

The Question of Siting

An Industrial Wind Turbine Installation

In the Town of Windham, Vermont

by
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Introduction:

Vermont towns are required to update Town Plans every five years. The Town of Windham is in the process of adopting a new Town Plan, in which the energy and natural resources sections have been substantially updated and strengthened.

Windham's current Town Plan prohibits industrial wind development. The Town of Windham Planning Commission did its own investigation of the consequences of such development after learning that the owner of an approximately 3000-acre tract in Windham known as the Stiles Brook (SB) tract had invited a wind developer to install turbines on the tract. The Planning Commission concluded that the SB tract is inappropriate for such development, and improved measures to protect the Town of Windham, its citizens, and its lands.

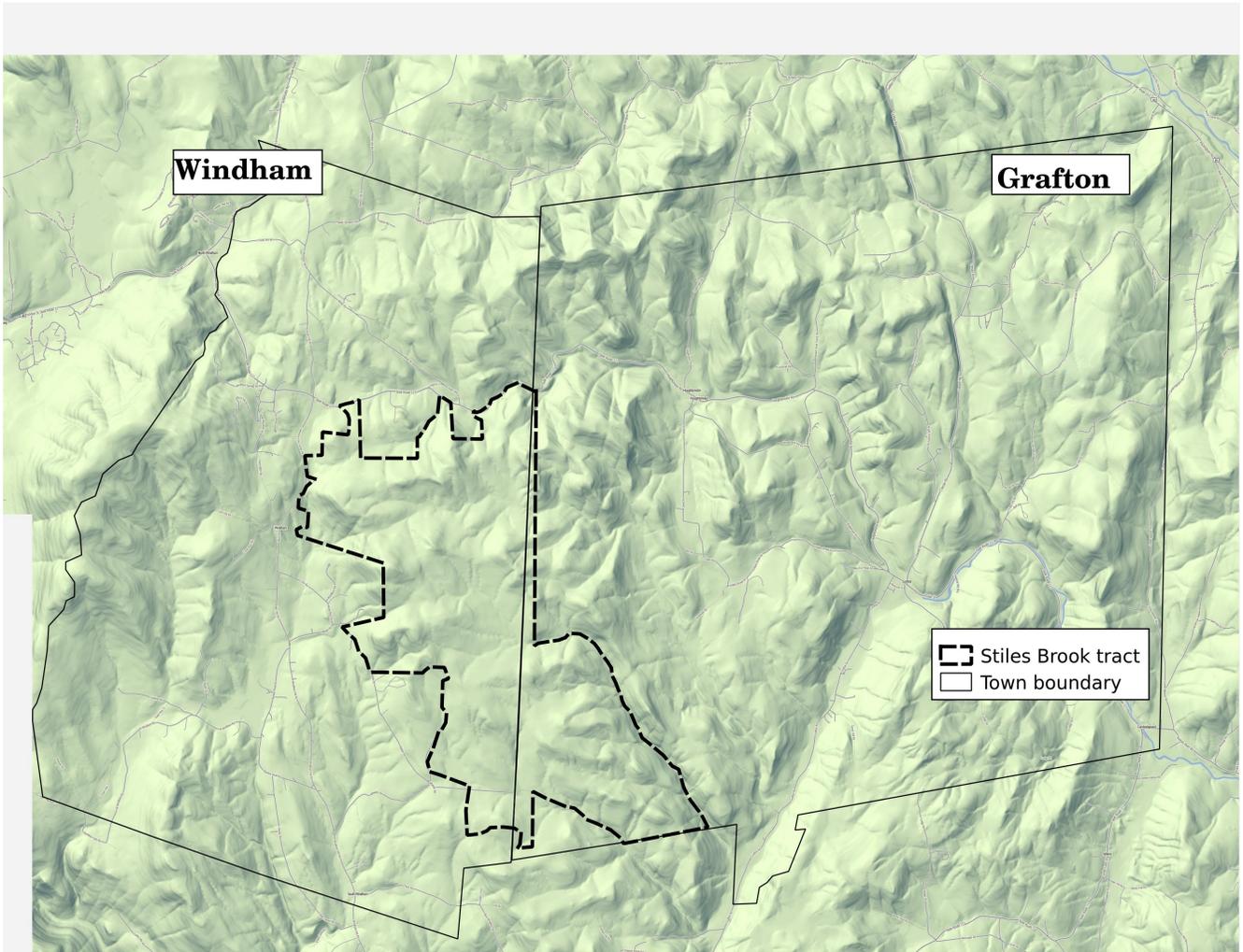
When a town is confronted with a possible industrial wind installation, the questions most likely to arise are:

- **Where will the turbines be located?**
- **How many will be erected?**
- **What will it mean for us as a town?**

Wind developers generally do not answer these questions. As a result, citizens are asked to support a project about which they know very little. Town officials decided to conduct their own analysis to help them consider probable consequences of an industrial wind installation. They also wanted to compare the Town of Windham to other sites with such installations. They examined terrain, wind resource, location of buildings, and presence of natural features in the Town of Windham and surrounding towns. They used a variety of data sources, including the Vermont Center for Geographic Information; the National Renewable Energy Laboratory; the US Geological Survey; and 911 data for the states of Vermont and Maine. (Note: the state of New Hampshire did not have available comparable 911 data at the time of this analysis, otherwise it would have been included.)

