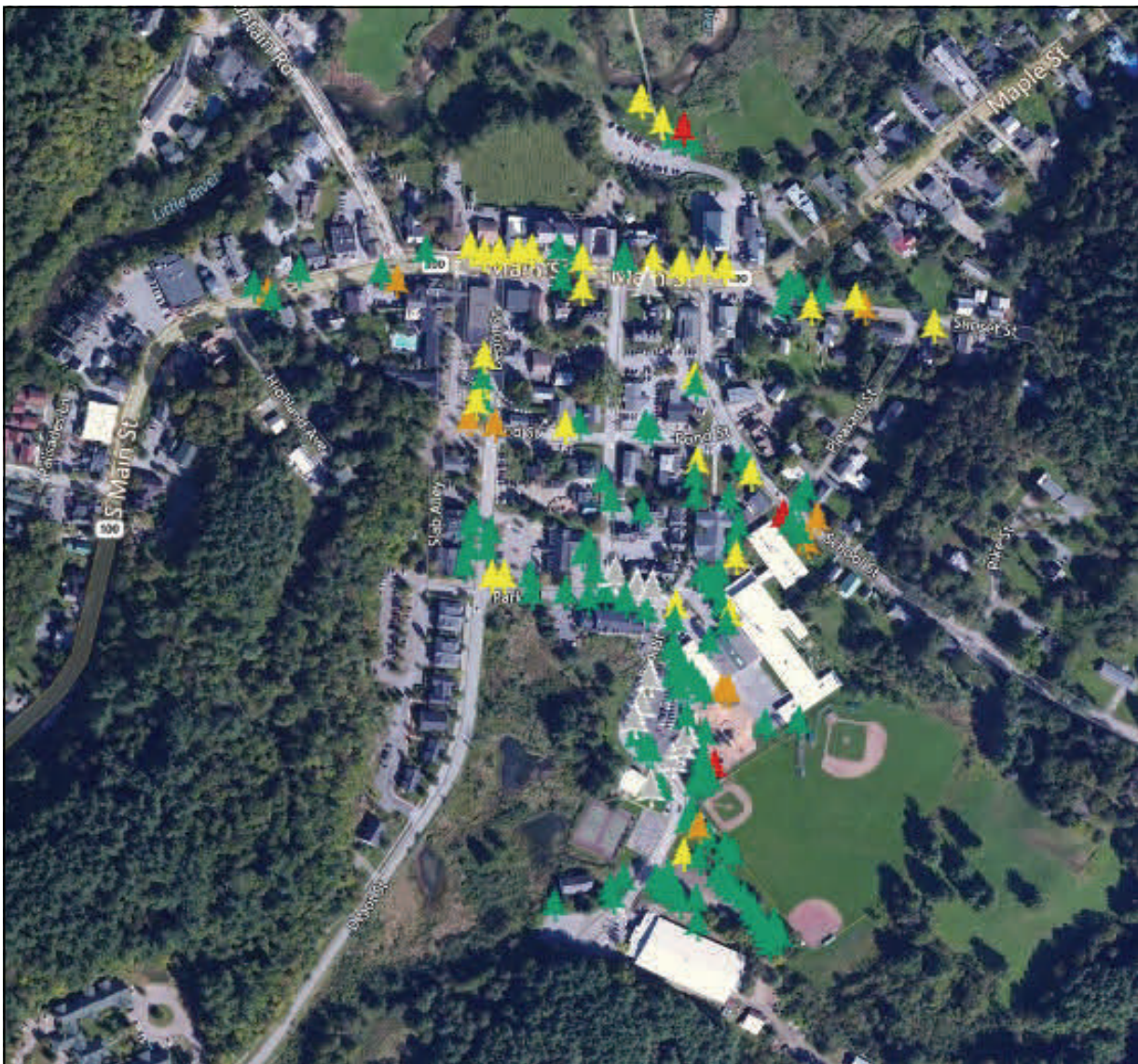


# Stowe Village Public Tree Inventory Summary Report



*Prepared for the Town of Stowe  
by the Vermont Urban & Community Forestry Program  
August 2016*



## **Acknowledgements**

This summary report was developed by Vermont Urban & Community Forestry Program (VT UCF) staff based on field work conducted by VT UCF staff for the Town of Stowe, Vermont in July 2016. We would like to thank Tom Jackman, Stowe's Director of Planning, for his assistance in coordinating this effort.

## **About the Vermont Urban & Community Forestry Program**

The field of forest management is not confined to the natural areas and forests of Vermont, but extends to the populated urban and rural spaces where trees play important roles. The trees in public parks, along roadsides, on town greens, and in municipal forests compose our urban and community forests and merit careful stewardship. VT UCF is a collaborative effort of the Vermont Department of Forests, Parks, & Recreation and University of Vermont (UVM) Extension. The program provides technical and financial assistance as well as educational programs and resources for the management of trees and forests in and around Vermont communities. The mission of VT UCF is ***to lead citizens, businesses, and governments in understanding the value of urban and community forests and promote civic responsibility for and participation in the stewardship of these resources for this and future generations.*** Since 1991, the program has been guided by a small staff and a twenty-member advisory council. The council meets quarterly to share information and advise the program; its members come from various professional associations, non-profits, educational institutions, municipal tree boards and committees, and state agencies. VT UCF works with state and municipal officials, as well as dedicated volunteers and local organizations, to steward the urban forest's ecological integrity and diversity. More information about VT UCF and its programming can be found at [www.vtcommunityforestry.org](http://www.vtcommunityforestry.org).

## Importance of Inventory and Community Forestry in Vermont

A public tree inventory establishes a record of the City-owned trees present in a municipality. An inventory can provide information about the species, size, health, maintenance needs, and location of each tree. This detailed information allows community leaders to estimate the numerous contributions and management requirements of the trees of which it is in charge. In the event of a disease outbreak or invasive insect infestation, data from an inventory may assist in monitoring and preventing spread, as well as supporting the response to the disease or infestation. An inventory can also help build public support for expanding community forests and to guide future urban planning.

Urban and community trees improve the quality of life for Vermont communities in a variety of ways. The most readily apparent benefit is the aesthetic value that trees provide a street, home, or public space. Along with this beauty is the functional benefit of providing shade along the streets in the summertime and blocking wind to reduce heating costs in the wintertime. The presence of trees has been shown to positively affect property values and boosts foot traffic in commercial areas. Parks and tree-lined sidewalks promote physical activity by creating shaded, comfortable outdoor spaces. Many types of urban wildlife depend on trees as sources of food and shelter. Unseen benefits of urban trees include improvements in air quality and temperature regulation through reduction of the heat island effect. Trees can mitigate noise pollution common in an urban environment and can clean and conserve water by controlling run-off. Additionally, urban and community forests create opportunities for education, community engagement, and in some instances can be related to crime reduction. Trees are an integral part of the green infrastructure of a place and contribute to keeping our communities healthier and our everyday lives more fulfilling.

## Project Summary & Methodology

The goal of the Stowe Village public tree inventory was to accurately locate and assess Town-owned trees within the public right-of-way (ROW) on streets in the downtown village, in select parks, at Stowe Elementary School, and at the Stowe Library to maintain a record of tree conditions, plantings, and removals. A secondary goal of the project was to identify potential tree planting locations within the public ROW. The information collected in the inventory and presented in this summary report should provide decision makers – and citizens – a better understanding of the composition, condition, and benefits of Stowe’s downtown public trees and will allow the municipal staff to plan for tree maintenance and future tree planting using a map-based tree inventory tool.

This project was initiated in the summer of 2016. To plan for the public tree inventory, VT UCF staff coordinated with Stowe’s Director of Planning to decide what streets and properties should be included in the inventory, and to determine the public right-of-way (ROW) boundaries for the streets. VT UCF has developed a tree inventory tool in collaboration with the Vermont Agency of Natural Resources’ (ANR) GIS team. The map-based tool uses the free application *Collector for ArcGIS*, developed by Esri (<http://doc.arcgis.com/en/collector/>), for data collection and is linked to the publicly-accessible ANR Atlas online mapping website (<http://anrmaps.vermont.gov/websites/anra/>).

