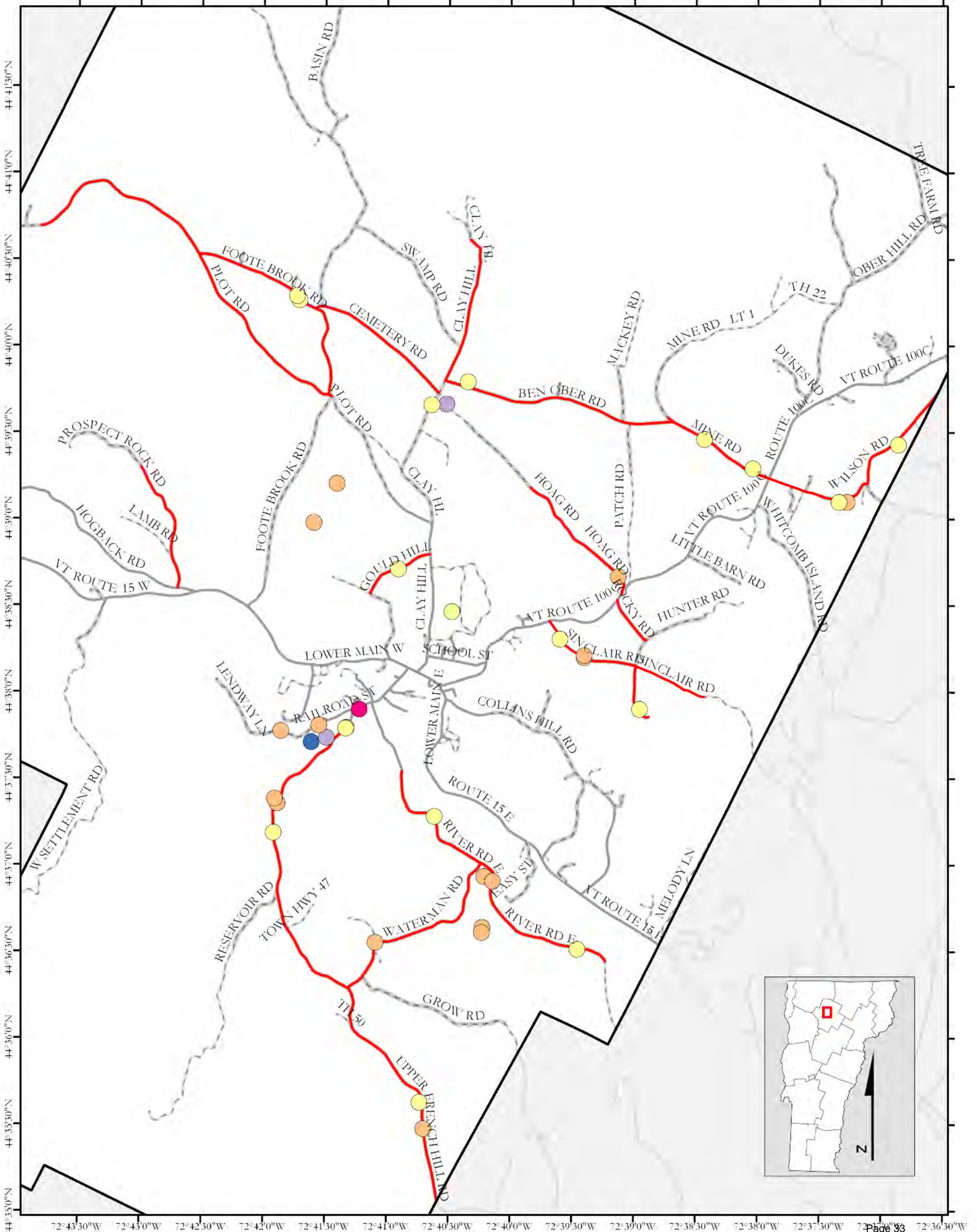
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Legend

- | | |
|----------------------|-------------------------|
| 2018 Inventory Roads | Invasive Species |
| Road Surface | Dame's rocket |
| Paved | Japanese barberry |
| Unpaved | Japanese knotweed |
| Other | Honeysuckle spp. |
| | Poison ivy |
| | Wild parsnip |



Resilient Right-of-Ways Project Data Johnson, VT

9. Vegetation Preservation Opportunities



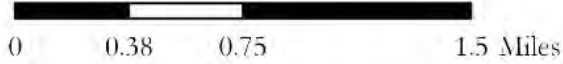
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Legend

- 2018 Inventory Roads
- Road Surface
 - Paved
 - Unpaved
 - Other
- ▲ Steep Slope
 - ▼ 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.