The Planning Commission and other Town officials concluded that the SB tract is *not* appropriate for industrial wind development, as explained in the following maps and supporting narrative.

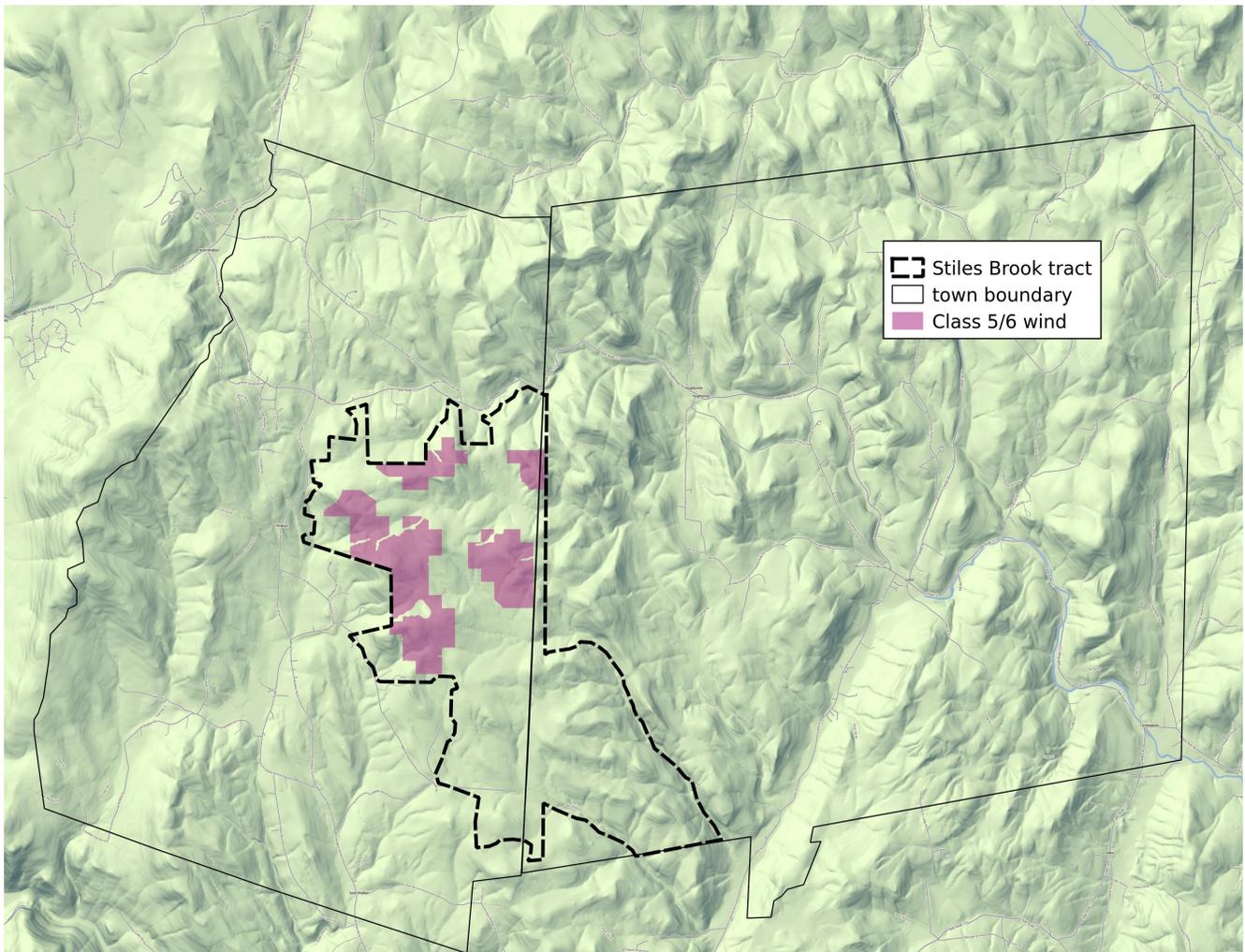
Map 1: Location of the Stiles Brook Tract in Relation to the Towns of Windham and Grafton



Map 1

Map 1 shows the towns of Windham and Grafton and an outline of the SB tract, parts of which lie in each town.

