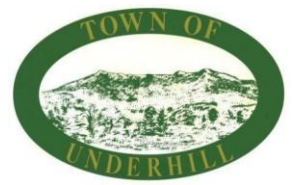


Emerald Ash Borer (EAB) Preparedness Plan



**Written and edited by Don Tobi,
Underhill Tree Warden, and
approved by the Emerald Ash
Borer Preparedness Plan Group**

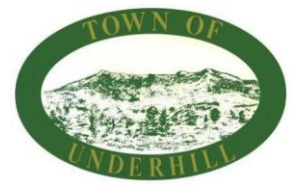
Town of Underhill



Contents

I. Emerald Ash Borer: What is it and where did it come from?.....	3
II. Statement of Purpose.....	4
III. Administration.....	5
IV. The Emerald Ash Borer; Ecology and Spread.....	6
V. Ash Tree Identification and Symptoms of an infestation.....	8
VI. Inventory.....	10
VII. Management Strategies.....	11
1. Management Strategy for Underhill.....	13
a. Treatment of high-value trees with an insecticide.....	13
b. Removal of Ash Trees.....	14
c. Estimate of Costs Associated with this Manag. Strategy.....	15
1. Insecticide Treatment.....	15
2. Tree Removal.....	15
3. Do Nothing.....	16
VIII. Disposal and Utilization of Infested Wood.....	16
IX. Replacement Planting.....	17
X. Community Outreach and Education.....	17
XI. Review of Ash Management Plan Recommendations.....	18
XII. Who is the Underhill Emerald Ash Borer Preparedness Plan Group?....	19
XIII. Contacts.....	20
XIV. References.....	20

Town of Underhill



I. Emerald Ash Borer: What is it, and where did it come from?

The Emerald Ash Borer or EAB (*Agrilus planipennis*), is an exotic beetle that was first found in the United States in southeastern Michigan in 2002. Native to Asia and Eastern Russia, it is thought that it was introduced in the 1990's in solid wood packing material from Asia. It is a beetle from the family commonly called the metallic woodboring beetles or *Buprestidae*, and feeds exclusively on ash trees in the genus *Fraxinus*. White, black, and green ash make up over 7% of all hardwood trees nationally and 5.5% of all hardwoods in the northeast. As of this writing, this tiny green beetle has killed millions of ash trees in 36 states and 5 provinces, causing devastation not seen since Dutch Elm Disease and Chestnut Blight ravaged our streets and forests 50 to 100 years ago. This insect will inevitably destroy most, if not all, ash trees in the public domain and will pose significant human health and safety risks (Donovan 2013). First discovered in Vermont in 2018, it is now either present in or found within 5 miles of every County in Vermont except Essex County in the Northeast Kingdom (Fig. 1).

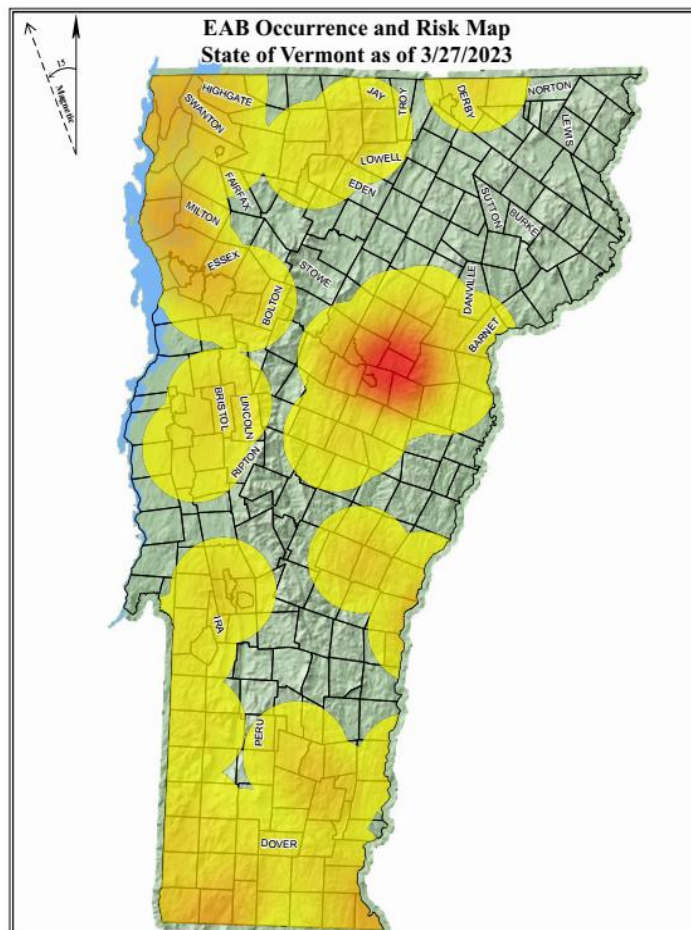


Figure 1. Vermont EAB Occurrence map.

USDA United States Department of Agriculture

EAB COUNTY DETECTIONS -- JANUARY 4, 2021
Cooperative Emerald Ash Borer Project

2021 EAB County Detections

EAB County Detections 2002-2020

Data Sources: USDA APHIS PPQ
Date Created: 12/31/2020
USDA APHIS PPQ
Burlington, VT

0 100 200 Miles

0 100 200 Kilometers

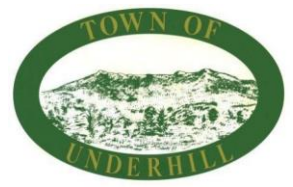
These data, and all the information contained therein, have been submitted by the U.S. Department of Agriculture's Forest and Rangeland Insect Survey (FRIS), or by its cooperators on FRIS' behalf, for research and general purposes only and is the sole property of APHIS for full disclosure: www.aphis.usda.gov/aphis/daohome

Coordinates: Statewide North America Lambert Conformal Conic

II. Statement of Purpose

Underhill

Town of Underhill



after the arrival of the emerald ash borer (EAB). Its recent arrival in Vermont is expected to have devastating consequences for our ash resource in both forest and urban areas.