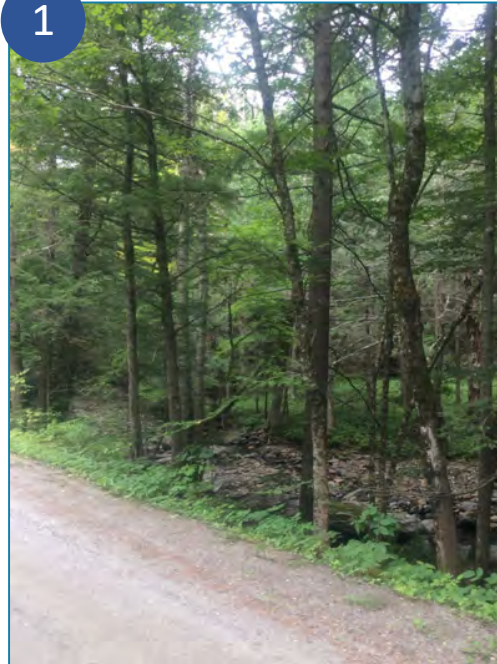


When mowing the clear zone, consider leaving vegetation at a height of at least 6 inches.



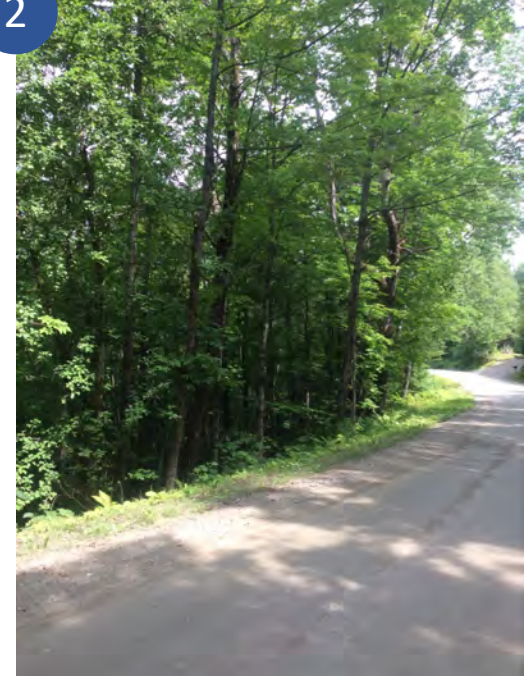
The [Vermont Rivers Program](#) recommends a 50-foot wide buffer of native woody vegetation surrounding streams. Ensure that woody buffers extend to roadsides.

1



“No Cut” recommendations often apply where the road borders a river or stream, such as on this section of Foote Brook Road. Learn more about river-road conflicts through the [Vermont Better Roads](#) program.

2



Despite the presence of ash trees and mature short-lived trees, this section of right-of-way on Upper French Hill Road slopes steeply downhill and should not be disturbed except to mitigate overhead hazard branches.

3



Stormwater runoff is blocked by a bare berm. Consider revegetating the berm and ditch through seeding or raise the road bed to allow for sheet flow into the forest. Preserve the vegetated buffer present underneath the immature canopy trees.

4



Hemlock grow onto top of bare bedrock. 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](https://vtcommunityforestry.org/sites/default/files/pictures/trees_and_stormwaterv2.pdf). Vermont Urban & Community Forestry Program. https://vtcommunityforestry.org/sites/default/files/pictures/trees_and_stormwaterv2.pdf
- [Bank Stabilization: Vegetation – Shrubs and Trees](https://vtrans.vermont.gov/sites/aot/files/highway/documents/ltf/Better%20Roads%20Manual%20Final%202019.pdf) (p.40), [Live Stakes](https://vtrans.vermont.gov/sites/aot/files/highway/documents/ltf/Better%20Roads%20Manual%20Final%202019.pdf) (p. 41), and [Buffer Zone](https://vtrans.vermont.gov/sites/aot/files/highway/documents/ltf/Better%20Roads%20Manual%20Final%202019.pdf) (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](https://dec.vermont.gov/watershed/rivers/river-corridor-and-floodplain-protection/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 Johnson, VT

9. Vegetation Preservation Opportunities



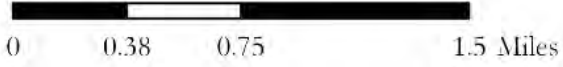
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Cartographer: Elizabeth Bannar