Map 2: Location and Magnitude of Wind Energy in Windham and Grafton

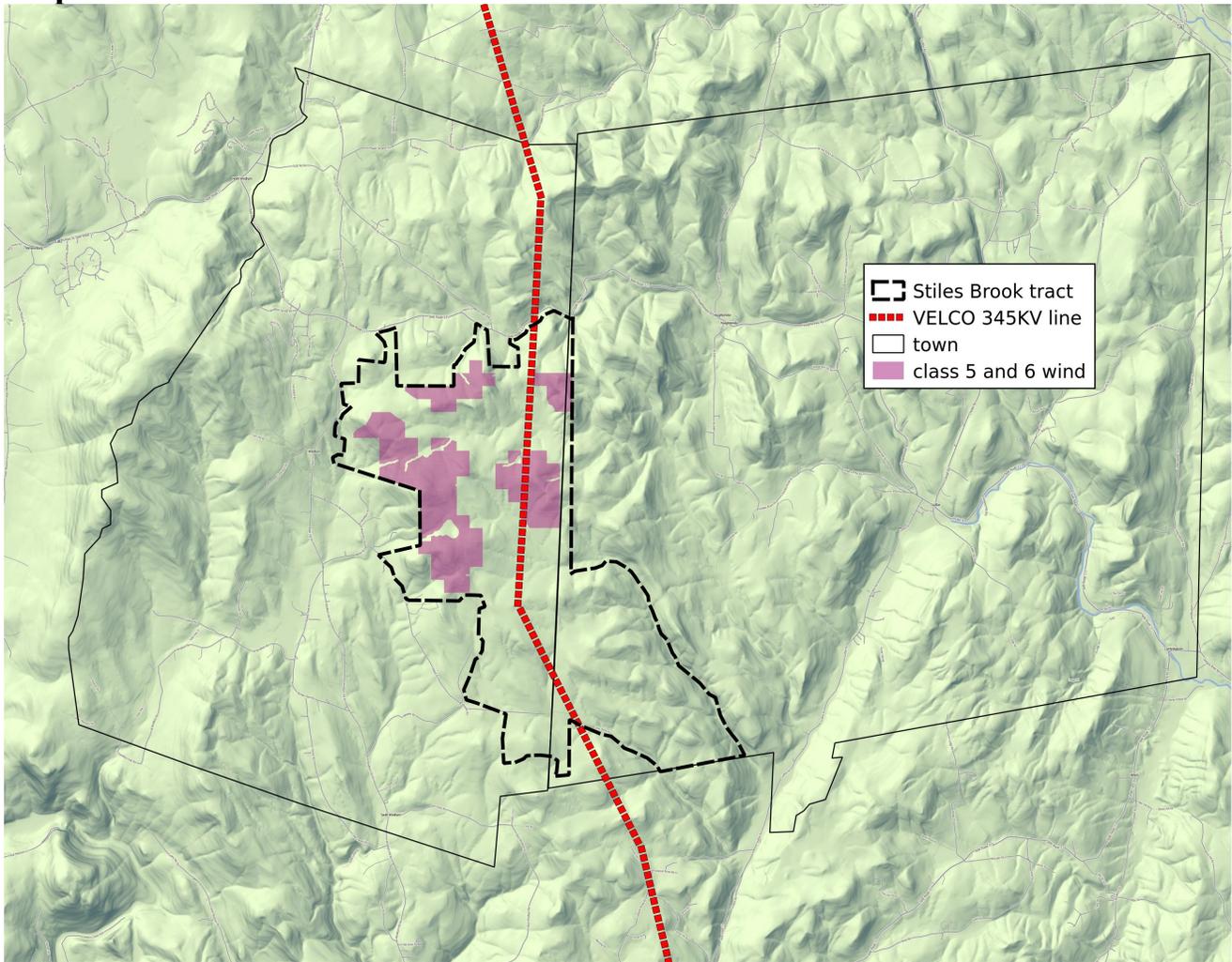


Map 2

Map 2 shows wind energy data produced by the National Renewable Energy Laboratory. Note that wind energy is generally classified as class 1 (low) through 7 (high). Map 2 shows where there are class 5 and 6 wind on the SB tract. (There is no class 7 wind on the SB tract.)

It should also be noted that an examination of wind installations at Lowell and Sheffield, VT and nine installations in Maine showed that turbines are always located on or in close proximity to the highest elevations.

Map 3: VELCO Transmission Line



Map 3

Map 3 adds the 345 kilovolt (kv) VELCO transmission line to the preceding map.