This action plan consolidates essential information within one reference document and details what Underhill will do before EAB is detected, what we will do when it is detected, and what we will do once it becomes established. The Plan specifies partner authorities and responsibilities, identifies our local EAB Preparedness Plan Group, and their roles in relation to the Underhill Town Select Board and other town agencies. In addition, it outlines a strategy for managing our community ash trees including waste wood disposal and utilization, comparative cost analysis of removals vs. insecticide treatments, and links to other Governmental resources and information.

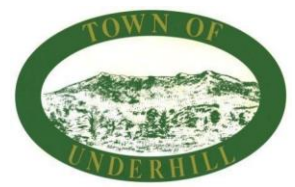
III. Administration

The Town Tree Warden with the support of the Town Emerald Ash Borer Preparedness Plan Group will have oversight of the plan implementation. The EAB Preparedness Plan group, in addition to the tree warden, will consist of the road commissioner, Town Manager, Chair of the Conservation Commission, and at least one member of the Selectboard. This may include others at the discretion of the Group for their expertise in pertinent areas such as arboriculture, forestry, or public outreach. Plan implementation will use both Town staff and outside contractors to do the work. The Conservation Commission will assist with public education and outreach, inventory assistance, and decisions regarding Town forests and parks.

Trees in the Town-owned ROW's, parks, and natural areas are covered by this Plan, whereas trees on private lands are the responsibility of landowners although any posing an immediate threat to the public in general may fall under Tree Warden jurisdiction as per State and Town law and ordinances. Trees within the State right-of-way are the responsibility of the State of Vermont. The plan will serve to distribute, over a manageable time period, the costs that will be associated with the removal and disposal of ash trees present in or adjacent to the highway ROW's of Underhill that are at risk of or presently being attacked and/or killed by the EAB. This plan deals with ash trees that are publicly owned as defined in (I.) above.

Work within the Town right-of-way is governed by relevant Town ordinances and State regulations. The Town of Underhill does not yet have a local Tree Ordinance. This should be established soon. The authority and responsibilities of the Tree Warden are defined under 19 V.S.A. §904, 24 V.S.A. §2291 (3), and 24 V.S.A §2502-2511. State and Federal quarantine regulations may apply once an infestation becomes established although as of this writing, all quarantines have been lifted.

The EAB Preparedness Plan is a living document and will continue to change.



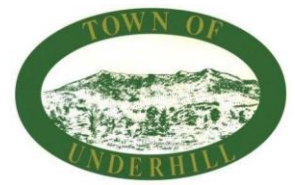
Toledo Street Before and After the Emerald Ash Borer Infestation
Photograph by Daniel A. Herms, The Ohio State University

IV. The Emerald Ash Borer; Ecology and Spread

The Emerald Ash Borer is a half inch long, bullet-shaped, metallic green beetle that feeds only on ash (trees in the genus *Fraxinus*). Adult beetles lay their eggs in the folds beneath ash bark where the larvae tunnel through the bark into the cambium and feed on the phloem, which is the vascular tissue responsible for transporting sugar and nutrients throughout the plant. As larvae feed on this vascular tissue, the ash becomes less able to transport nutrients to the top of the tree, killing the tree from the top down in a span of 2-5 years depending on the size and health of the tree.

Emerald ash borer adults are very small, metallic green beetles. They are only 3/8 - 1/2 inch long and 1/16 inch wide (about the size of a cooked grain of rice). Adult emerald ash borers emerge from beneath the bark of ash trees in late May through mid-July, creating a D-shaped exit hole as they chew their way out of the tree. Adult beetles are most active during the day and prefer warm, sunny weather. Once they emerge, they feed on ash foliage in the upper parts of the tree. In general, they never wander far from where they exit a tree (less than one mile) in search of a mate. However, research in laboratory conditions suggests that a mated female may fly more than 20km (Taylor et al. 2006). Human assisted dispersal of EAB can be much greater and is the primary reason for establishment of satellite populations (USDA). The spread of this population has been facilitated through human transport of firewood and nursery stock. Quarantines have extended to dead, cut and living materials, including stumps, logs, roots, branches, and

Town of Underhill



both composted and uncomposted ash chips. Because of the proliferation of this pest across most of the eastern and midwestern states, most quarantines have been lifted as of this writing. However, firewood quarantines or “slow the spread” guidelines are in effect in most eastern states including Vermont to try and prevent or slow further spread of EAB. This may give natural controls such as parasites time to become established.

Another factor in facilitating the spread of the EAB has been the lack of natural ash tree resistance and natural predators. Ash trees in Asia have co-evolved natural defenses to deter EAB, and parasitoid wasps have kept EAB populations in check. The USDA Animal and Plant Health Inspection Service (APHIS) is currently rearing and researching the effectiveness of four species of exotic parasitic stingless wasps, *Spathius agrili*, *Spathius galinae*, *Tetrastichus planipennisi*, and *Oobius agrili*, as a means of controlling active emerald ash borer infestations. Colonies of these wasps have been established in other areas of the United States infested with EAB and recent research shows that they have been overwintering and reproducing at some of these locations. Research and trials are being actively conducted by USDA-APHIS.

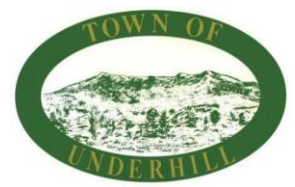
Once they find a mate, the female EAB will lay 60 – 90 eggs, one at a time, in the crevices of ash tree bark. The adult beetles will feed lightly on ash tree leaves, but do not cause much harm by doing so. The adult beetles live a total of three to six weeks. Emerald ash borer eggs are very small (1 mm), difficult to find and are rarely seen. Female adult beetles deposit them in the bark crevices and as larvae hatch from the egg, they immediately chew their way into the tree.