Date: 3/1/2019

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Legend

— 2018 Inventory Roads Steep Slope

Road Surface

— Paved

— Unpaved

--- Other

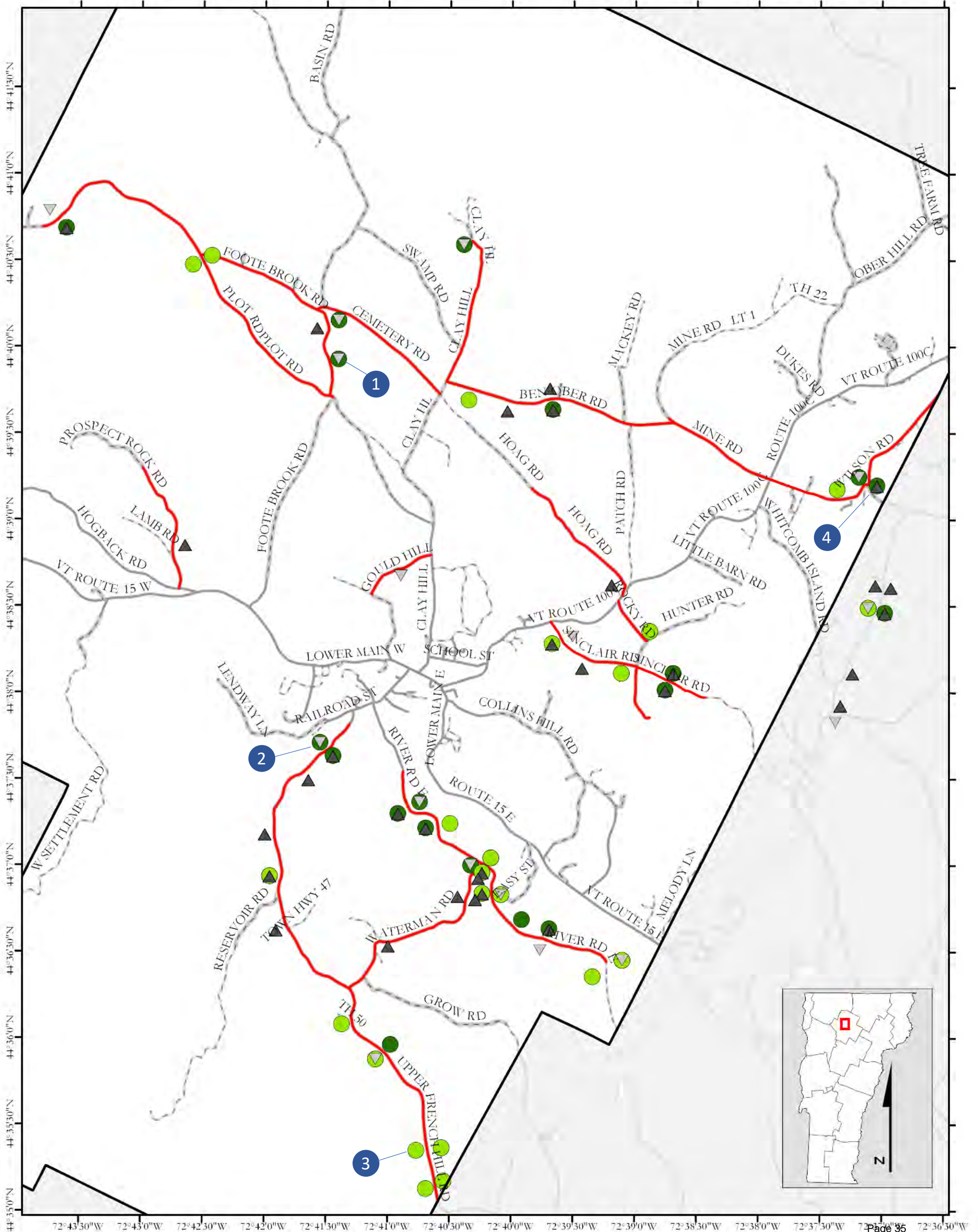
▽ Down

▲ Up

Preservation Opportunities

● Preserve Herbaceous Buffer

● No cut (trees)



Resilient Right-of-Ways Project Data Johnson, VT

10. Planting & Regeneration Opportunities in Roadside Communities



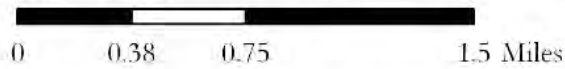
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

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Legend

2018 Inventory Roads	Field (Hay)	Tree Plantation
Promote Regeneration	Forest	Water Edge
Planting Opportunities	Hedgerow to Field/Water	Wetland
Other	Impervious	Road Surface
Trees	Lawn	Paved
Roadside Community	Other	Unpaved
Field (Ag)	Riparian Zone	Other
	Street Trees/Lawn	