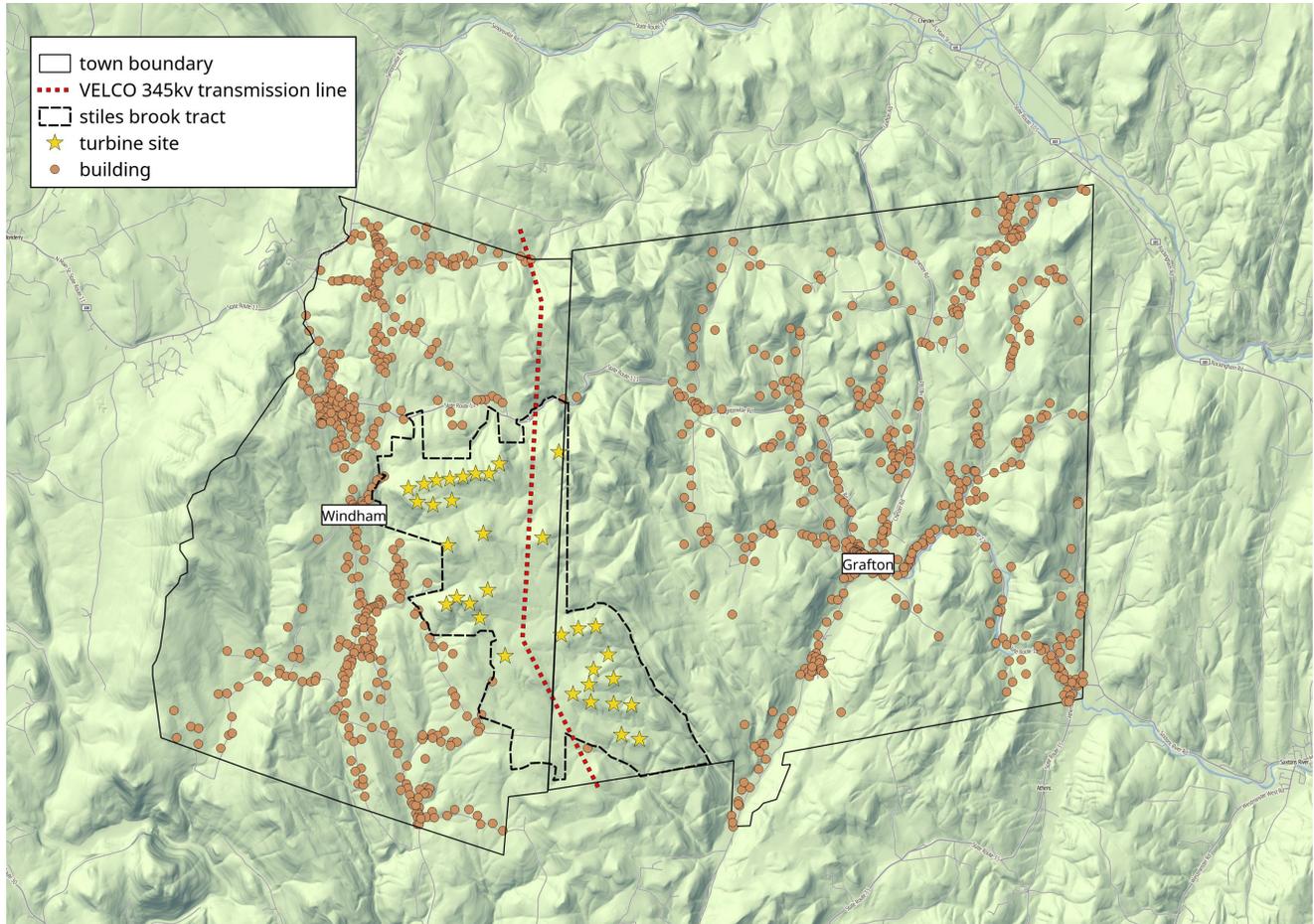
The transmission line bisects the SB tract near the Windham/Grafton border with potentially important consequences for the Town of Windham. The area of the SB tract available for wind turbines on Windham's eastern flank would likely be curtailed for safety reasons: turbines can throw ice 1300 feet or more, making it probable that VELCO would require a safety setback. Such a setback would preclude turbine placement in the northeast area of the SB tract. For this site to be economically viable the developer would have to place turbines on the highest elevations where the class 5 and 6 winds are found on this site.

Cost considerations will be paramount in the development of the SB tract because the developer must pay for costly equipment to boost generated electricity to 345 kv or more in order for power to flow onto the VELCO transmission line. Tom Dunn, VELCO's CEO said in June 2014 interview with VermontBiz.com magazine said "I think we're in a state of equilibrium now, where the amount of wind

works for the system that we have. For the next project that shows up, their basic interconnection costs are going to be pretty expensive, I believe. But perhaps more importantly, if they decided to pay for those interconnection costs, and we're talking tens of millions of dollars...”

This suggests that for the site to be economically viable it would have to be thickly populated with the largest possible turbines. Installations of which will require extensive roadwork and foundation building which will exacerbate runoff and erosion.