Emerald ash borer larvae are white and slightly flattened, with a pair of brown pincher-like appendages on the last abdominal segment. Their size varies as they feed under the bark on the ash tree's tissues and grow. Full grown larvae average 1½ inches in length. They wind back and forth as they feed, creating characteristic S-shaped patterns called galleries under the bark (starting in the phloem and extending into the xylem layers). Larvae will feed under the bark for one year and often two years in healthier trees, and can survive in green wood, such as firewood, even if the tree is no longer standing.

In autumn, after feeding under the bark, larvae will create a chamber for themselves in the tree's sapwood. They stay in this chamber over winter and pupate in the spring, turning into adult beetles. The adults emerge from the pupal chamber and emerge from the tree, completing the life cycle. The pupae, like the larvae, cannot be seen unless the bark is pulled away from the tree.

There are numerous metallic green insects common to the northeast that could easily be confused with EAB. In addition, there are several native pests other than EAB that attack ash trees.

Town of Underhill



V. Ash Tree Identification and Symptoms of an Infestation

Since EAB attacks only ash trees, monitoring for its presence means knowing how to identify ash. Ash trees are most easily identified by their compound leaves (leaves are composed of 5-11 leaflets) and opposite branching pattern where branches, buds, and leaves grow directly across from each other as opposed to being alternately located. The

To properly identify ash trees, use the following criteria:

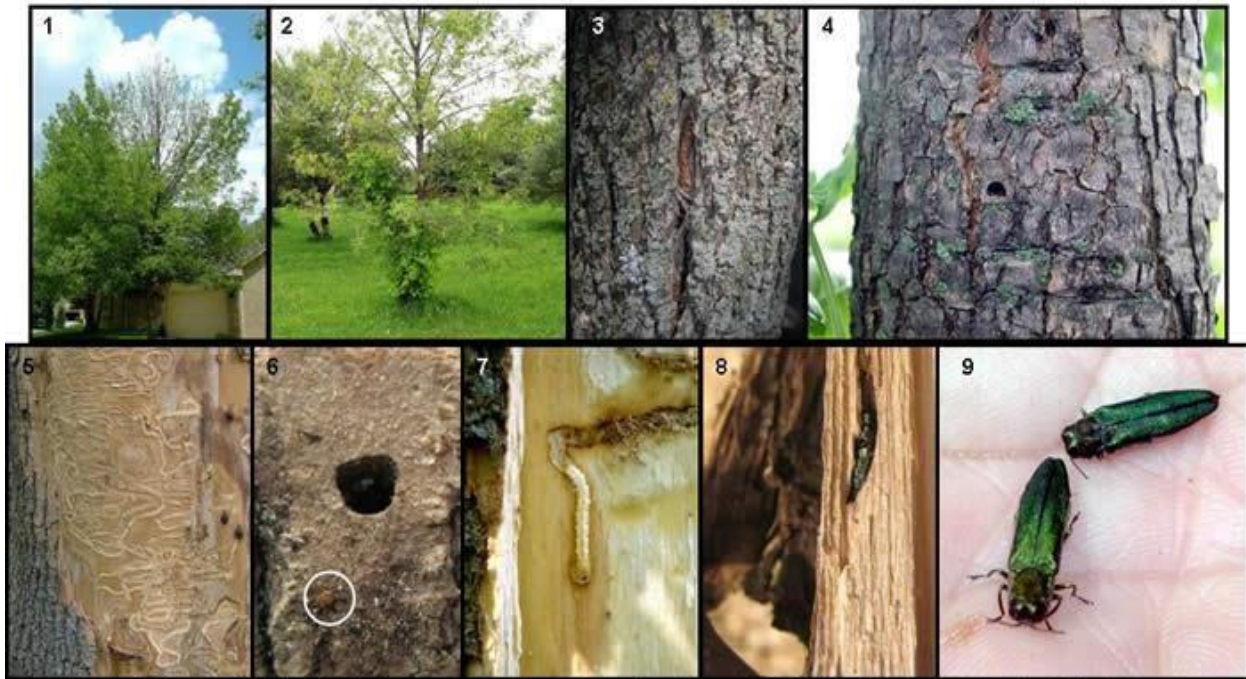
	Branch and Bud Arrangement Branches and buds are directly across from each other and not staggered. When looking for opposite branching in trees, please consider that buds or limbs may die; hence not every single branch will have an opposite mate.	
 Dawn Brown-Hylleberg	Leaves Leaves are compound and composed of 5-11 leaflets. Leaflet margins may be smooth or toothed. The only other oppositely branched tree with compound leaves is boxelder (<i>Acer negundo</i>), which almost always has three to five leaflets. White ash (on left) and green ash (on right)	
 *Paul Wang, Iowa State University	Bark On mature trees (left), the bark is tight with a distinct pattern of diamond-shaped ridges. On young trees (right), bark is relatively smooth.	
 *Paul Wang, Iowa State University	Seeds When present on trees, seeds are dry, oar-shaped samaras. They usually occur in clusters and typically hang on the tree until late fall, early winter.	MICHIGAN STATE UNIVERSITY EXTENSION  Emerald Ash Borer

only other oppositely branched tree with compound leaves is boxelder (*Acer negundo*), which almost always has three to five leaflets. The bark on mature ash trees is tight with a distinct pattern of diamond-shaped ridges. On young trees, bark is relatively smooth.

It is important to remember that since EAB is a wood-boring insect and spends most of its life under the bark of the tree, it is difficult to detect in ash trees. It is also difficult to detect because the decline of infested ash trees is usually gradual. Looking for visible signs and symptoms is one method for detecting EAB.