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

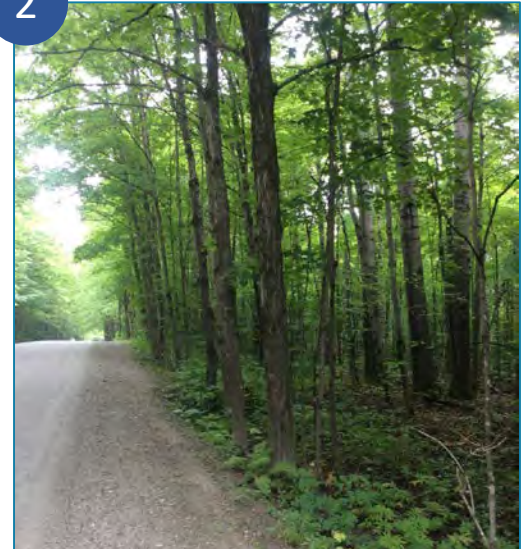
- [Living Snow Fences Control Blowing and Drifting Snow. Minnesota's Best Practices Handbook for Roadside Vegetation Management.](http://www.dot.state.mn.us/environment/livingsnowfence/)

1



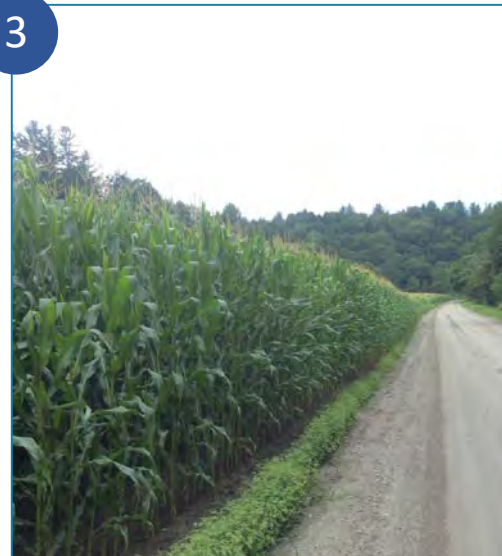
Frequent mowing to the edge of the travelled road presents **opportunities for planting** tree, shrub or wildflower planting. The lack of overhead utilities is an advantage.

2



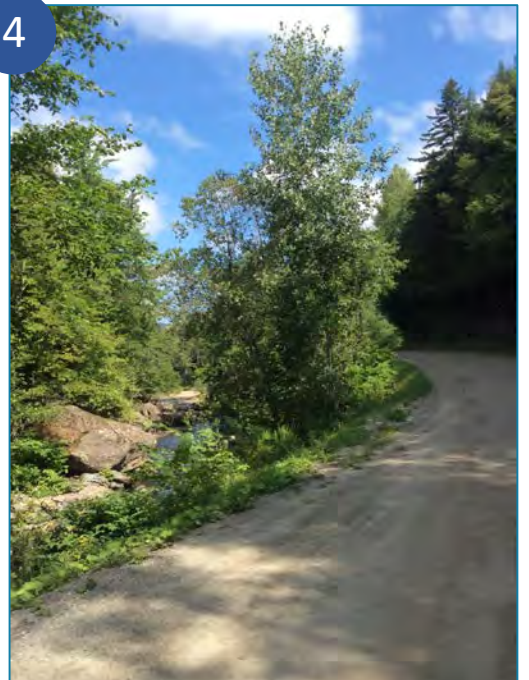
This section of Upper French Hill Road has likely widened over time and is now graded up to the trees. Consider **promoting forest regeneration** by reducing the road width or consider another buffer that protects tree trunks and roots from impact and compaction.

3



The corn stalks nearest this section of River Road did not produce corn. Consider **planting other types of plants** in the right-of-way to reduce impact to crops from stormwater runoff, roadside dust, and other environmental stressors. See recommendations on Map 6: Agriculture in the Right-of-Way.

4



Promote regeneration and consider **seeding or planting grassy cover** for this section of Wilson Road that borders the river.

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 Johnson, VT

11. Thinning Opportunities & Mature Short-lived Trees



Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

1:40,000

This map is for illustrative purposes only. The accuracy of the data layers shown on this map are limited by the accuracy of the source materials. No warranty is made by the agency of the usefulness of the data as presented or implied.

0 0.38 0.75 1.5 Miles

Legend

● Mature Short-lived Trees — 2018 Inventory Roads

Thinning

● Other

● Trees

Road Surface

— Paved

— Unpaved


- - - Other



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



Historic clearing often leaves a tangle of young saplings competing for light and nutrients, as has happened along this section of Mine Road.

2



Work with the landowner to revitalize this section of street trees along a stone wall. Consider thinning ash trees and damaged maples, selecting for healthy canopy trees that will frame the road. Consider stone-lined ditching without widening the road to reduce erosion.

3



Southerly views are obscured by a hedgerow that includes mature short-lived trees. Consider if some trees may be candidates for removal.