On July 27<sup>th</sup>, 2016 VT UCF staff completed an inventory of **160 trees** located within the public ROW of **8 streets** and in **4 town green spaces**, and also identified **11 potential public tree planting locations**. In total, the inventoried land area was less than 1 square mile, a small fraction of the Town of Stowe's 72 square mile total land area, but encompassed the concentrated center and most densely populated portion of town. A list of streets and sites with ROW boundaries and number of trees inventoried is found in Table 1 below. A series of GIS maps highlighting the tree inventory results can be found in Appendix B.

Table 1: Stowe streets and sites included in the public tree inventory.

Street Name/Site Name	What to Inventory	Right-of-Way Extent	Number of Trees Inventoried
Main Street	From Highland Avenue (W) to Sunset Street (E)	49.5'	24
Depot Street	From Main Street (N) to Park Pl (S)	49.5'	18
Park Street	Full road	49.5'	5
Park Place	Full road	49.5'	6
Pond Street	Full road	49.5'	4
Pleasant Street	Full road	49.5'	1
School Street	From Main Street (N) to Pleasant Street (S)	49.5'	11
Sunset Street	Full road	49.5'	8
Memorial Park	All planted landscape trees	n/a	21
Stowe Elementary School	All planted landscape trees	n/a	28
Stowe Ice Rink	All planted landscape trees	n/a	28
Rec Path Parking Lot	All planted landscape trees	n/a	6

Each public tree identified to be within the ROW was recorded into the *Collector for ArcGIS* application using an iPad, provided by VT UCF. The application is map-based and uses GPS and a base layer map to allow the user to input information about a tree, linking it to a particular geographic location. Data recorded for each public tree in Stowe, outlined in Table 2 below, included street name, overall condition, species, diameter class (using a measurement for diameter at breast height, or DBH), a recommendation for monitoring (yes/no), if the tree needed to be pruned (yes/no), if the tree had mulch piled too high against its trunk, known as a mulch volcano, (yes/no), additional comments, and the nearest house or building address. In



most cases, a picture was also taken of each tree. All inventory data collected on public trees in Stowe is available for viewing on the ANR Atlas and instructions are included in Appendix A.

Table 2: Data collection parameters for the Stowe public tree inventory.

Data Parameters	Description
Site ID	Street name or property name.
Species	Common name. Include in comments box if not listed.
Tree Condition	<ul style="list-style-type: none"> <li>● <i>Good</i>: full canopy (75-100%), no dieback of branches over 2" in diameter, no significant defects, minimal mechanical damage</li> <li>● <i>Fair</i>: thinning canopy (50-75%), medium to low new growth, significant mechanical damage, obvious defects/insects/disease, foliage off-color and/or sparse</li> <li>● <i>Poor</i>: declining (25-50%), visible dead branches over 2" in diameter, significant dieback, severe mechanical damage or decay (over 40% of stem affected)</li> <li>● <i>Dead</i>: no signs of life, bark peeling; scratch test on twigs for signs of life (green)</li> <li>● <i>Vacant</i>: potential spot for a tree within the public ROW. Add "small", "medium", or "large" in the comments box <ul style="list-style-type: none"> <li>- Small= max 30' at maturity, presence of overhead wires, minimum planting space 4' x 4'</li> <li>- Medium= 30-50' at maturity, green belts over 6' wide, no overhead wires</li> <li>- Large= 50'+ at maturity, parks and open space</li> </ul> </li> </ul>
Diameter (DBH)	Diameter taken at 4.5' above ground in classes of 0-3", 3-6", 6-12", 12-18", 18-24", 24-36", 36-42", 42"+. If on slope, uphill side measured. If abnormal growth, measured above or below growth. If multi-stemmed, each stem's DBH is squared, all squares summed, and the square root taken; indicate "multi-stemmed" in comments box.
Monitor	<p>Yes: any one visible defect is affecting &gt;40% of the tree, the tree poses a hazard to people/infrastructure/cars, the trunk or branches are growing into utility wires, the tree is dead or in poor condition, or the tree is an ash tree showing evidence of woodpecker flecking, blanding, epicormic branching/water sprouts, and/or suspicious exit holes</p> <p>No: no major defects, tree in good or fair condition</p>
Prune?	<p>Yes: Flag trees for pruning if any of the following signs are present: broken branches, branches are overlapping /touching/growing on each other, the tree is overcrowded, branches are interfering with utility lines or other built infrastructures, the branches can interfere with pedestrians/vehicles/bikes, etc.</p> <p>No: No branch needs to be trimmed</p>
Mulch Need to be Removed?	<p>Yes: Mulch is piled too high against trunk; needs to be removed</p> <p>No: No mulch volcano; no need to remove mulch</p>
Comments	Notes, elaborate on any existing conditions; max 255 characters.
House Number	Corresponding house address, numerical field. If a corner lot house is on a different street, enter house number and write "House located on X Street; corner tree" in comments box.
Collection Date/Time	Date and time.
Photo	Photo of full tree. Additional photos of any significant defects.

## Summary of Findings

### Community Forest Diversity

- Of the 160 public trees, there are 24 different species in 14 different genera.
- The five most common tree genera by number of trees are *Fraxinus* (ash) at 49%, *Acer* (maple) at 19%, *Quercus* (oak) at 8%, *Malus* (apple) at 6%, and *Abies* (fir) at 4%. See Figure 1 below.
- *Acer* and *Fraxinus* species together represent over two-thirds (68%) of Stowe Village’s public trees. Invasive tree pests currently threaten both of these genera: the Asian long horned beetle (ALB) and the emerald ash borer (EAB), respectively. It is recommended that one genus not represent more than 20% of a public tree population.
- The five most common species are green ash (*Fraxinus pennsylvanica*) at 48%, northern red oak (*Quercus rubra*) at 8%, sugar maple (*Acer saccharum*) at 6%, crabapple (*Malus* species) at 6%, and red maple (*Acer rubrum*) at 5%, See figure 2 below. It is recommended that one species not represent more than 10% of a public tree population.

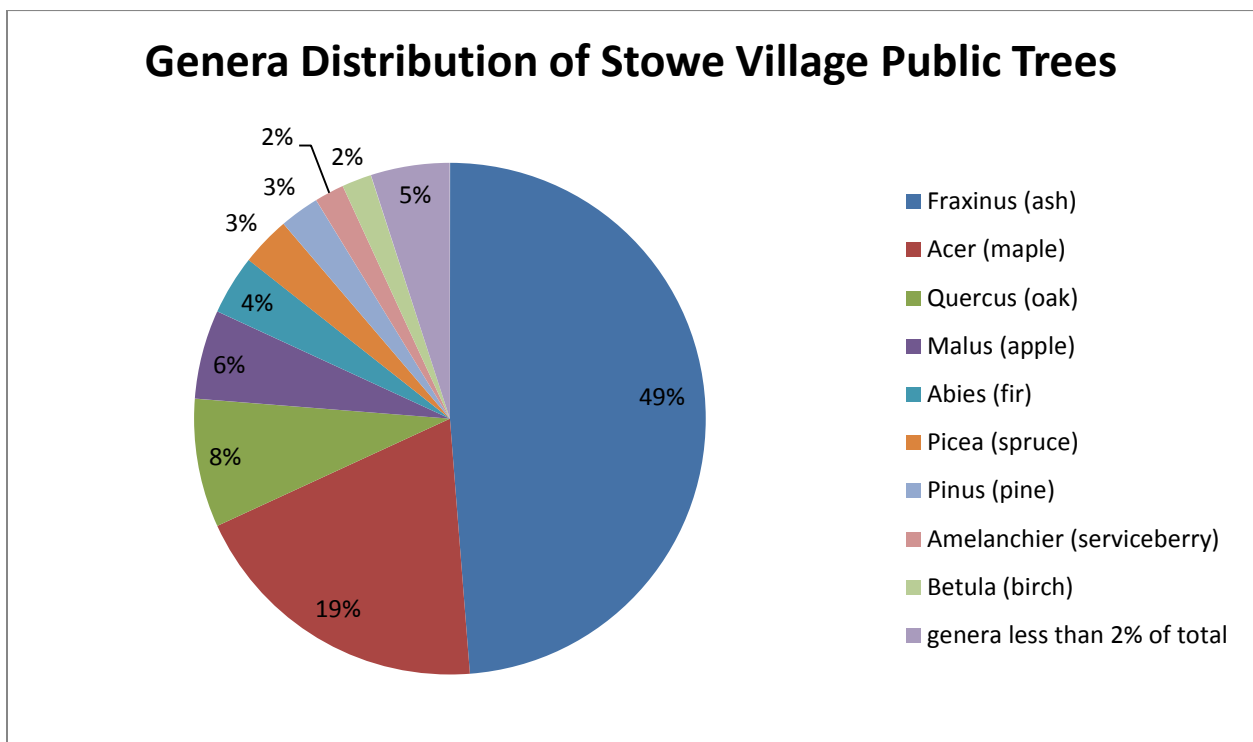


Figure 1: Genera distribution of Stowe’s public trees.