Signs of EAB infestation are difficult to detect in the early stages and at low densities, but evidence of increased woodpecker foraging may be an early sign of infestation. This can make the bole of an infested tree look a light brown or honey color as the birds have torn off the outer bark layers looking for larvae and prepupae. Other often early signs are canopy dieback in the upper 30 percent of the canopy, bark cracking, and epicormic shoots (new growth sprouting at the base of the tree), but these symptoms only become apparent when the beetle has reached moderate to high densities. Serpentine under-bark galleries and D-shaped exit holes are also tell-tale signs of EAB infestation, though other native borers can leave similar tunneling or exit hole patterns. The D-shaped exit holes and bark splits exposing S-shaped tunnels are significant signs of EAB. For D-shaped holes to be present a tree has to be infested for at least one year. Since EAB prefers warm sunny areas of the tree the infestation usually begins in the tops of ash trees making it difficult to find the D-shaped holes in the early stages of infestation.

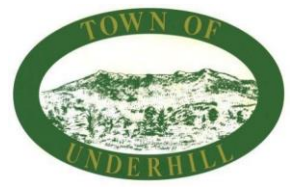
SYMPTOMS AND SIGNS OF EMERALD ASH BORER



1. Crown decline from the top down, 2. Epicormic shoots, 3. Bark split, 4. D-shaped exit hole, 5. S-shaped galleries, 6. Egg (circled) and exit hole, 7. Larva, 8. Adult in pupal cell, 9. Adults

An elliptical area of discolored sapwood, usually a result of secondary infection by fungal pathogens, sometimes surrounds larval feeding galleries. The S-shaped tunnels excavated by feeding larvae interrupt the transport of nutrients and water within the tree during the summer causing foliage to wilt, and the tree's canopy becomes increasingly thin and sparse as branches die. Many trees appear to lose about 30% to 50% of the canopy after 2 years of infestation and trees often die after 3-4 years of infestation. Often

Town of Underhill



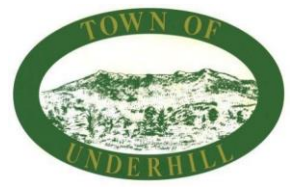
at the margin of live and dead tissue, epicormic shoots may arise on the trunk of the tree. Dense root sprouting sometimes occurs after trees die.

VI. Inventory

An ash tree inventory of Town lands and ROW's is necessary to determine and identify the liabilities of EAB before it arrives. Underhill has only just started conducting an ash inventory. This is necessary to facilitate realistic management of EAB by assessing the Town's vulnerability to the beetle and to provide the information needed to prioritize removal of trees, establish a budget and management timeline, and potentially identify high-value trees suitable for treatment. The inventory will involve tallying and referencing all ash that are ≥ 4 " in diameter within Town road ROW's of all Town roads except class 4 roads. This will be done using the State of Vermont's Rural Roadside Ash Inventory Tool. The "Tool" is an App that can be used on a tablet or cell phone and is supported by the State of Vermont Urban and Community Forestry Program. This procedure is preferable to the State's Rapid Roadside Ash Inventory as it provides more data that will be useful to the Town. After each day of inventorying, the data is uploaded to a State database which allows for the printing of detailed spreadsheets and maps that can be viewed and manipulated in the ArcMap digital mapping program. These can be made available to anyone with access to a computer and the internet. Also to be included in the survey will be Town parks and greens, and around town buildings. Parks that should be included would be Moore Park, Veteran's Park, portions of Mills Riverside Park, especially near trails and other pedestrian-heavy areas, and possibly along the Crane Brook Trail. Town Forests such as the land owned around the Town garage would be treated differently and will defer to any Forest Management Plans already in place (See: fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Forest_Health/Library/Ash_Management_Guidance_for_Forest_Managers.pdf). Ash trees along State highways will not be the responsibility of the Town. There are approximately 52 miles of Town roads in Underhill that will need to be inventoried.

It will be very important to know the boundary between Town road ROW and private property throughout this process. Most roads in Underhill are 3-rod roads which means that the ROW is 49.5 feet wide which is 24ft-9in from center of road. In Underhill, there are some 4-rod roads and some others, mostly new developments, where the road ROW is 60ft. The Tree Warden, Town Administrator, and Road Foreman all have lists of Underhill Town roads and how wide their ROW's are. Inventory-takers may need to do some measuring in certain situations. It should be noted that in some places the road may have moved or "drifted" off-center and it will be hard to determine just where the centerline actually is. In some circumstances, the actual ROW is bounded on either side by a rock wall or some other feature and in these cases this feature should be used to determine edge-of-ROW. Note that only a licensed surveyor can actually pinpoint the edge-of-ROW, we just have to do our best and make an educated guess with the help of a measurement if necessary.

Town of Underhill



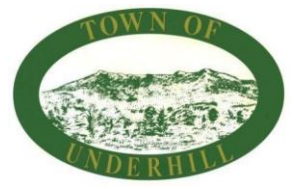
We will also need to note where the utility ROW's are as these commonly overlap with the Town ROW. Electric Power utilities have taken a proactive approach and have been actively engaged in ash removals along their ROW's and we've seen this starting to happen in Underhill the past two seasons. We need to note which ash are likely in one of these ROW's and tally them, but not include them in any budgeting calculations. It will also be necessary to determine when the utility is present if the lines are electricity lines, telecommunication lines, or both. The two sometimes share poles and other times have separate poles and ROW's. This is important because for whatever reason, the telecommunication utilities don't seem to have a plan for ash removals and the Town may wind up having to remove or treat these trees.