Resilient Right-of-Ways Project Data Johnson, VT

11. Thinning Opportunities & Mature Short-lived Trees



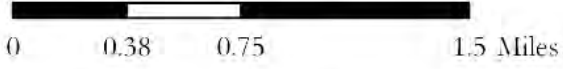
Vermont Department of
Forests, Parks & Recreation

Cartographer: Elizabeth Bannar

Date: 3/1/2019

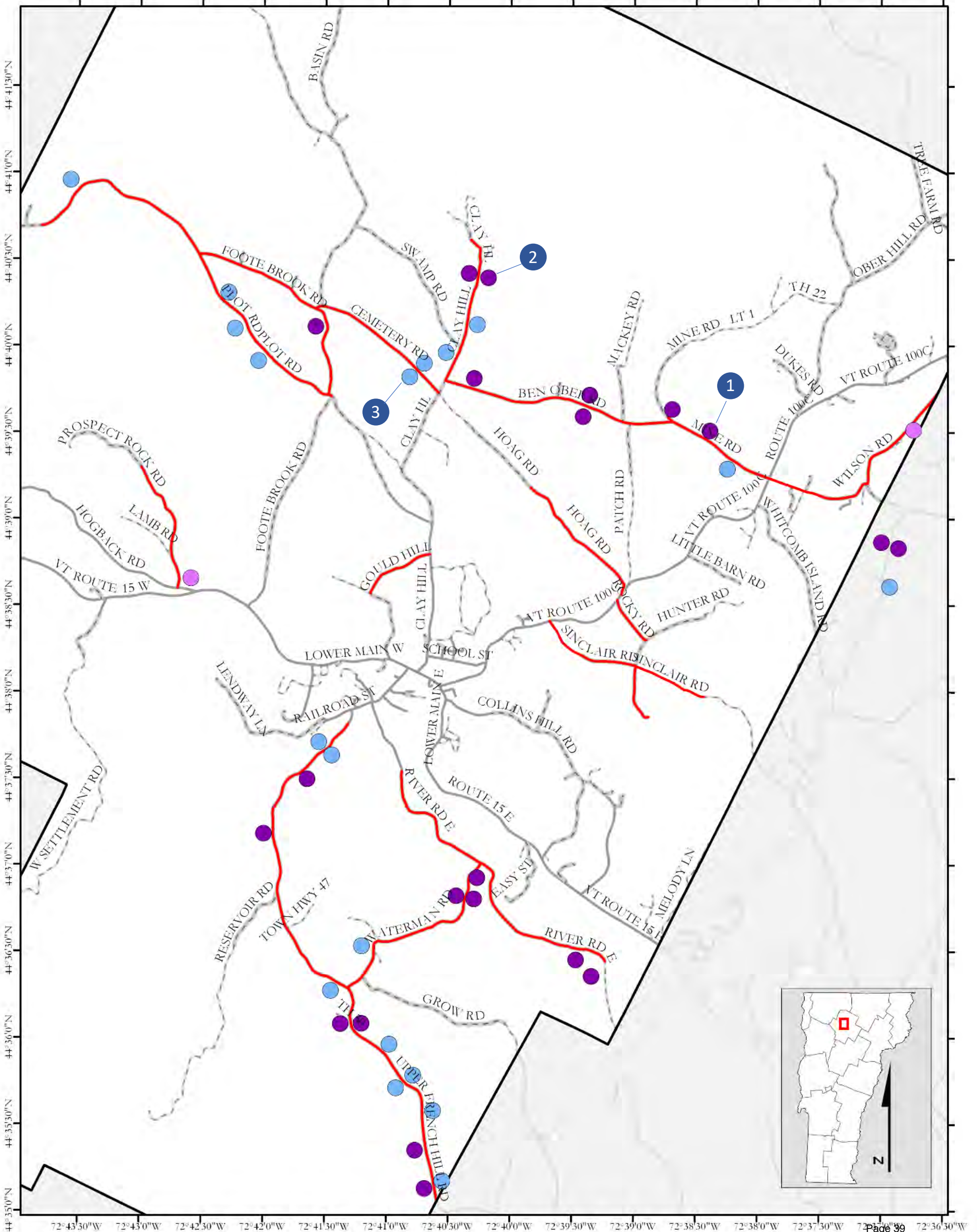
1:40,000

This map is for illustrative purposes only. The accuracy of the data layers shown on this map are limited by the accuracy of the source materials. No warranty as to the accuracy or the usefulness of the data is expressed or implied.



Legend

- Mature Short-lived Trees
- 2018 Inventory Roads
- Thinning**
- Other
- Trees
- Road Surface**
- Paved
- Unpaved
- Other



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 one- to 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 the tax base of the town to fund important infrastructure changes.