## Species Distribution of Stowe Village Public Trees

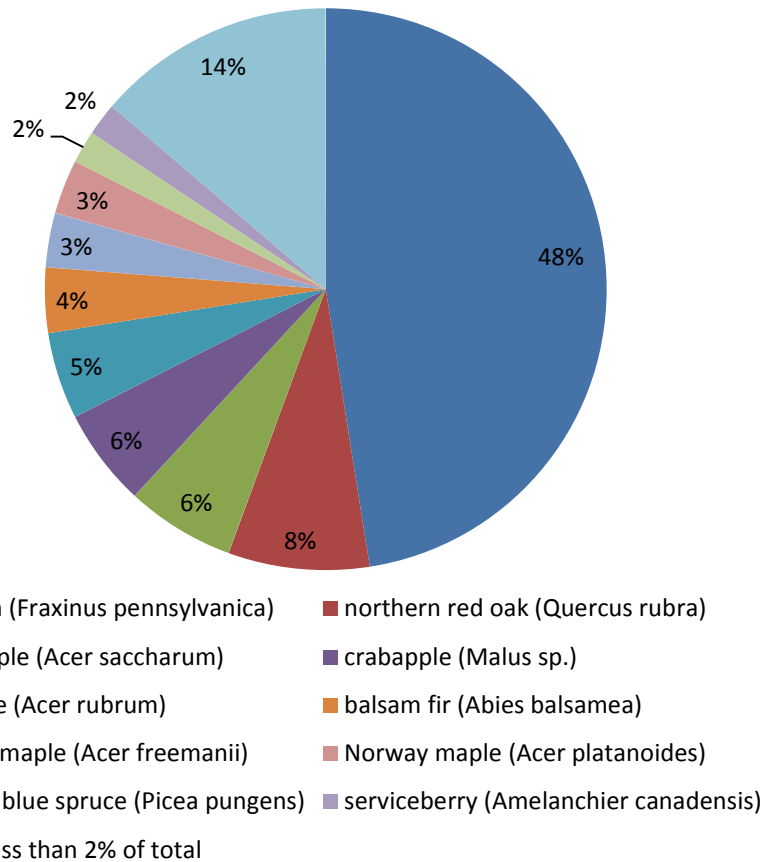


Figure 2: Species distribution of Stowe's public trees.

### Community Forest Structure

- Two-thirds (67%) of the inventoried public trees (107) in Stowe have a diameter at breast height (DBH) measurement between 6" and 18" (Figure 3).
- The remaining 53 trees are represented in the following size classes: 0-3" (10), 3-6" (27), 18-24" (9), 24-30" (4), 30-36" (2), 36-42" (1) (Figure 3).
- The largest public tree inventoried was a sugar maple on Main Street
- Figure 4 below shows the diameter distribution of all trees in the *Fraxinus* (ash) and *Acer* (maple) genera. Of note is that there are no *Fraxinus* or *Acer* trees in the smallest size class, indicating that no new trees in these genera have been planted recently. However, the

large number of *Fraxinus* trees in the 6-18" size range indicate that at some point, a large number of ash were planted in Stowe Village. Currently, Vermont is under the threat of EAB, an invasive forest pest that feeds on ash trees and, unless treated, causes mortality of ash trees. Stowe leaders and decisions-makers are encouraged to be prepared and to plan for the arrival of EAB.

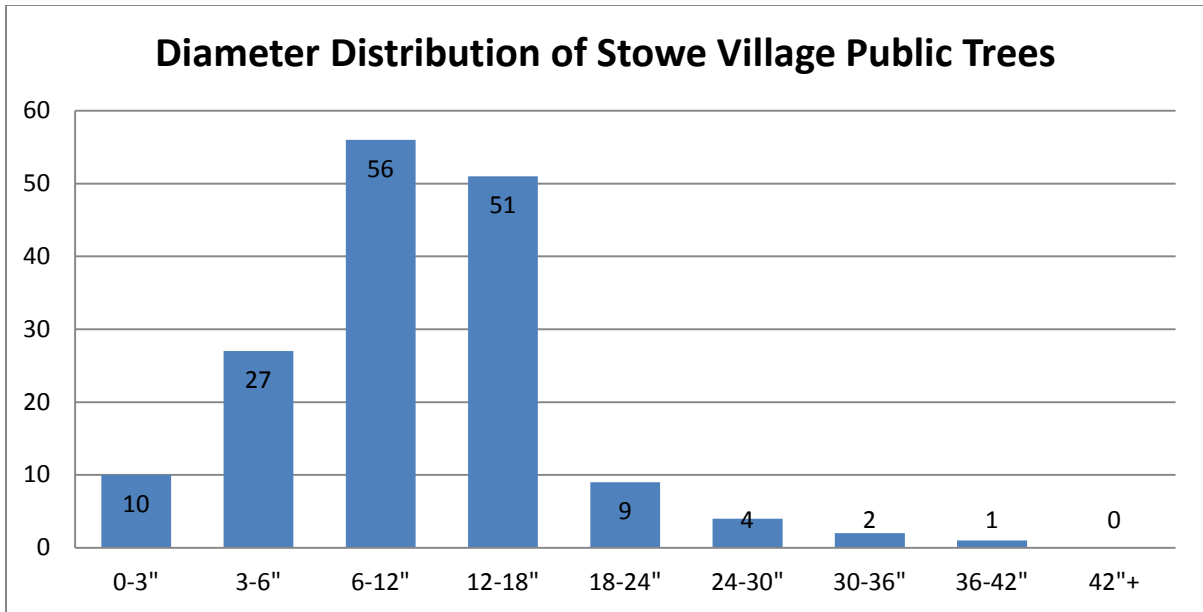


Figure 3: Diameter distribution of Stowe's public trees.