Using the State's Rural Roadside Ash Inventory Tool will allow for the gathering of the following information which will aid the Town in making management decisions:

1. **ROW:** Town
Utility
Private land – We may choose to tally any large trees that pose a public threat even on private land, as we may have some jurisdiction on these.
2. **Diameter:** We will use 4"-12", 12"-24", and 24" plus (3 categories).
3. **Condition:** Use program default;
"Good" (Healthy, a few dead small branches, no dieback of branches over 2" in diameter)
"Fair" (some dead branches, 50-75% crown dieback)
"Poor" (>75% of the crown dead, visible dead branches over 2" in diameter)
"Dead"
4. **Count:** Count each tree as "1". On multiple-stemmed trees count the number Of stems and use that number, ie, count each one separately.
5. **Priority Removal:** "Yes" – Tree shows signs of decline or is already dead.
Possibly for another reason such as stem damage from plow, vehicle crash, construction, etc.
"No" – Tree is healthy
"Unknown" – You're not sure.
6. **Comments field:** Note if leaning over road, utility, etc. Note any interactions with public or adjacent landowners.

VII. Management Strategies

Managing for EAB is an immense and potentially costly task to take on and there are several different methods and strategies that can be used. If left untreated, ash most likely will die 1-5 years after the initial infestation, so it is important to begin managing for



EAB before it gets established in Underhill. This is not only to save ash trees that we might choose to chemically treat, but to also save time and money on removing those that will ultimately need to be removed. Once dead, infested ash are a public hazard in the ROW or along hiking trails because as EAB eats the inner parts of the tree and the tree slowly dies, the structural integrity of the tree is compromised, and this is particularly so with ash species. If left standing the dead ash can have catastrophic failure resulting in large branches snapping off and whole tree stems breaking at any time. This characteristic is what makes removing dead ash more difficult to be done safely. This alone can increase the cost of removals threefold.

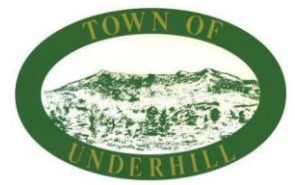
Three potential management strategies (preemptive, selective, and reactive management) have been identified and are outlined below (VU&CFP).

Preemptive Management

Ash trees along downtown streets and rural roads, in parks, and along trails are removed prior to EAB infestation and, if appropriate, replaced (1:1 or 2:1) with a diversity of species that do not host EAB. As a result, the community contains no public ash trees and, as such, no future concerns over EAB. **COST:** The initial costs associated with this option will be high due to expenses associated with tree removal and replacement. Streets and parks will have major canopy gaps temporarily before replacement trees become well established. However, limited annual cost for EAB management will be incurred after the implementation of the strategy.

Selective Management

Along rural roads, trees will be removed before or at early infestation to reduce risk and long-term cost. High-value ash trees in selected areas (streets and parks) are managed actively and protected for future generations. Those in other areas (e.g. woodlands) are left unmanaged (and will likely succumb to EAB infestation) or are managed under the guidance of a forest management plan. In wooded areas with trails, management of high-risk ash trees will still be needed. Ash trees are regularly monitored for their health and levels of EAB infestation. Insecticide treatment of EAB and ash tree removal may be applied where financially and culturally appropriate. Tree replacement (1:1 or 2:1) will be prioritized towards community needs, and dead or dying ash trees along roads and in parks will be replaced with non-host species to prevent major canopy gaps in neighborhoods. **COST:** Treatment, removal, and replacement costs will be spread out over an extended period.



Reactive Management

Ash trees are managed and maintained the same as all other trees in the community. No survey is conducted to detect and monitor EAB's spread and no control actions, including replanting and treatment efforts, are pursued, even when EAB becomes established. However, the community is still responsible for the removal of hazard trees along roads, trails, and in parks. Ultimately, most ash trees will die as the infestation spreads through the municipality. **COST:** Although this strategy may cost nothing up front, significant costs will be incurred over a short period of time as ash die quickly. Additionally, the cost of the removal of dead ash trees is more expensive than live trees due to decreased structural integrity of EAB-infested trees and the risk they pose to tree removal crews.

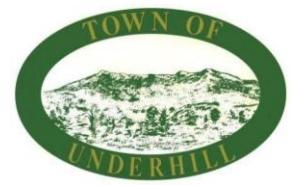
A Management Strategy for Underhill

The best avenue for Underhill to take, we believe, is somewhere in-between (or including features of) both "Preemptive" and "Selective" management. This needs to start with as complete an inventory as can be done followed by identification of any trees to be treated with insecticide. Since most of Underhill's ash trees are naturally growing in ROW's and not planted purposefully, the need for directed re-planting efforts should be relatively unnecessary as there are in most cases other native trees already established and available to fill the spaces made by any ash removals. Ash that are not chosen for treatment and that would likely to pose a direct threat to the public if they die should be removed while they are still living. The Town should coordinate with the power companies and start tree removals in areas where the power companies have already gone through and done ash removals along their utility ROW's. This way, we don't incur the costs associated with any removals that these utilities would have done anyway and in so doing also limit liability issues working near power lines. The Tree Warden will coordinate these efforts and mark trees to be removed with tree marking paint. Also note that State highways do not fall under the jurisdiction of the Town and as such will not be inventoried or treated. The Town should develop a State DOT contact however and maintain a line of communication so we can inform them in the instance of a potential hazard.

a. Treatment of High-Value Trees with an Insecticide

First, we will need to determine which trees might be good candidates for treatment. The Emerald Ash Borer Preparedness Plan Group will make these decisions. In general, these trees might be located in a park, near a Town building, or along a Town trail. Trees should be healthy with full crowns and bark that is held tightly to the trunk to be considered as a candidate. Treatments will be done by a professional arborist who is a certified pesticide applicator holding a license with the Agency of Agriculture, Food and Markets in Ornamentals and Shade Tree pest control.

Town of Underhill



Treatment should be via stem injection as opposed to ground or surface applications as this is the safest and most effective methodology. Products that contain emamectin benzoate or azadiractin are recommended (VU&CFP). The first is recommended as it lasts for at least two years requiring fewer applications.