Given the budgetary constraints and multi-faceted nature of right-of-way management, towns should view roadside vegetation growth and management as an iterative process and take a step-by-step approach to identify, and act upon, identified 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 may 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, Technical Assistance 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 Johnson Letter of Collaboration
June 19, 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 Johnson.

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 Johnson 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 native 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. Finally, the project considers the importance of cost-efficient and effective road maintenance 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 Johnson'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 Johnson 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; 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 Johnson 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 Johnson Project Advisory Committee and other key stakeholders to develop integrated recommendations and best practices to care and plan for Johnson'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
- Sue Lavery for the Town of the Johnson, will be the primary point of contact for Johnson.
 - Contact information.

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 June 19, to the end of the grant period in September 2019.
2018

Both parties agree to the conditions as described above.

Appendix B:

Rural Road Resilient Right-of-Ways Project
Town of Johnson Work Plan
July 26, 2018

Rural Road Resilient Right-of-Ways Vegetation Assessment

Town of Johnson Work Plan - DRAFT

July 26, 2018

Town priorities

Maintain healthy forests and roadside vegetation along Johnson'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;
- areas that merit preservation of vegetation for environmental or cultural reasons;
- areas that are relatively free of invasive plant species;
- assess areas at higher risk from storm damage that causes trees to fall on or across the road (including areas with high concentrations of ash trees);
- areas affected by utility lines; and
- areas in conflict with road maintenance equipment.

Additional deliverables will explore ways to:

- promote relevant communication between the Johnson tree board and selectboard to discuss best practices for preserving existing culturally important trees and fostering the next generation of resilient public roadside trees;
- promote relevant communication between the road foreman and Johnson Tree Warden;
- reduce the spread of roadside invasive species, specifically by addressing mowing practices that may facilitate migration and/or reproduction of these species;
- inform decision-making around potentially conflicting laws, rules, recommendations or funding requirements for rural road maintenance and water quality protection;
- provide outreach and education regarding emerald ash borer, the town EAB preparedness plan, and ash tree management along rural roads;
- inform the drafting of a municipal tree ordinance; 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 Johnson 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 August 2nd, 2018 and continue throughout the middle of August. The assessed routes aim to cover half of the unpaved road miles in Johnson, or approximately 21 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. 6.5 miles

Upper French Hill – Waterman Road – River Road East from Waterman Road west to Railroad Street

Route 2 – Approx. 4.75 miles

Mine Road – Ben Ober Road – Clay Hill Road south to Plot Road – Clay Hill Road north to terminus

Route 3 – Approx. 5 miles

Cemetery Road – Foote Brook Road – Plot Road

Route 4 – Approx. 3.25 miles

Hoag Road (graded and “impassable”) – Rocky Road – Sinclair Road

Route 5 – Approx. 1 mile

Wilson Road (unpaved portions)

Route 6 – Approx. 1 mile

Prospect Rock 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](#).

Appendix C:

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

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.)



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 nterest 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, or 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.

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
Morrisville Water & Light Vegetation Management Plan

Morrisville Water & Light Department: Vegetation Trimming and Cutting Plan

Vegetation in close proximity to the electric facilities and power lines is not only the leading cause of power outages, but also represents a safety risk to utility workers and the general public. The Morrisville Water & Light Department (MW&L) takes the responsibility to reduce the risks to both safety and reliability very seriously.

To promote sustainable plant communities which are compatible with the electric facilities and discourage incompatible plants (i.e. plant species which at maturity will attain a height of greater than 15 feet) that may pose concerns including safety, access, fire hazard, electric service reliability, emergency restoration, visibility, regulatory compliance, environmental and other specific concerns.

Important benefits of vegetation management include:

- Increased visibility and access along rights-of-way
- Timelier and less costly outage restoration
- Safer working conditions for line workers and line clearance contractors
- Long-term control

Cutting & Trimming Maintenance Cycle

MW&L aims to establish a target of attaining a five-year vegetation maintenance cycle on transmission rights-of-way and a seven to ten-year maintenance cycle on distribution rights-of-way.

Undesirable Vs. Desirable Vegetation

Essentially, all of the commercial tree species found in the forest types identified within MW&L's rights-of-way are classified as incompatible with electric utility lines. They are generally moderate to fast growing species, reaching mature heights in excess of 15 feet tall. Immature trees (less than 4 inches in diameter at breast height and with the capability to exceed 15 feet in height) are defined as incompatible target brush.

Although immature target brush does not pose an immediate threat to system reliability or safety, allowing it to mature can increase maintenance costs and impede or prevent accessibility to electric facilities. Aggressive incompatible target brush species control is crucial in limiting MW&L's future vegetation control workload and cost increases.

