AVA Petition

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4/28/2022

Alcohol and Tobacco Tax and Trade Bureau
AVA Program Manager
1310 G Street NW, Box 12
Washington, DC 20005

Dear Karen Thornton,

This AVA Petition is regarding the region of Nashoba Valley. The Nashoba Valley region refers to the area in Northwestern Middlesex and Northeastern Worcester Counties, Massachusetts, located around the interchange of Interstate 495 and Massachusetts Route 2.

The Nashoba Valley area has been historically known for the abundance of agriculture. With vast apple orchards, peach orchards and now vineyards. This area is successful in viticulture due to being geographically located between two of the highest elevation points in central Massachusetts. Due to these high elevation areas and not being located near a major body of water, the climate is referred to as hot- summer humid sub continental climate. These hot temperatures during the growing season are comparable to those of Napa Valley according to the Winkler Index and are a key reason viticulture is successful in this area. The Nashoba Valley region also has great soil for viticulture and the soil drains well allowing the soil to handle the high amount of rainfall this region gets.

The mesoscale impact on the Nashoba Valley region compared to surrounding areas greatly alters the climate. Weather, temperature, wind, and humidity are all effected by this valley and are major factors as to how viticulture can be successful in a cold weather growing environment. We hope you consider this petition and agree with our analysis of why the region of Nashoba Valley should be classified as an AVA.

Sincerely,

Justin Pelletier

1. *A proposed name, as well as evidence showing that the name is currently used to describe the region of the proposed AVA.*

Proposed AVA name- Nashoba Valley. The Nashoba Valley region refers to the area in Northwestern Middlesex and Northeastern Worcester Counties, Massachusetts, located around the interchange of Interstate 495 and Massachusetts Route 2.

The name Nashoba Valley is widely used within the region of the proposed AVA. Some examples of businesses utilizing this name are Nashoba Valley Ski Area, Nashoba Valley Tubing Park, Nashoba Valley Winery, and Nashoba Valley Spirits. Other businesses utilizing the proposed AVA name are, Nashoba Valley Chamber of Commerce, Nashoba Valley Regional district dispatch, COWS of Nashoba Valley, Nashoba Valley Fitness, Nashoba Valley Express Co, Nashoba Valley Elder care, Life Care center of Nashoba Valley, Oh- Deer of Nashoba Valley, Nashoba Valley Voice, and the Nashoba Valley Movement. Appendix A

Within this AVA viticulture has proven to be successful. Nashoba Valley Winery planted its first vineyard in 2007 and has been planting more acreage every year. They currently grow Albarino, Cab Franc, Chardonnay, Lemberger, Riesling, Seyval Blanc, St. Croix, and Vignoles totaling roughly 12 acres. AAronap Cellars is another winery participating in viticultural activity within the proposed AVA. To date they have planted two acres of Arandell and two acres of Marquette. Refer to Appendix G to see where these viticultural areas occur within the proposed AVA. This viticultural activity has grown greatly over the last 15 years

2. *A description of the geographic and/or climatic features that distinguish the proposed AVA from the surrounding regions and have an effect on how grapes are grown, along with evidence to support your claims of these distinctive features.*

The proposed Nashoba Valley AVA occupies roughly 18,367.54 acres or 28.699 square miles. This area located between Wachusett Mountain and Nashoba Hill, two of the highest elevations in Central Massachusetts. These two high elevation points create very distinctive features in the Nashoba Valley region. Elevation of this region ranges from 37m to 177m. The mesoscale impact on the Nashoba Valley region compared to surrounding areas effects weather, temperature, wind, and humidity. Being in the more central area of Massachusetts the weaher of this proposed AVA is not nearly as affected by the ocean compared to the eastern part of the state. The climate of the Nashoba Valley region is hot- summer humid sub continental. This is due to the geographical location in the Valley. This region typically has warmer summer months than the western part of the state. The highest average temperature is 82°F which occurs in July, and the average low during the growing season is 49°F in May. Throughout the growing season temperature average between 47°F- 72°F, for a full breakdown of the 5-year average temperatures see Appendix B. The Nashoba Valley region has historically been prime farmland for various crops due to the distinct climate, weather, and soil (Appendix C). Within this AVA viticulture has proven to be successful growing, Albarino, Arandell, Cab Franc, Chardonnay, Lemberger, Marquette, Riesling, Seyval Blanc, St. Croix, and Vignoles. One of the main distinguishing factors of this region is temperature during the growing season. As we look at the Winkler Index of Growing Degree Days for the Nashoba Valley region, the date range of 4/1 to 10/31 over the last 3 years has averaged a total of 1697 Celsius Growing Degree Days which is

higher than the regions North, South and West of this proposed AVA. This would put Nashoba Valley as a region III area compared to the areas North, South and West being region II.