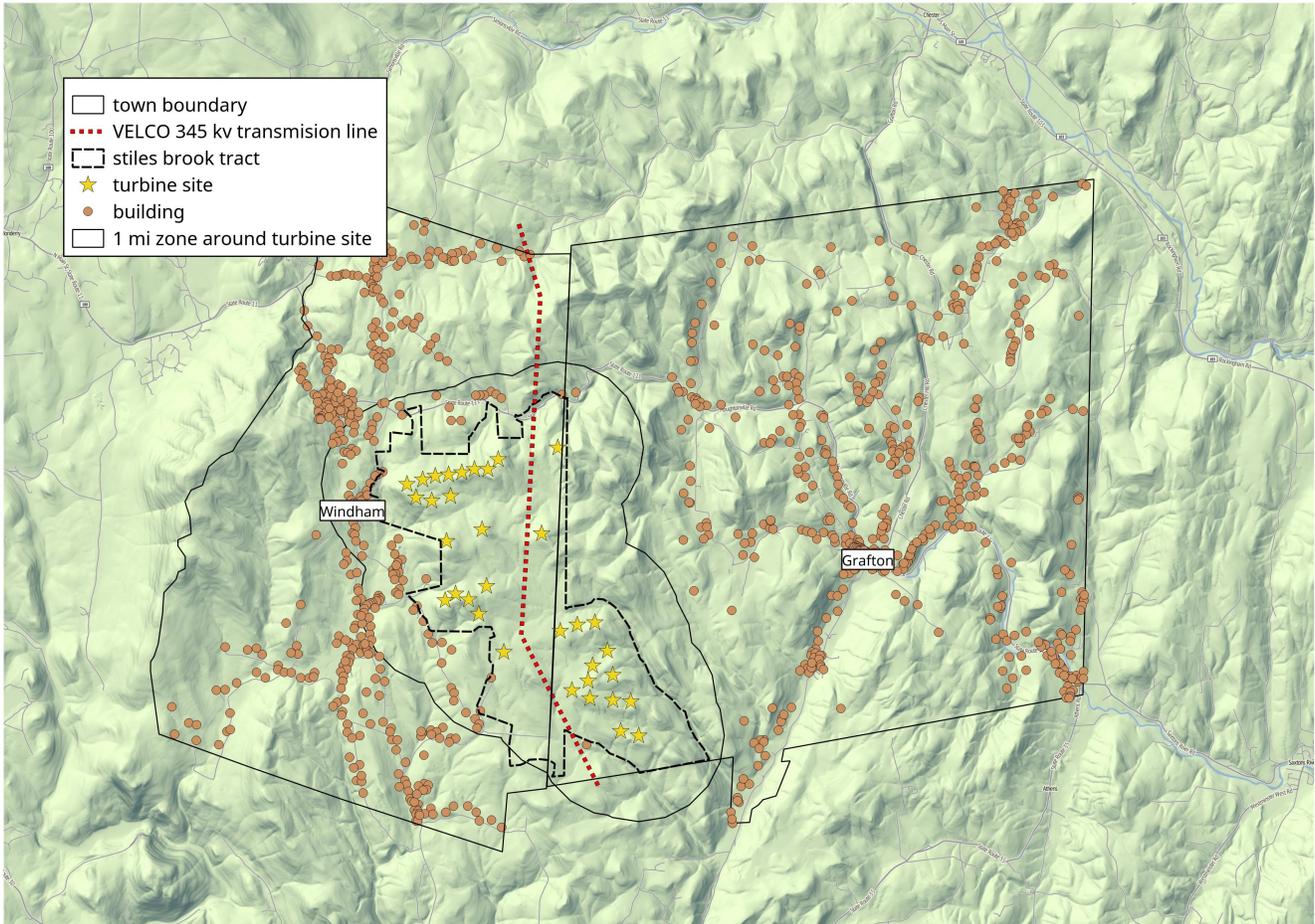
Map 4: Location of Buildings and Projected Wind Turbines in the Towns of Windham and Grafton



Map 4

Map 4 shows the most likely placement of wind turbines, on the basis of wind energy data. (A 1000ft grid was overlain on the site to guide turbine spacing) A 30ft wide road would be created along the ridgelines, connecting the turbines and used for installation and ongoing maintenance.

Map 5: One-mile Zone Around Projected Wind Turbines on the SB Tract



Map 5

On this map, a line has been drawn around the projected turbine-installation area at a distance of one mile, to show number of buildings in the Windham and Grafton that would be near the turbines.

Figure 1: Number of Buildings Within One Mile of Industrial Wind Turbines in Maine and Vermont