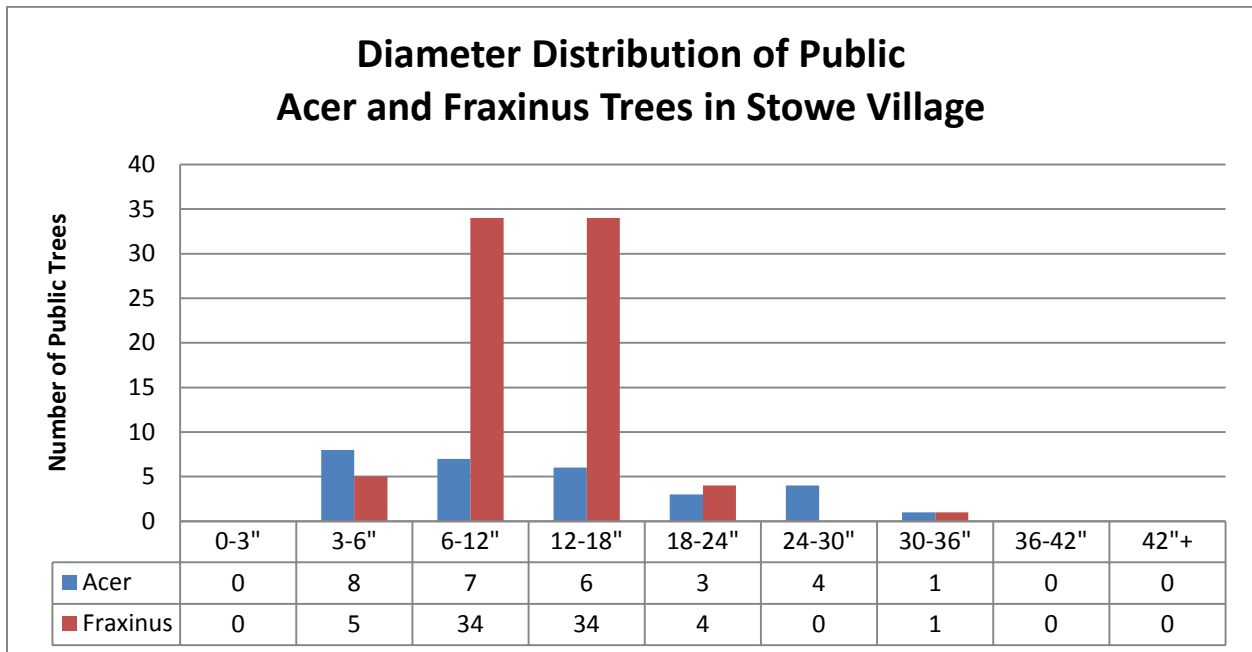


Figure 4: Diameter distribution of *Acer* and *Fraxinus* in Stowe's public tree population.



## Community Forest Health

- The majority of Stowe’s public trees (115, or 72%) were assessed as being in “Good” condition. Of the remaining trees, 31 (19%) were considered to be in “Fair” condition, 11 (7%) were in “Poor” condition, and 3 (2%) “Dead” trees were inventoried (Figure 5).
- 36 (23%) public trees were assessed to be in need of monitoring by a Certified Arborist, the Stowe Tree Warden, or another qualified individual (Figure 6). Trees that were flagged as in need of monitoring expressed one or more of the following conditions:
  - The tree has a visible defect affecting >40% of the tree,
  - The tree poses a hazard to people/infrastructure/cars,
  - The tree is growing into utility wires, or
  - The tree is dead or in poor condition.
- 56 (35%) of the public trees were assessed to be in need of pruning (Figure 6).
- 45 (28%) of the public trees were assessed to have too much mulch piled up against the trunk of the tree. This condition, termed a ‘mulch volcano’, leads to excess moisture at the trunk of the tree and can lead to decay, introduction of pests and pathogens, and stem-girdling roots that cut off the vascular system of the tree. Volcano mulching is a cultural practice that promotes poor tree health. Mulch should be applied 2-3” thick under the crown of the tree but should be pulled away so that it is not touching the trunk (Figure 6).

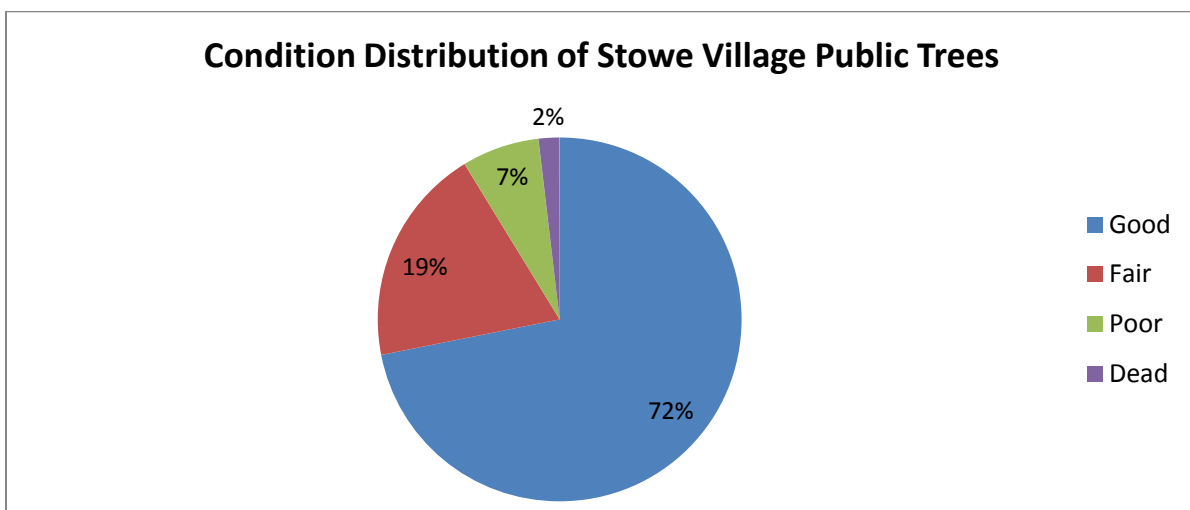


Figure 5: Condition class distribution of Stowe's public trees.

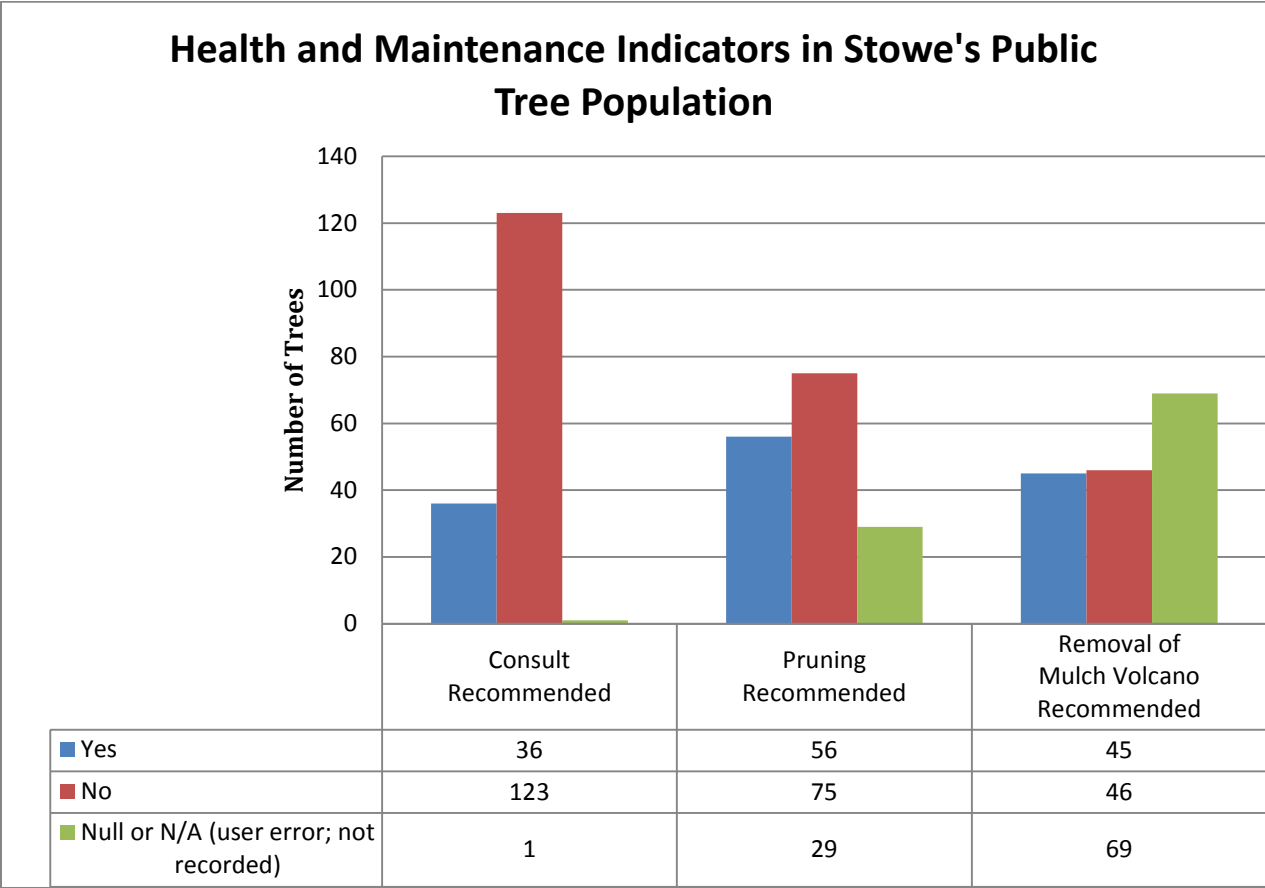


Figure 6: Maintenance needs and health indicators of Stowe's inventoried public trees.