The soil of this area is also a feature which distinguishes the growing environment compared to surrounding areas. Most of this area, as seen in Appendix D, has parent soil of supraglacial till, subglacial till, alluvial deposits and glaciofluvial deposits. A key aspect of successful viticulture/ agriculture in this area is the type of soil found in this area; Paxton Soil which makes up 21.3% of the parent soil material (Appendix E). The Paxton series consists of well drained loamy soils formed in sandy loam eolian mantled material underlain by lodgment (dense) till derived mostly from schist, gneiss, and granite. The soils are very deep to bedrock and moderately deep to a dense contact. Stones have been cleared and slopes are gentle, Paxton soils are well suited to cultivate crops. The main agricultural uses for Paxton soils are apples, corn, and silage. Paxton soils have a high-water holding capacity and are well suited for intensive agricultural and woodland production. The height- water holding capacity is also essential for successful viticulture as it aids in minimizing fungal infections. Soils with poor water holding capacity can cause stagnant water which leads to fungal disease such as rot and mold. Paxton soils also have slowly permeable dense till layers that perch seasonal water tables. These parent materials create soils of mostly sandy loam. For a full soil breakdown refer to Appendix E. Sandy loam typically has good texture, without heavy clods of clay or accumulations of rock. This is the best soil for growing root crops where the roots need unobstructed even soil. This type of soil is great for establishing strong root systems in grape vines to survive the harsher winters in this area. Another key aspect of the Nashoba Valley is the Hydrologic soil groups, as seen in Appendix F. Much of this Nashoba Valley region falls into Group A/B Soil. These soils have a moderate infiltration rate when thoroughly wet. These consist chiefly of soils that are moderately deep to a restrictive layer, moderately well drained or well drained, with textures ranging from fine sand to silt loam. These soils have a moderate rate of water transmission. The Nashoba Valley region receive high levels of rainfall, on average 49 in/ year. This is almost double what the average in Napa is. Having soils that can drain this amount of water is crucial for allowing successful viticulture in this region. This is essential to reduce the amount of mold fungus and potential rot in the vineyard, without well-draining soil the excess water would cause major fungal infections. The Nashoba Valley region is located between two high points in central Massachusetts. This valley greatly alters weather, temperature, soil conditions and separates it from surrounding areas creating an area where viticulture succeeds.

Wind is another important aspect which allows viticulture to be successful in this area. In the springtime, when these new tender shoots and buds can be killed by frost, air movement through the vineyard can stop winter damage from occurring for a few degrees. Between March and May, the wind can, however, be also very damaging. The more intense the wind is, the less quantity of the shoots whose flowers will grow into berries. This will cause a smaller harvest. However, in the summer, when humidity increases, and rainstorms are common, wind and sun can be seen as an antibiotic to the vineyard. Wind and sunlight can speed up the time it takes for the vineyard to dry out causing less potential for molds and mildews to form. Constant light wind can be a very beneficial aspect of the vineyard and is a reason that viticulture can be successful in this proposed AVA, however, very strong wind clearly has an impact on vine productivity,

which can cause extreme damage to new shoots and buds, tattered leaves, and sliced-off shoot tip.