While individual healthy trees existing within rights-of-way may be pruned and maintained in order to avoid contact with conductors, the majority will be eliminated when economically feasible, and planting of these tree species within the rights-of-way is strongly discouraged.

The most common reason for pruning an incompatible tree rather than removing it is landowner request. This may be because of the aesthetic value, or because of its value as a shade tree or as a screen from a highway or

neighbors. Apple trees, due to their value as wildlife feed, will be pruned for maximum clearance without jeopardizing their survival and removed only when necessary.

Not all vegetation found in MW&L rights-of-way is undesirable. There are many low-growing plants and shrubs such as lilac, serviceberry, dogwood, hawthorns, honeysuckle, etc., which can be compatible with utility lines. In wetlands and boggy areas, species such as speckled alder and pussy willows, as well as cattails, ferns and many other low growing plants and shrubs are quite compatible.

Retaining or encouraging the growth of low-growing desirable vegetation will help to suppress the growth and density of less desirable species. While shrub growth will not eliminate the encroachment of tree species, it will compete with the other species for nutrients, light, and space.

Significant shrub growth is not retained in the area immediately surrounding pole locations or directly under the conductors. These areas must be kept free of obstruction to facilitate access to the poles and create an open climbing space. This is especially important for any plant species bearing briars or thorns, as they could cause a puncture hole in a lineman's rubber gloves, thereby creating the risk of electric shock.

Line Maintenance

Generally involves the cutting of all brush (up to 25 ft. on each side of the center of the pole line for distribution lines and up to 50 ft. on each side for transmission lines) to ground level, as well as proper pruning of all branches growing towards conductors and removal of any/all trees, which cannot be properly pruned to provide adequate clearance.

Hazard Tree Removal

Involves the removal of trees, which due to size, location and/or condition, have a potential for damaging the conductors or structures now or within the next ten years. These trees will be removed regardless of distance from the center of the pole line.

Minimum Tree-to-Conductor Clearances

Distribution System - A minimum of 10 feet of clearance on each side of the outside conductor and 20 feet of clearance for all branches that overhang the conductors must be achieved. Additional clearance is necessary on branches that could bend (due to snow or ice loading) or break and contact the conductors below.

Transmission System - A minimum of 15 feet of clearance on each side of the outside conductor must be achieved. No branches shall be left overhanging the conductors.

These are the minimum required clearances. Individual tree location, health, species, and growth rate must be considered when determining appropriate/acceptable clearances.

Disposal Procedures

Brush, branches and woody debris from pruning and removal operations along roadsides and within 100 feet of house sites will be chipped. In all other areas, brush will be moved away from the poles, out from under the conductors and windrowed (placed in a long, low heap or pile) off to the side.

Trees, which have been cut remain the property of the landowner and will be left on site. Trees that appear to contain log products will be left in long lengths (except when it is necessary to cut them into smaller sections) and all other wood will be left in manageable lengths, unless directed otherwise by the owner.

Customer Notification

The trimming contractor has the primary responsibility for contacting property owners prior to the commencement of vegetation management work. MW&L trimming notification door hangers will be left at all residences along the section of power line scheduled for maintenance activities. The same information contained in the flyer may also be detailed on Front Porch Forum posts and/or posted on the MW&L web page. <http://www.mwlv.com/>

Where personal notification has not been made, maintenance activities will not take place for a minimum of 5 days following the placement of a MW&L door hanger. If 5 days have passed and the customer has not made contact with the foreperson identified on the hanger, maintenance activities will take place without further notification.

A reasonable effort will be made to identify property owners at locations where there is not a nearby residence.

Program Principles

- *Cost effective vegetation management requires a long-term, consistent approach.*
- *Proactive vegetation management operations are more efficient and effective than reactive operations.*
- *Proper arboricultural practices are essential to minimizing costs and maximizing the effectiveness of tree maintenance operations.*
- *Programs based on Integrated Vegetation Management (IVM) techniques are both the most efficient and environmentally sound.*
- *Proper record keeping and productivity measurement are critical to long-term success.*
- *Professional supervision and sufficient technical expertise are essential to ensuring that a program is successful and cost-effective.*

Appendix F:

Rural Road Resilient Right-of-Ways Project
Update to Resilient Right-of-Ways project team regarding draft report and discussion
questions – November 7, 2019

Subject: RE: Resilient Right-of-Ways
Date: Thursday, November 7, 2019 at 11:16:02 AM Eastern Standard Time
From: Garton, Joanne
To: Susan Lovering
CC: Lois Frey, Noel Dodge, Brian Krause, robm@vtlink.net
Attachments: charlotte_rfp_for_ash_tree_removal_lakeroad_2019.pdf, image001.jpg

Hi Sue, Lois and Noel,

Thank you for taking the time in October to review the Johnson Resilient Right-of-Ways plan. **Attached** is the final copy of Johnson's Resilient Right-of-Ways report. I update the Process Recommendation 7: Understand updated stormwater regulations and standards. I also added Process Recommendations 8: Maintain backroads and ditches to their specifications; 9: Create and maintain a public relations plan; and 10: Keep abreast of funding opportunities.