See: <https://vtcommunityforestry.org/sites/default/files/2022-10/eabtreatment.pdf>

b. Removal of Ash Trees

Once ash trees are infested with EAB, they typically decline and die over a period of two to three years, at which point they often become unacceptable hazards to property, infrastructure and to the public. The burden of dealing with hundreds of dead and dying trees in a short period of time can place an enormous strain on a town's budget, personnel, and resources.

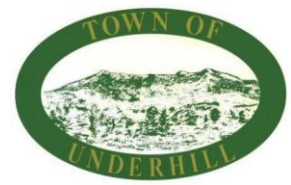
There is not a *do-nothing* option because the town will need to address the problem of EAB-caused ash tree mortality eventually. If the town were to wait until ash trees are dead before removing them, then road crews will be called upon to address a large number of one-off emergency calls at any hour to remove trees blocking roadways. Addressing the problem in this manner would be another factor increasing the cost of a do-nothing or reactive approach.

The cost savings resulting from preemptive cutting are not calculated here, but they are substantial enough for the authors of the plan to be confident that this is a cost effective course of action. To provide a sense of the magnitude of difference, the City of Rutland in its EAB plan estimated that removing dead ash trees would cost 50 percent more than proactively removing live ash trees.

The EAB plan for Underhill should call for the removal of at-risk ash from town road ROW's over a five-year period. There are approximately 52 miles of class 2 and 3 roads in Jericho. So, the Town should plan for the treatment of approximately 10 miles of road each year if it wants to stay ahead of the problem and extra cost of dealing with already-dead trees. These would primarily be trees within the public right-of-way. Trees that are on private property just beyond the right of way, but pose a potential threat to roads, can be handled on a case by case basis working with the landowner. Class 2 paved roads should be first priority, while class 3 unpaved roads are second priority. And again, consideration should be given to those roads where power companies have already treated their ROW's. Higher priority will be assigned to the most heavily traveled roads.

The Tree Warden along with other trained members of the Emerald Ash Borer Preparedness Plan Group will map the locations and sizes (diameter at breast height, DBH) of trees to be removed. The Tree Warden or others will also mark trees to be removed with blue tree marking paint or, blue flagging. Flagging is less desirable because it can be easily removed by anyone. Interested contractors will be provided copies of maps with tree locations. The EAB Preparedness Plan Group (Town administrator or road commissioner) will send requests for proposals (RFPs) to interested arborists and tree companies. The

Town of Underhill



group will review bids and approve contracts. All bid solicitation, proposal review, and contract awards will conform to town regulations and requirements.

c. Estimate of Costs Associated with this Management Strategy

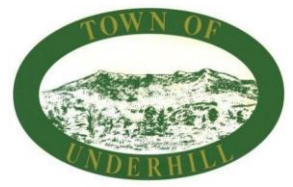
1. *Insecticide treatment*

These costs can vary greatly by tree size and arborist/tree service utilized but in general can range in cost from 5\$ to 15\$ per inch DBH. Treatment is good for two years. So for instance, a 12-inch diameter tree might cost between \$60 and \$180 to treat. If the Town has multiple trees to be treated, we most likely would be able to get the work done for a figure on the lower end of that spectrum. We need to keep in mind though that this cost would be incurred every two years forever, or at least until natural predators and parasites of EAB become established. Spending a lot of money on chemical control would be wasteful if at some time in the future Town officials choose to stop the treatments or the tree dies anyway. We need to also consider the possible long-term negative effects of chemical treatments. Although the upfront costs might be higher, it might be more cost-effective to remove the tree and replant another non-ash if the situation calls for it.

2. *Tree Removal*

Costs for removing non-dead ash from Town road ROW's can vary widely depending on size and location of the tree. Trees along rural road ROW's will likely be less expensive to have removed than those in neighborhoods and around buildings. In general though, costs range from \$85 to \$3500 or more per tree. Another cost predictor uses the estimate of \$18.33/inch of DBH of tree. See: [vt community forestry eab municipal management worksheet 2021](#). Because Underhill is only just starting our roadside tree inventory it will be hard to come up with an exact figure as to how many ash trees we have within the public ROW's and parks. However, using data we do have and some from neighboring towns will give us a general idea of what we will have to deal with and budget for. Richmond for instance, estimates that they have 95-125 trees/road mile and in Underhill a small sampling of 3 miles of wooded rural road yielded 339 ash trees or 113 +/-/mile. The Town of Danville surveyed about half of their 98 miles of class 2 and 3 roads and came up with an average of 38 ash trees/mile so you can see that this can be variable. Not **all** of these trees will need to be removed and some may be removed by utilities in their ROW's so using an estimated average of 75 trees/road mile and an average diameter of 10 inches, Underhill may be looking at about (75 trees/mile) x (\$18.33x10") or \$13,748 per mile of road. Multiply that out by our 52 miles of roads and we have a total projected tree removal cost of \$714,870. There are a lot of moving parts here and the adjustment of any of them even slightly can greatly influence this final number. Let's just say that we can get a better price on removals of say \$15.00/inch DBH and the average size tree is slightly smaller at 8" dbh, this would give us a total of \$9000/road mile or a total of \$468,000. Dividing this out by the 5 year duration of the project would be \$142,974/year in the first scenario,

Town of Underhill



and \$93,600/year in the second scenario. We may want to explore options such as hiring a tree crew (with their own equipment) to work for the Town on a time basis, i.e., work for Underhill on a weekly or monthly basis.

3. *Do Nothing*

Take the above numbers, double them, and have it all come at once. Purely not an option.