**Recommendations**

A healthy public tree population is contingent upon proper management, stewardship, and a municipality’s commitment to understanding and maintaining its urban and community forest. A comprehensive public tree inventory is an important piece of a vibrant community tree program. Based on the results of the Stowe public tree inventory, our priority recommendations are:

- Prioritize the timely assessment and, if needed, maintenance of the 36 trees that were identified as in need of monitoring by a Certified Arborist or the Stowe Tree Warden.
- Remove the mulch volcanoes from the 45 public trees; this is a simple maintenance activity that can greatly improve the health and vibrancy of the trees. Train those at the

municipal level whose job it is to mulch these trees that the cultural practice of volcano mulching is detrimental to the health of the trees.

- Prioritize the timely removal of the three dead public trees included in the inventory and, if appropriate, replace them. The three dead trees are located at the elementary school, Memorial Park, and at the rec path parking lot.
- Consider the 11 potential tree planting locations, for the most part along Park Street, that were identified in the inventory as possible spots for future tree plantings.
- Promote species and structural diversity in Stowe's public tree population. Planting new species and increasing the number of lesser represented species in order to promote long-term health and resilience of individual trees and Stowe's overall tree population. Refer to VT UCF's Tree Selection Guide at [vtcommunityforestry.org/resources/tree-care/tree-selection](https://vtcommunityforestry.org/resources/tree-care/tree-selection).
- 90% of Stowe's public tree population is less than 18" in diameter. As Stowe's public trees mature, promote their health and integrity with a systematic structural pruning and maintenance cycle.
- Prepare for the arrival of EAB by developing a strategic EAB community preparedness plan. Refer to the VT UCF website for resources and guidance in the community preparedness process and considerations.

## **Conclusion**

Trees in our downtowns and densely populated landscapes contribute to environmental integrity, social cohesiveness, economic activity, cultural heritage, and overall well-being. This report should help the leaders and citizens of Stowe to understand, manage, and steward the town's public tree population. The recommendations outlined in this report should be considered by Stowe municipal leadership based on long-term vision and capacity. With improved monitoring, regular maintenance, and an engaged and informed citizenry, the potential for a healthy, sustainable community forest is attainable.

## **Appendix A: Instructions for Accessing Public Tree Data in ANR Atlas**

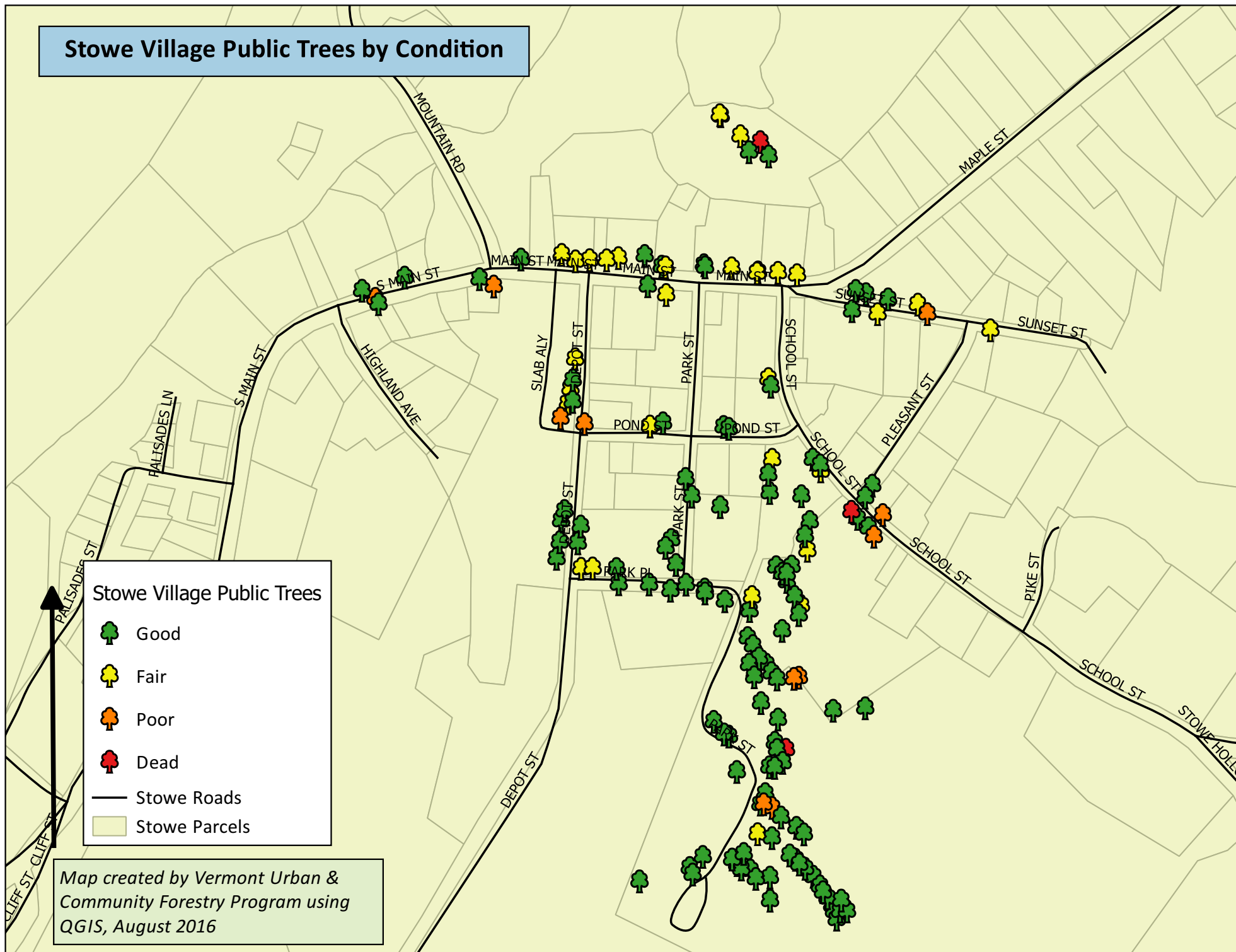
Anyone with Internet access can view all of Stowe's inventoried public trees by using the Vermont Agency of Natural Resources' (ANR) Atlas mapping tool. Follow these simple steps:

1. Set your web browser (Internet Explorer works best, Chrome does not work) to <http://anrmaps.vermont.gov/websites/anra/> (or search "VT ANR Atlas").
2. Zoom in to Stowe using the +/- scale navigation tool in the upper left portion of the map (the tree data layer won't show up unless you are zoomed in to the city-level so that you can see the street names on the map).
3. In the information pane on the left of the screen switch to the "map layers" tab at the bottom.
4. Expand the "Forests, Parks, & Recreation" heading,
5. Click on the box to the left of "Urban Tree Inventory" to load public tree data (it might take a moment for the layer to load).
6. Once you see all the trees on the map, you can zoom in and right-click on any individual tree and click on "What's here"; when you do this, the left information pane will change to give you the basic details for that specific tree.
  - o To access all of the information collected on that specific tree, click on the grey text title of the tree in the left pane and a new window will open with the inventory data.
  - o In this new window there are three tabs: "Details" and "Attributes" display the same information in different formats and if a photo was taken of the tree, it will show up in the "Attachments" tab.