These additions stemmed from work I did addressing further questions from participating Resilient Right-of-Way municipalities. I hope you find them useful and I welcome other questions about their content.

I left our October meeting with a bit of homework from you; my apologies for taking so long to find some answers.

- The only two towns that I know of that are completing pre-emptive roadside ash tree removal (as opposed to entire ROW vegetation clearing) are Charlotte and Rutland. Some utility companies are increasing clearing within the infested areas; however, I am not sure that this clearing specifically targets ash trees, includes risk trees of any species, or includes all trees in the utility ROW.
- We talked about the process that the town of Charlotte used to remove healthy ash along a 1.2 miles of one road in town (Thompson's Point Road). The town had inventoried 261 ash trees over 6 inches DBH within this 1.2 mile section. Mark Dillenbeck, the Charlotte tree warden, let me know that the town received two bids to cover the entire project area on Lake Road for \$10,000 (see **attached** RFP). Mark wrote "The person who was awarded the contract was motivated to submit a relatively low bid because he wanted the firewood." However, the initial project idea stated that the wood would be left for landowners "for a time", then moved to a marshalling area in Charlotte if not claimed. I do not know how many landowners ultimately kept and utilized the ash wood from their property.
- At present, a town cannot remove healthy ash trees (that do not pose a risk to a person or property) without a public hearing. This will be especially applicable in Johnson because it is not yet in the confirmed EAB-infested area. Proposed edits to the Tree Warden statutes going to the legislature this coming winter (January -May 2020) will ask that no public hearing be required to remove trees endangered by a nearby infestation or tree pest, but only within the confirmed infested areas (within a 10-mile radius of a known infestation).
- At this point, a town cannot right a tree ordinance that allows for pre-emptive ash tree removal without a public hearing because this would contradict the tree warden statues.
- We also talked about marking hazard trees, whether on the tree itself or on a map. Mark Duntemann is an expert on risk trees – I think you said that you've met him, Sue. I found this webinar archived on our UCF YouTube channel – [Community Level Tree Risk Management](#). My understanding is that the town should have a plan for risk trees and be addressing them within their means. This, of course, gets into a grey area of defining the town's "means". It may be worth noting

how many dead, dying, or otherwise risk trees the town of Johnson addresses per year at present -- Brian Krause may be able to estimate this number. This may start to guide how many risk trees the town of Johnson can accommodate per year without extra funds allocated to risk tree management when EAB arrives.

- We also talked about site visit for May 2020 with the FPR watershed forester and possibly a Better Roads (Agency of Transportation) or DEC Municipal Roads Program representative. Some ideas for the location(s) of this field visit are:
 - We could examine sites where agricultural practices occur in the ROW. There are some along **River Road** near Waterman Road and others on Mine Road.
 - We could also look at tree thinning potential along **Waterman Road** (near River Road).
 - I would be interested in looking at least one location marked as a “vegetation preservation opportunity”. There is a steep slope on **Foote Brook Road** (#1 on map 9) and some road width and berm issues at the southern end of **Upper French Hill Road**.
 - VTrans runs an interactive traffic counter map: <https://vtrans.ms2soft.com/tcds/tsearch.asp?loc=Vtrans&mod>. There is a lot of traffic on Mine Road west of Rte. 100. There are also some overgrown hedgerows on this section of **Mine Road** AND sections were planting or vegetation regeneration are encouraged.
- We also spoke about trees on school properties, particularly in light of school district merges. Trees on school property are not specifically identified as being under the jurisdiction of the tree warden and I believe are not considered public trees. I called the Lamoille North Supervisory Union and School District and left a message with Dylan Laflam, the facilities manager for the Lamoille North Supervisory Union, asking for more information on tree maintenance in the supervisory union and asking if he has ever connected with town tree wardens in his district. I will let you know what I hear back from him and if I learn more clarifying facts both in Lamoille North and supervisory unions statewide.

Thank you, all, for your continued work on Johnson’s trees and roads. Please reach out with any comments anytime and I will touch base again in the winter to firm up plans for our site visits in the spring of 2020.

Best,

Joanne

JOANNE GARTON | *Technical Assistance Coordinator*

VT Urban & Community Forestry Program

Department of Forests, Parks and Recreation

802-249-4217 | www.vtcommunityforestry.org

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