Some EAB cost calculators have been developed and they can be referred to here:

1. <https://www.urbantreealliance.org/eab-costs/>
2. <https://int.entm.purdue.edu/ext/treecomputer/>
3. <https://int.entm.purdue.edu/ext/treecomputer/index.php?page=tutorials/costsAndInfestation.php§ion=6>

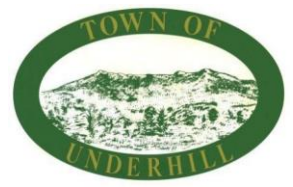
VIII. Disposal and Utilization of Infested Wood

Adjacent landowners will be given first rights to wood products generated by this process. These landowners will be contacted by someone representing the Town such as the road foreman, Town administrator, or Tree Warden. This could be done with mailers, door tags, public notices, Front Porch Forum posts, or something similar. It needs to be realized however, that we may not be able to contact every single adjacent landowner in person ahead of scheduled tree removals.

Depending on the tree-removal contractor and contract in place with them, roadside ash logs can be left by the roadside, outside the right of way (ROW) where practical, to enable landowners to utilize felled trees for firewood. Logs that are not removed by landowners or firewood collectors can be removed by the Town if desired for special purposes such as “Wood For Good”, a local non-profit supplying firewood to low income Vermonters. The Town will not be responsible for delivering this wood however. Removal of tree tops and/or trees not wanted by landowners will be removed by the contractors doing the tree removals, which should be specified ahead of time in the contract. All use of wood products generated by must adhere to the State’s “Slow the Spread” guidelines which can be viewed here: [vtinvasives.org Slow the Spread Guidelines.pdf](http://vtinvasives.org/Slow%20the%20Spread%20Guidelines.pdf).

The cutting of trees within the right-of-way by landowners will not be authorized, except if done by qualified tree service companies contracted by the landowner. The prohibition against private tree removals in the right-of-way is a measure to ensure public safety and to prevent disruption to travel due to incorrectly felled trees. The tree warden may grant exceptions to this prohibition on a case-by-case basis. An example might be tree removal by an experienced chainsaw operator on a less traveled road. In all instances, however, pre-approval by the tree warden is required.

Town of Underhill



IX. Replacement Planting

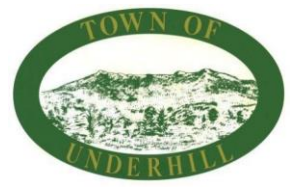
We do not anticipate the need for much replanting of trees due to this ash removal effort. Underhill's roadside trees are largely the result of natural regeneration, especially ash. Occasionally a landowner will plant some trees along the ROW but seldom are they ash trees. In the event that there is a call for some replanting, the landowner should work with the Tree Warden and/or Conservation Committee to determine the best species to be planted. There are multiple factors to consider when replanting such as salt tolerance, native vs exotic species, or the presence of overhead power lines for instance. The Vermont Urban and Community Forestry Program has a good guide to help with choosing trees for replanting which can be found here: [Vermont tree selection and planting guide](#).

X. Community Outreach and Education

The removal of street trees and decline of the ash tree population can have a stressful effect on the community. A community outreach and education program should be part of Underhill's efforts to inform and to *keep* informed members of the Town community with general information about EAB spread and biology, eradication efforts, costs to the community, replanting efforts, and proper disposal of EAB-infested wood. These efforts could include any or all of the following elements:

- a. Articles in the Mountain Gazette.
- b. Posts in Front Porch Forum (FPF).
- c. Informational meetings either as stand-alone events or as part of selectboard meetings. These could be done either as online webinar's or in-person.
- d. Field days where the public would have a chance to see what to look for and how to identify ash trees, the Emerald Ash Borer, and what damage to the trees looks like.
- e. Development and maintenance of informational kiosks at places like the Town library and Town hall.
- f. Develop and maintain a webpage on the Town website to include this plan, as well as current information on EAB, survey and monitoring results, current wood disposal recommendations, key contacts, treatment or removal options and arborists and tree services who provide these services, and any other pertinent information.
- g. Prior to tree removals, abutting landowners should receive notices in the mail. This can be a simple post card created for this purpose with who to contact for contesting removals, requesting the wood from the removals, or to offer treatment as an alternative to removal.

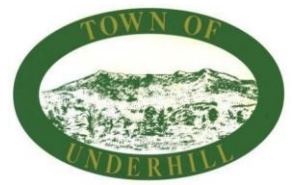
Town of Underhill



XI. Review of Ash Management Plan Recommendations

1. Conduct roadside ash inventory. This will help to identify the number of trees that will need to be removed and/or treated which will help in budget projections.
2. Conduct ash inventory of parks and town forests. Decide how we will handle these trees, i.e., removal or treatment.
3. Identify and/or set aside monies to fund this and develop a line-item in Town budget for this work as it will last for several years. Decide if one-time federal money can be used (e.g. ARPA funds).
4. Have Conservation Commission continue with occasional EAB public awareness events, Tree Warden post information on FPF and the Town website, and Selectboard address the topic at Selectboard meetings as necessary.
5. Implement a plan to preemptively begin ash tree removals in the Town road ROW's over a period of the next 5 years.
6. Implement a plan to begin removals and/or treatment of ash trees in Town parks and forests. Forests will only have trees treated/removed that are near trails. Insecticide treatments will need to be started in advance of EAB infestation. Other ash trees within the forest will be left alone.
7. Advise private landowners to help them understand how to deal with EAB and the ash tree die-off. Trees on private property that are deemed to threaten public good can be removed by the Town with guidance by the Tree Warden who will work with the landowner on a case-by-case basis.
8. Ash trees within the State ROW's such as Rt. 15 will not be the responsibility of the Town. Develop contacts at the State level to inform of hazard trees that pose a threat to public safety.