## **Appendix B: Maps**

1. Stowe public trees by condition class
2. Stowe public trees by diameter distribution
3. All ash (*Fraxinus*) public trees inventoried in downtown Stowe
4. All Stowe public trees identified to be in need of monitoring
5. All Stowe public trees identified to be in need of pruning
6. All Stowe public trees identified to be in need of removal of mulch volcanoes
7. Potential tree planting locations (“Vacant”) identified in downtown Stowe









# Stowe Village Public Trees by Condition



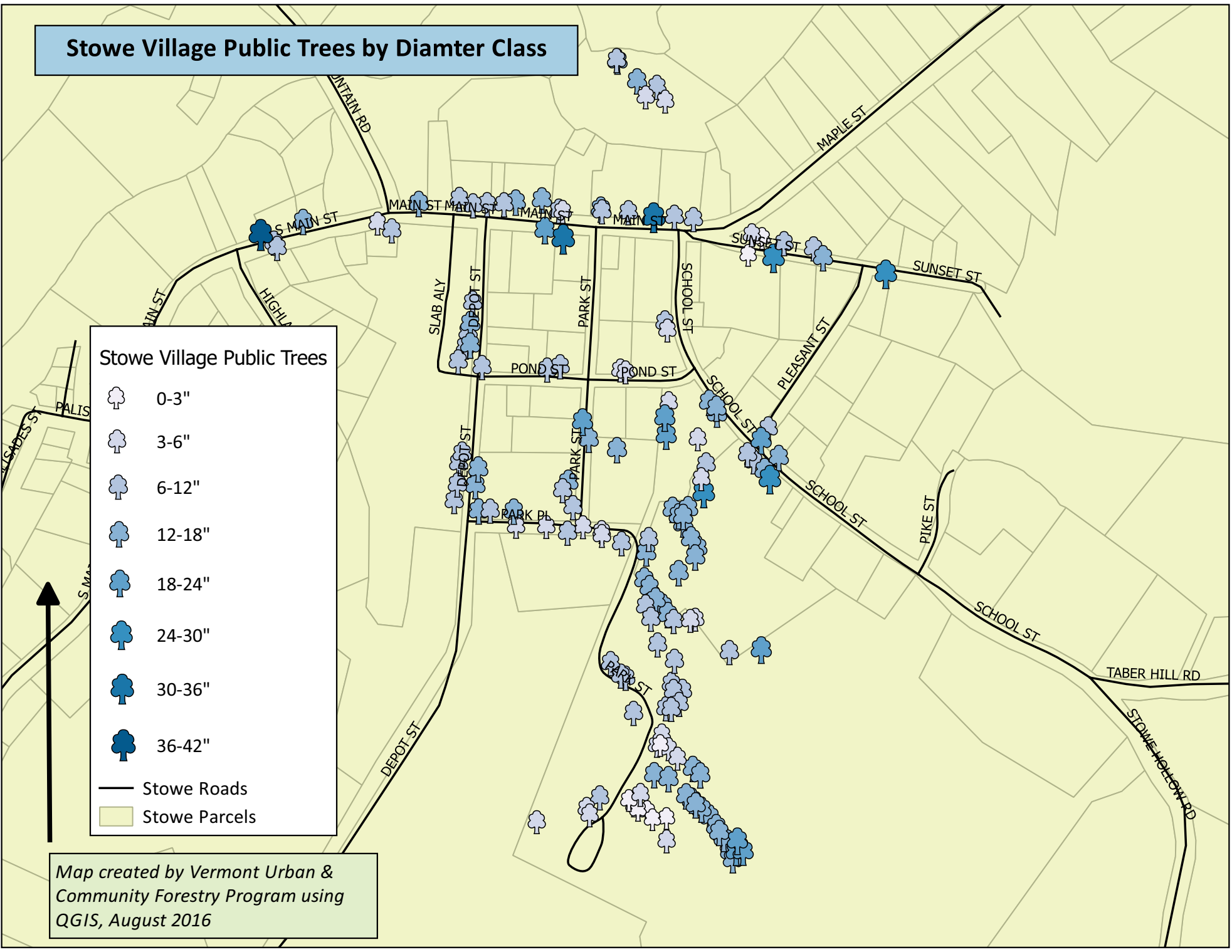


# Stowe Village Public Trees by Diamter Class

**Stowe Village Public Trees**

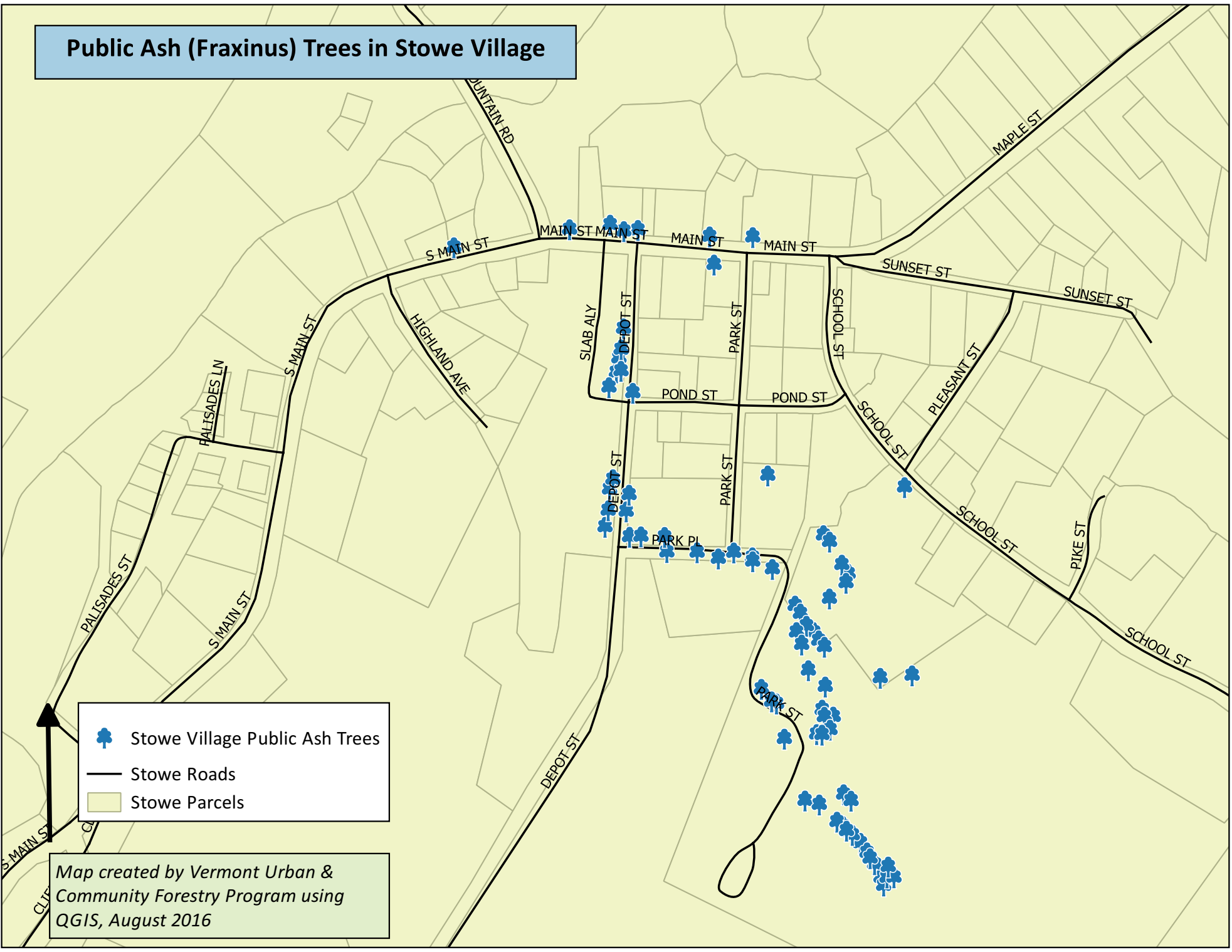
-  0-3"
-  3-6"
-  6-12"
-  12-18"
-  18-24"
-  24-30"
-  30-36"
-  36-42"