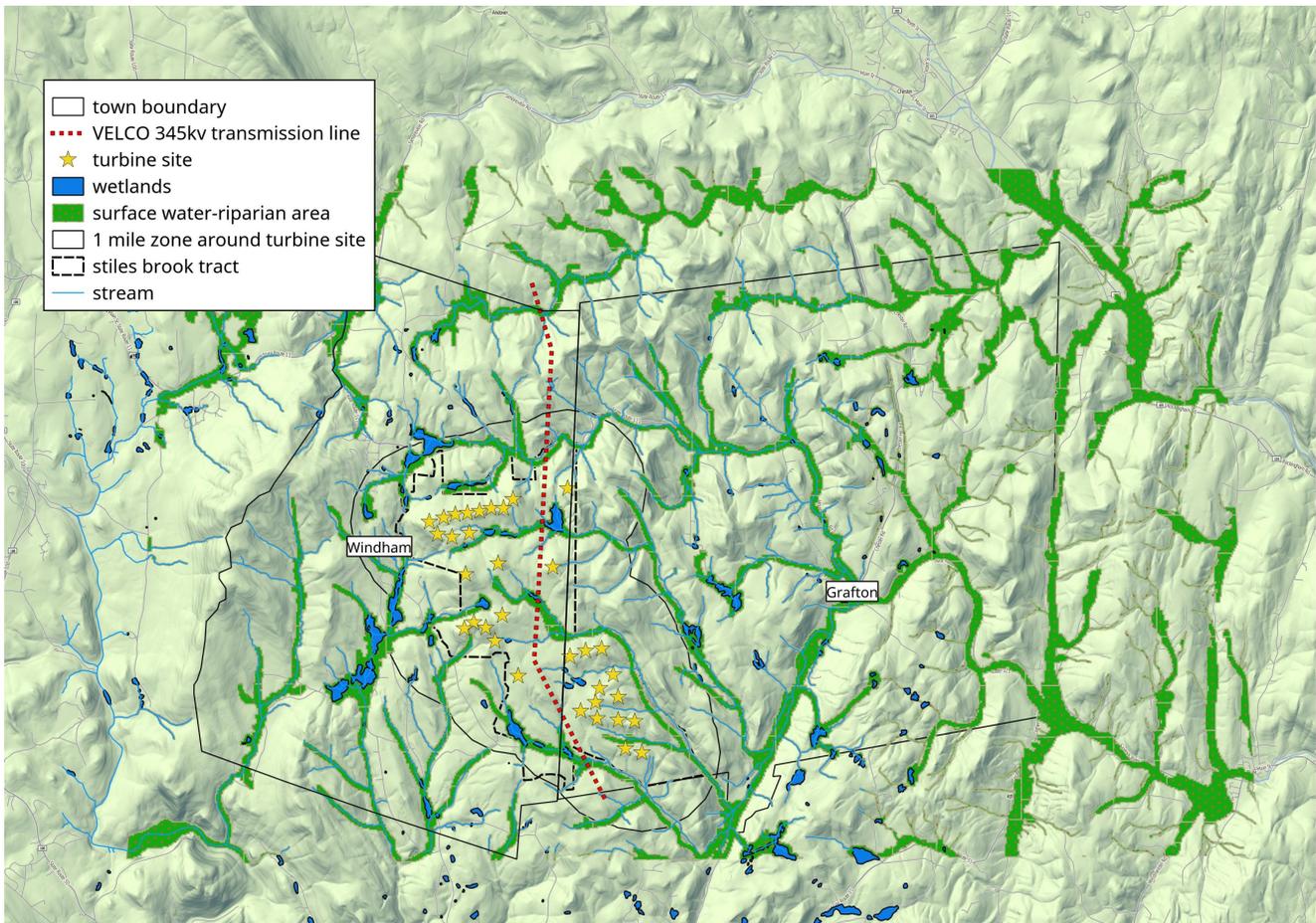
State	Installation	Buildings at One mile
Maine	Mars Hill	24
Maine	Stetson Mt	0
Maine	Rollins Mt	24
Maine	Rollins Mt South	11
Maine	Blue Sky East	2
Maine	Vinylhaven (Fox Isl)	42
Maine	Spruce Mt	11
Maine	Record Hill	6
Maine	Kibby Range	0
Total		120
Vermont	Lowell	18
Vermont	Sheffield	23
Total		41
Total Maine and Vermont		161
Windham	Stiles Brook	111

Figure 1

A one-mile zone was drawn around each of the nine wind installations in Maine, and around the Lowell and Sheffield sites in Vermont. Figure 1 shows the number of buildings lying within the one-mile zone for each site, compared to the number in the Town of Windham.

These data indicate that *Windham would have almost as many buildings lying within one mile of turbines as there are at all nine Maine installations combined; and Windham would have almost 28 times more nearby buildings than at the Lowell, VT site, and nearly five times more than at the Sheffield, VT site.* It should also be noted that approximately 48% of the value in the Town of Windham's Grand List lies within one mile of the SB tract.