Town of Underhill



XII. Who is the Underhill Emerald Ash Borer Preparedness Plan Group?

Tree Warden Don Tobi

Underhill Town Administrator Brad Holden

Underhill Road Crew Foreman Nate Sullivan

Underhill Conservation Commission

Members:

Pat Lamphere	4-year term expiring 3/2025
Karen McKnight - Chair	4-year term expiring 3/2025
Betsy Chapak - Vice Chair	4-year term expiring 3/2025
Laurie Graham - Secretary	4-year term expiring 3/2027
Trinity Schroeter	4-year term expiring 3/2027
Daphne Tanis	4-year term expiring 3/2024
Craig Volpe	4-year term expiring 3/2026

Underhill Selectboard

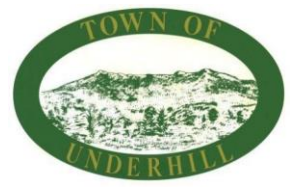
Members:

Dan Steinbauer, Chair - Term expires 2024
Bob Stone, Vice Chair - Term expires 2025
Patricia Richards - Term expires 2026

Other community members

Highway Infrastructure and Equipment Committee..... Kurt Johnson, Chair

Town of Underhill



XIII. Contacts:

At the Town:

Underhill Tree Warden:

Don Tobi, dtobi@uvm.edu

Underhill Town Administrator:

Brad Holden, bholden@underhillvt.gov (802) 899-4434 option 7

At the State:

Chittenden County Forester:

Ethan Tapper, ethan.tapper@vermont.gov (802) 585-9099

Vermont Urban & Community Forestry Program, Program Manager, Vermont Dept. of Forests, Parks, & Recreation:

Elise Schadler, elise.schadler@vermont.gov (802) 522-6015

Vermont Urban & Community Forestry Program, Technical Assistance Coordinator, Vermont Dept. of Forests, Parks, & Recreation:

Joanne Garton, joanne.garton@vermont.gov (802) 249-4217

XIV. References:

Ash Management Guidance for Forest Managers. April 2021.

[fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Forest_Health/Library/Ash Management Guidance for Forest Managers.pdf](http://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Forest_Health/Library/Ash_Management_Guidance_for_Forest_Managers.pdf)

Donovan, G. H., Butry, D. T., Michael, Y. L., Prestemon, J. P., Liebhold, A. M., Gatziolis, D., & Mao, M. Y. (2013). The relationship between trees and human health: Evidence from the spread of the emerald ash borer. *American journal of preventive medicine*, 44(2), 139-145. www.ncbi.nlm.nih.gov/pubmed/23332329

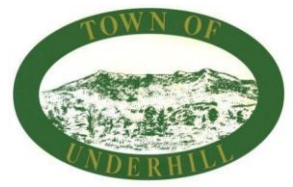
Emerald Ash Borer Program Manual, 2nd Ed. 2020. USDA Animal and Plant Health Inspection Service,

https://www.aphis.usda.gov/import_export/plants/manuals/domestic/downloads/eab-manual.pdf

Emerald Ash Borer Management Worksheet for Vermont Municipalities. Dec. 2021 update. Vermont Urban & Community Forestry Program,

https://vtcommunityforestry.org/sites/default/files/2022-09/eab_municipal_management_worksheet_dec_2021.pdf

Town of Underhill



Emerald Ash Borer: Information for Forest Landowners. January 2021. Vermont Dept. of Forests, Parks, & Recreation, Vermont Forest Health, https://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Forest_Health/Library/EAB%20Landowner%20FAQs.pdf

Rural Roadside Ash Inventory Tool Guide. Vermont Urban & Community Forestry Program, Available from Joanne Garton, Technical Assistance Coordinator, Vermont Dept of Forests, Parks, & Recreation. Acquired in 2020.

Taylor, R. A. J., T. M. Poland, L. S. Bauer, K. N. Windell, and J. L. Kautz. 2006. Emerald ash borer flight estimates revised. In: Emerald ash borer research and technology development meeting, Compiled by: V. Mastro, D. Lance, R. Reardon, and G. Parra.

The following Town EAB Preparedness Plans were used as “good” examples throughout the process of developing this plan for Underhill. Certain ideas and basic structure were gleaned from them and for that we thank you.

Town of Charlotte, VT., Emerald Ash Borer Preparedness and Management Plan (2019). [https://www.charlottevt.org/vertical/sites/%7B5618C1B5-BAB5-4588-B4CF-330F32AA3E59%7D/uploads/EAB_Plan_3_14_19\(1\).pdf](https://www.charlottevt.org/vertical/sites/%7B5618C1B5-BAB5-4588-B4CF-330F32AA3E59%7D/uploads/EAB_Plan_3_14_19(1).pdf)

Town of Danville, VT., Emerald Ash Borer (EAB) Pest Preparedness Plan (2018). <https://www.danvillevermont.org/wp-content/uploads/2019/02/11-15-2018-EAB-Prep-Plan-adopted-2-7-19.pdf>

Town of Essex Jct., VT., Management Plan and Recommendations for Emerald Ash Borer and the Threat to Essex Junction’s Trees (2019). https://vtcommunityforestry.org/sites/default/files/2022-10/essex_junction_eab_plan_2018_final.pdf

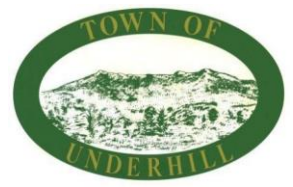
Town of Richmond, VT., Richmond Emerald Ash Borer Preparedness and Response Plan (2021). https://vtcommunityforestry.org/sites/default/files/2022-10/richmond_eab_plan_210207.pdf

City of Rutland, VT., City of Rutland, EAB Strategy – Revised 03-18-19. https://vtcommunityforestry.org/sites/default/files/2022-10/rutlandcity_01-18-19_eab_strategy.pdf

Town of Williston, VT., Emerald Ash Borer Preparedness Plan (2015). https://vtcommunityforestry.org/sites/default/files/2022-10/williston_emerald_ash_borer_preparedness_plan_2015.pdf

Town of Shelburne, VT., Town of Shelburne Emerald Ash Borer Management Plan and

Town of Underhill



Inventory Project (2020).

<https://www.shelburnevt.org/DocumentCenter/View/4824/Shelburne-EAB-Management-Plan-2020>