— Stowe Roads  
 ■ Stowe Parcels



Map created by Vermont Urban & Community Forestry Program using QGIS, August 2016

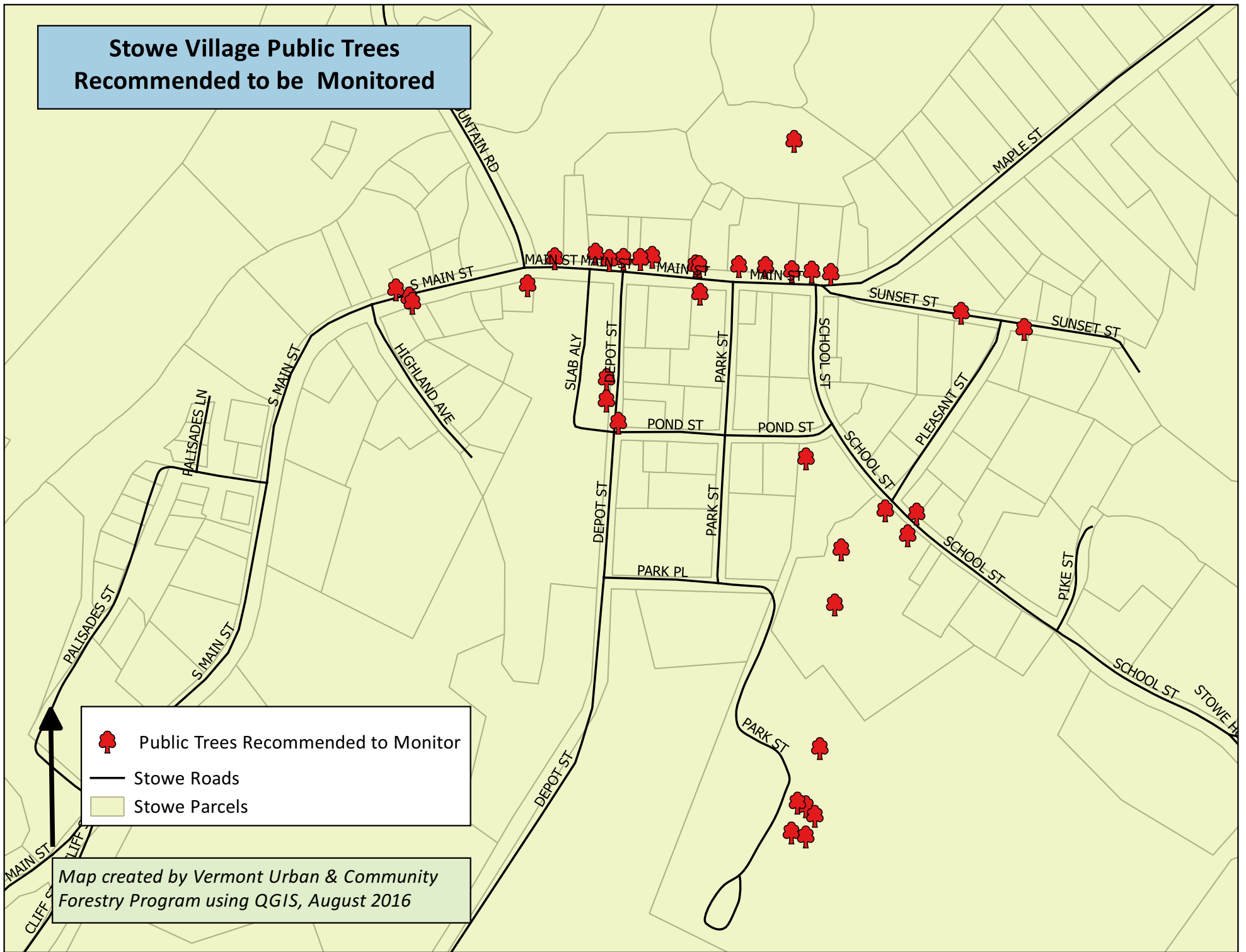
# Public Ash (Fraxinus) Trees in Stowe Village



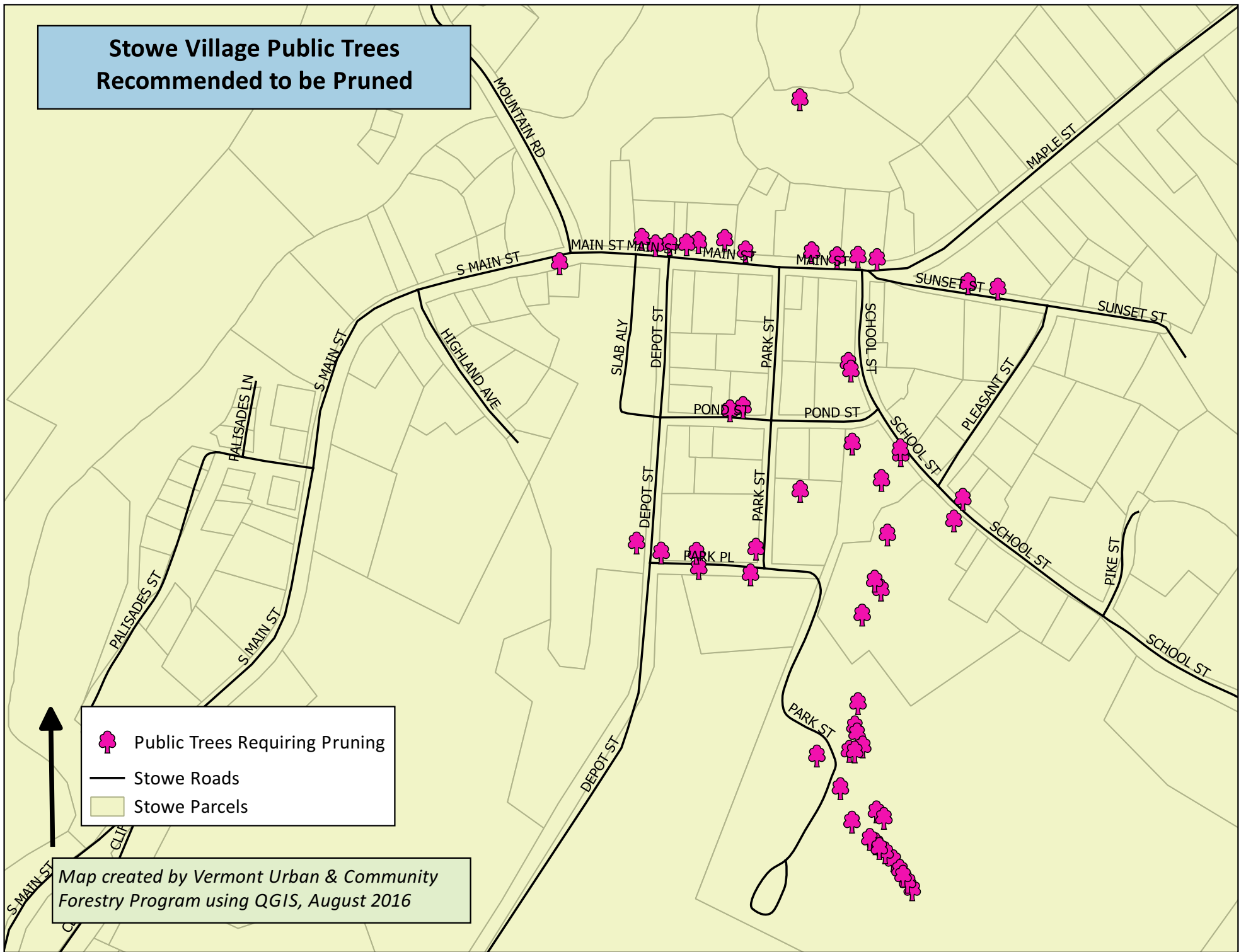
-  Stowe Village Public Ash Trees
-  Stowe Roads
-  Stowe Parcels

Map created by Vermont Urban & Community Forestry Program using QGIS, August 2016