Map 6: Natural Features of the SB Tract



Map 6

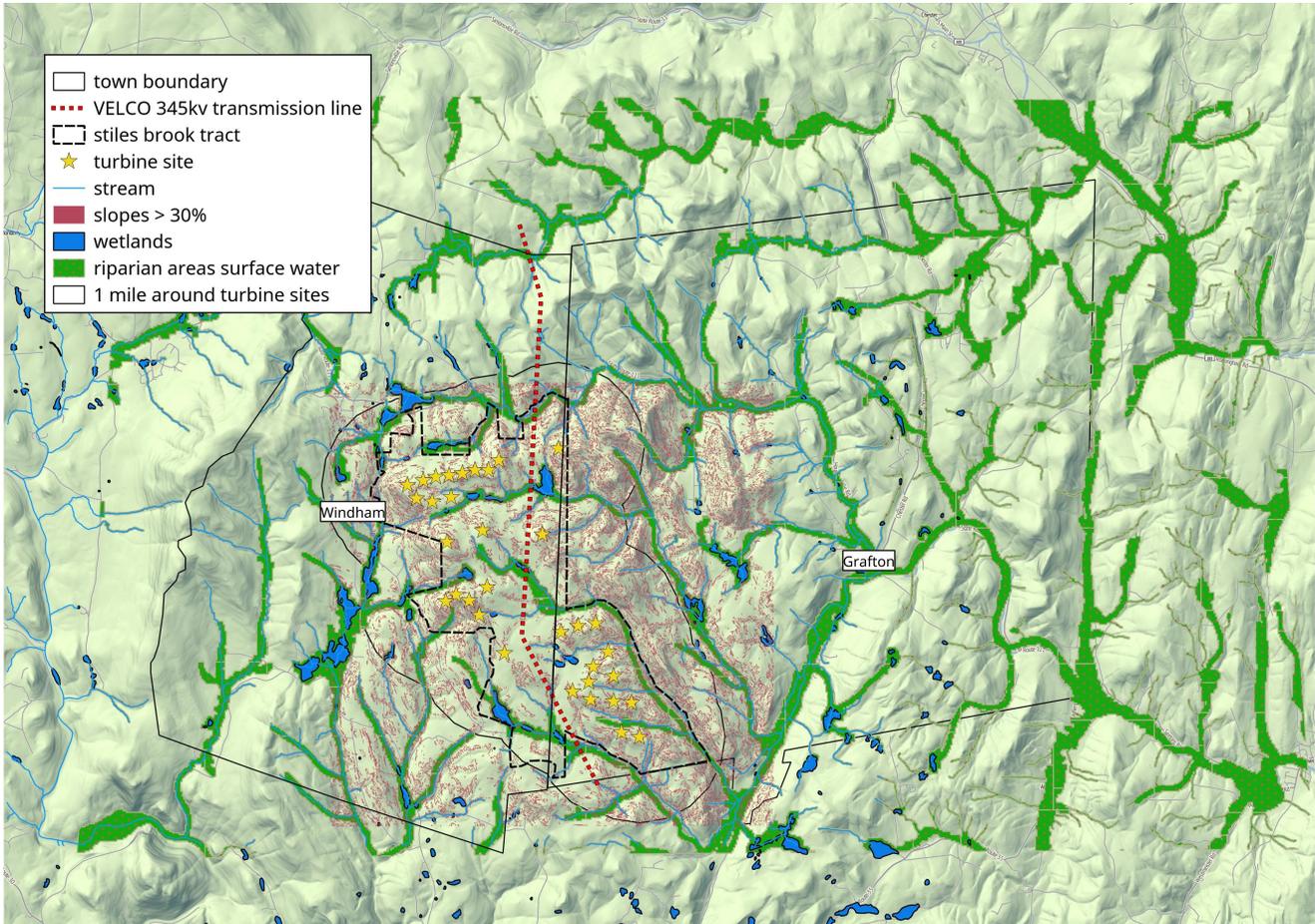
Map 6 shows wetlands and riparian areas on the SB tract and surrounding area. A riparian area is the interface between land and a river or stream. In 2005 Vermont's Agency of Natural Resources (ANR) stated that "Riparian corridors, including stream banks and lake shores, serve vital functions that have significant environmental, economic, and social value."

The Town of Windham has approximately 31 miles of streams and riparian areas within one mile of projected turbine sites. By comparison, the wind installations at Lowell and Sheffield, VT have 16.5 and 18.7 miles respectively. Wind installations require removal of ridge tops and their replacement with impermeable surfaces. The resulting effect on storm-water runoff is important for streams and wetlands, creating thermal pollution, silting, erosion, and abnormal fluctuations in water levels. A visual inspection shows that an immense area of streams and riparian areas lie along the Saxtons River between the Stiles Brook tract and the Connecticut river. Map 6 shows that riparian areas on the Stiles Brook tract may be affected at nearly every potential turbine site and access road. In addition, nearly all of Windham is above 1500 feet in elevation, the highest of any neighboring town; its rivers and streams contribute to three watersheds: the Saxtons, Williams, and West rivers, all of which run through surrounding towns. The north and south forks of the Saxtons river will receive increased runoff from ridgeline destruction on the SB tract and both those forks converge in downtown Grafton which already

has a history of flooding.