# Stowe Village Public Trees Recommended to be Monitored



# Stowe Village Public Trees Recommended to be Pruned



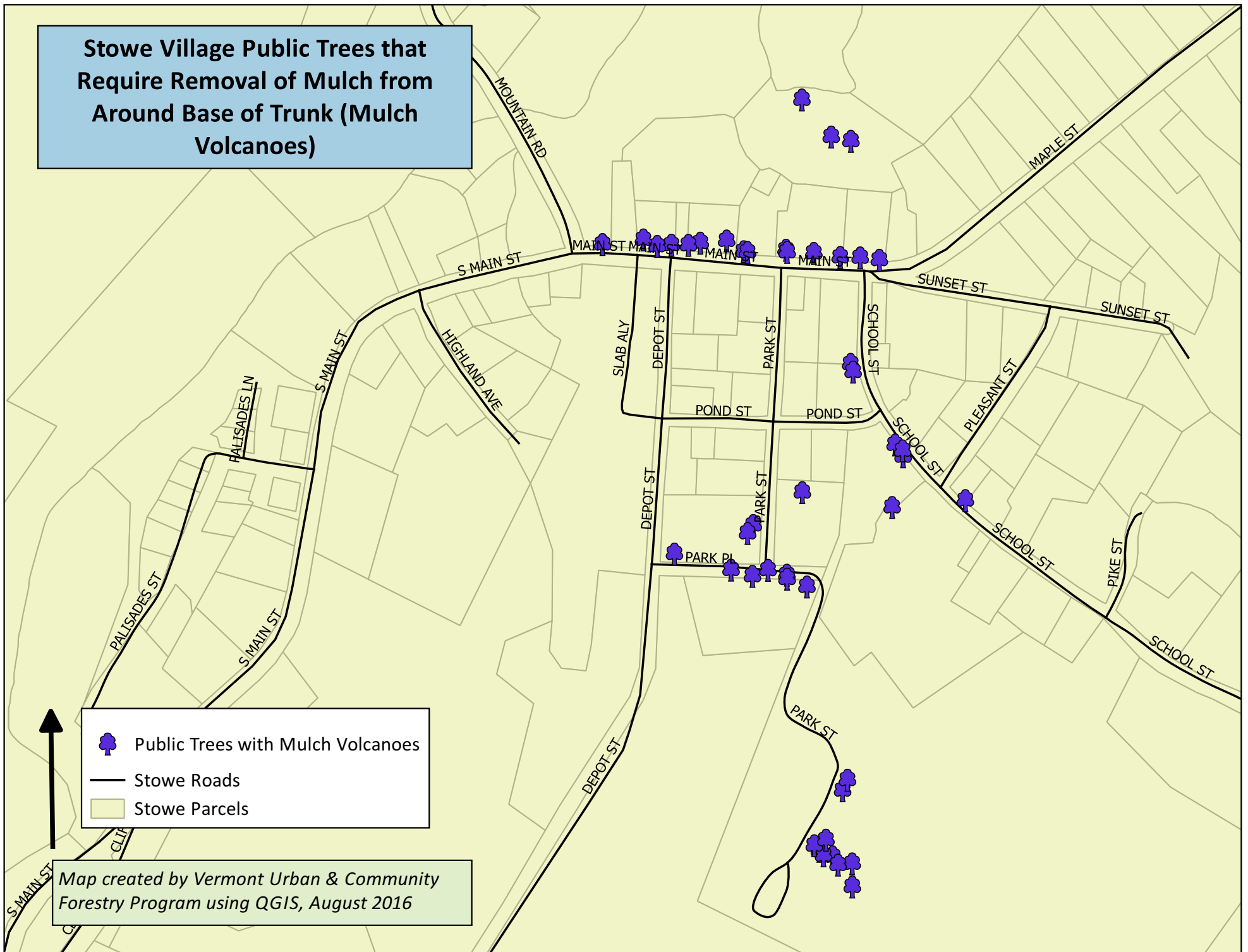
 Public Trees Requiring Pruning

 Stowe Roads

 Stowe Parcels

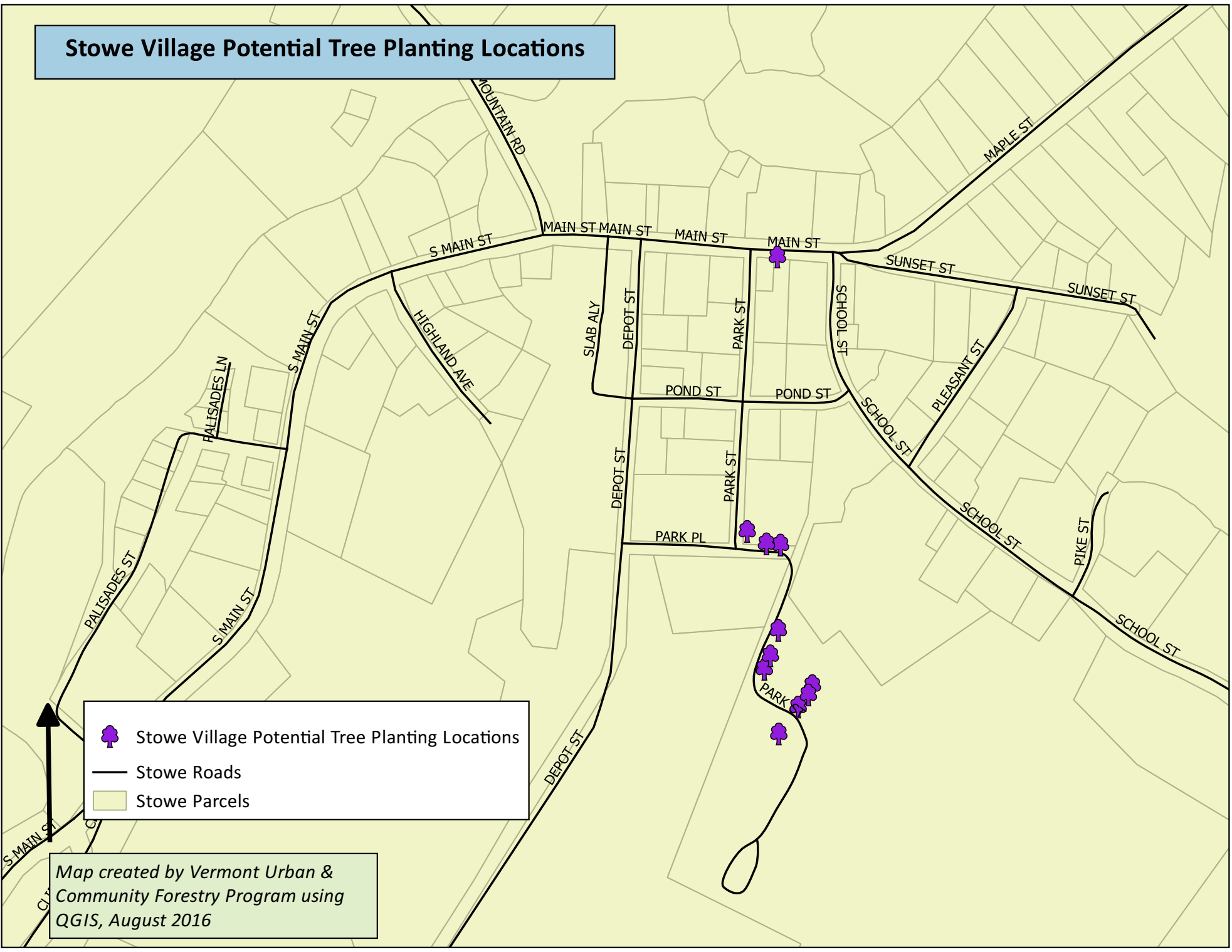
Map created by Vermont Urban & Community  
Forestry Program using QGIS, August 2016

**Stowe Village Public Trees that  
Require Removal of Mulch from  
Around Base of Trunk (Mulch  
Volcanoes)**





# Stowe Village Potential Tree Planting Locations



Map created by Vermont Urban & Community Forestry Program using QGIS, August 2016