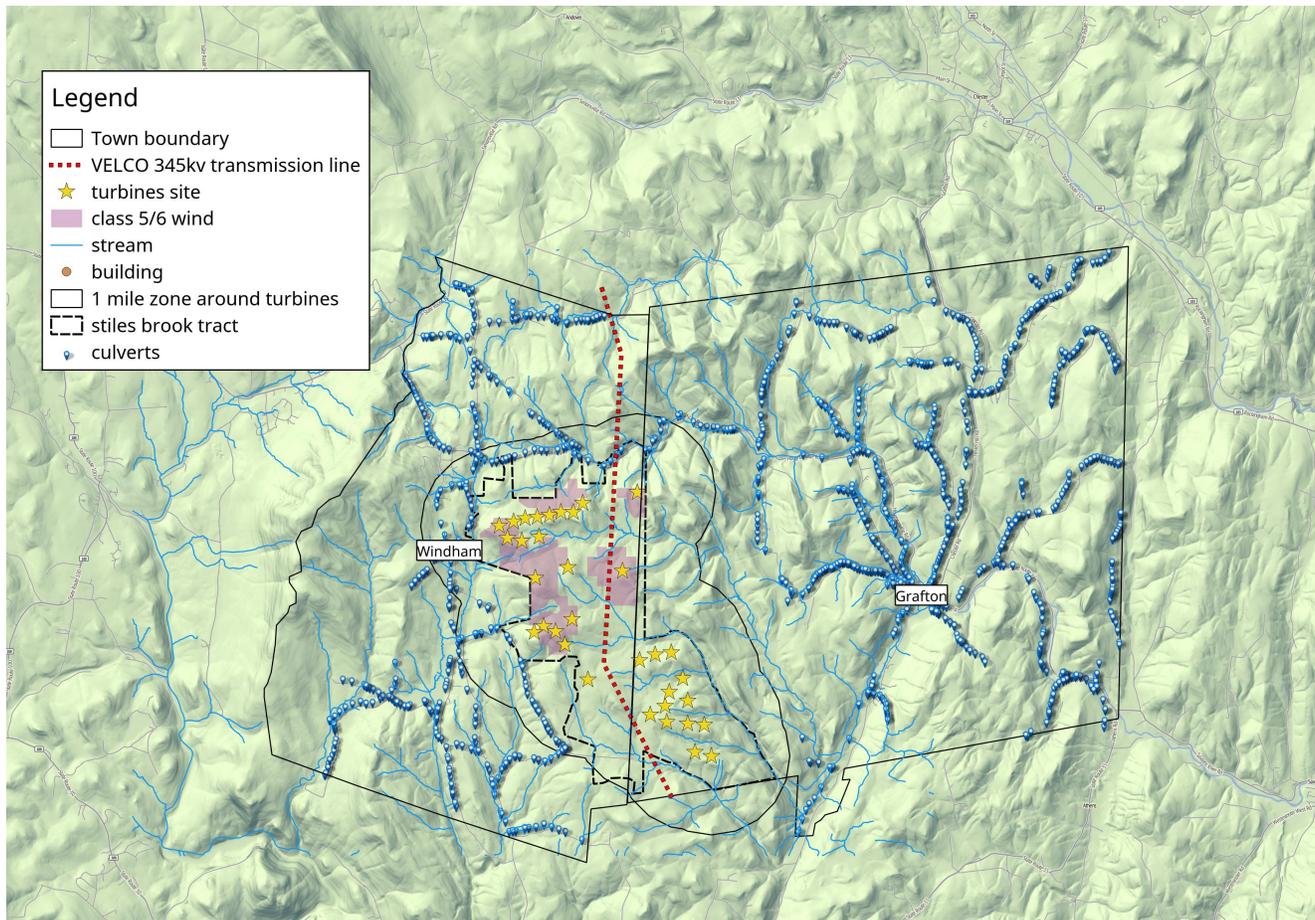
Map 6 also shows that several streams that originate in the projected turbine site run directly under the VELCO transmission line. Runoff from a storm such as Tropical Storm Irene could directly threaten the VELCO transmission line and parts of the New England electricity grid.

Map 6A: Slopes in the area of the SB tract



Most of the slopes on the Stiles Brook site are considered steep (greater than 10%). Map 6a shows slopes $\geq 30\%$ in and around the Stiles Brook tract. The Town Plan prohibits the use of Level Spreaders to control stormwater runoff; the literature reports that Level Spreaders are difficult to install correctly, require constant maintenance and are ineffective on slopes of 30% or greater.

Map 7: Windham/Grafton Roads and Culverts



Map 7

Map 7 shows Windham's roads and culverts in relation to the projected wind turbine siting.

Windham would have 110 culverts (31% of the 359 culverts in Windham) within one mile of turbine sites; by contrast the Lowell and Sheffield sites have, respectively, 0 and 26 culverts within the same distance. Approximately 21% of Grafton's 715 culverts lie along the Saxtons River. Serious damage to roads, culverts, and bridges is a likely consequence of a wind installation on the SB tract due to three factors: Windham's many streams, very steep slopes, and the central location of the most likely site for turbines. Many culverts and miles of Windham's roads would be directly threatened by runoff associated with extensive excavation on the SB tract. The same is true for Grafton. The developer, as a holder of a Certificate of Public Good, would be immune from paying the cost of damage resulting from their development. The ongoing cost to taxpayers for road and culvert maintenance would certainly rise.

Windham's Town Plan and Hazard Mitigation Plan

Windham has road washouts every year, especially during spring snow melt and late summer season rains. Due to the extreme threat posed to our town by flooding and fluvial erosion, Windham officials have done extensive work to develop a protective Town Plan and Hazard Mitigation Plan.

Some recent Windham history:

- 2003 - flood resulting in approximately \$700,000 in damages. The storm all but destroyed Route 121; costs were so significant that the Town had to obtain financial aid from a local bank.
- 2007 - Windham County was part of a Presidentially Declared Disaster associated with severe spring storms and flooding; the Town of Windham shared with the state costs associated with this disaster and local flooding in previous years.
- 2011 - \$718,667 spent to repair extensive damage to Windham's roads and culverts from Tropical Storm Irene.
- Ongoing - Windham continues to seek grants to upgrade culverts and bridges in order to meet new state requirements.
- 2014 – a microburst in July caused approximately \$69,000 in damages.

Windham has taken steps listed by Flood Ready Vermont so that we may be eligible for increased financial assistance following a declared disaster. But the extensive blasting, forest clearing, excavation and road-building required for a wind installation on the proposed site in Windham would present a mitigation problem well beyond the resources and ability of local and state government. Additionally, our knowingly acting contrary to recommended mitigation activities may make Windham and downstream towns ineligible for Federal reimbursement. The Saxtons River rises in Windham and every down-stream town – Grafton, Cambridgeport and Saxtons River – will be place at increased risk for flood damage. One of the other streams running directly off the proposed wind installation site is in the West River watershed, with the same consequences as those described for the Saxtons River.

These are some of the reasons that the Windham town officials thinks that Windham is an inappropriate location for a wind installation.