East of Nashoba Hill and this Nashoba Valley proposed AVA, the Atlantic Ocean and Cape Cod Bay greatly affect the climatic features. Cool breezes off these water fronts creates strong winds and influences weather patterns. To the East of this proposed AVA lies the city of Waltham sitting at 13m of elevation. Waltham over a three-year average had 1738 Celsius Growing Degree Days making it also a Region III on the Winkler Index. This area has slightly higher Growing Degree Days than the Nashoba Valley region, however it is not as suited for viticulture. This area is heavily urbanized leaving very little area for farming to occur. This area has a higher average wind speed over a 5-year average. This higher wind average can be attributed to ocean storms often producing gale force winds. These spells of extreme wind drive up the average windspeed in this area. While some wind is a very positive attribute to have in a vineyard, these spells of severe strong winds can cause serious damage to young vines. These gale force wind days, especially early in the season, can destroy buds and new shoots. Strong winds also greatly affect the vigor of the vine. A less vigorous vine will see less flowers turn into berries resulting in a smaller harvest. Winds also can cause broken shoots, tattered leaves, and trellis damage to established vineyards as well. Having successful viticulture in this area with the strong ocean winds can cause it to be very difficult to establish a new vineyard and can cause severe damage to established vineyards. This area also is far more likely to experience severe storms which can lead to flooding. Unlike the Nashoba Valley region, the Eastern part of the state falls into the Hydrologic Soil Group D. These soils have a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of soils that have a high-water table. The Waltham area experiences similar rainfall as the Nashoba Valley region in June and November. With soils not being able to handle the high amount of water, often flooding will occur or in lower elevations water will become stagnant. These factors do not make for a good viticultural area and can lead to fungal disease in the vineyard, damaged young vines and difficulty starting/ operating a vineyard. This area also does not fall into the prime farmland area and consists of towns and urban area.

As you travel West of this proposed AVA region you encounter a different climate. The Western part of Massachusetts, according to the Koppen Climate types, is a warm-summer humid sub continental climate. The town of Barre lays to the West of this proposed AVA and sits at 279m of elevation. In this area the Winkler index for a 3-year average only receive 1548 Celsius Growing Degree Days. This is much lower than the Nashoba Valley region and puts this region into zone II on the Winkler index. Barre has a lower 5-year average temperature during every month of the growing season as well as during the winter. These lower temperatures in the winter/ growing season can lead to much more winter damage and limits the suitable varietals for this area. Another factor is the amount of rainfall this area gets. Unlike the rain shadow created by Wachusett Mountain for the Nashoba Valley region, Barre receives higher average rainfall in June, July, and August. Soil conditions also vary outside of this proposed AVA, this Western area has shallower soil. This has the area fall into Group C of the Hydrologic soil groups meaning they have slow infiltration rate. Barre also falls into the town region of prime farmland soils, meaning there are few areas for agriculture to occur. These shallow soils combined with the high amount of rainfall Barre receives and the lower temperatures does not allow viticulture to be nearly as successful compared to the Nashoba Valley Region.

To the North of the Nashoba Valley area lies Fitchburg. Fitchburg is historically a manufacturing town with very little area left for viticulture to occur putting it outside the prime farmland area according to Appendix C. Fitchburg sits at a much higher elevation than the Nashoba Valley region at 306 m of elevation. This area averages over the last 3 years 1536 Celsius Growing Degree Days, putting this area in Zone II of the Winkler Index. Over a 5 year average this area has a lower average temperature than the Nashoba Region every month (Appendix B). The soils of this area fall into Group C of the hydrologic soil group (Appendix F). Meaning soils have a slow infiltration rate. The combination of high rainfall and soil that does not drain can lead to extremely high-water tables. The lower temperatures, lack of prime farmland and an excess amount of water does not allow viticulture to be as successful as proven in the Nashoba Valley area.

To the South of the Nashoba Valley sits another city, Worcester. Worcester is similar to Fitchburg being it was once a manufacturing hub; therefore, very little area has remained open for agriculture to occur. Again, this area falls outside the prime farmland zones according to Appendix C. Worcester just like Fitchburg and Barre has a lower 3-year average of Celsius Growing Degree Days (Appendix B). Worcester averages 1598 Celsius Growing Degree Days which puts the area as a Zone II on the Winkler index. This area over a 5-year average also has lower average temperatures during the months of June, August and September. The lack of farmland and lower average temperatures and lower growing degree days causes this area to not be nearly as suited for viticultural practices to occur.

3. *A written description of the proposed AVA boundary and the appropriate U.S.G.S topographic maps with the boundary drawn on it.*

The area directly to the north of this proposed AVA have the same distinguishing features; however, that land was omitted due to the lack of current viticulture, as well as two large regions not currently available for commercial viticulture; the Bolton flats which are a wildlife area and Fort Devens which is a training area for the military. If viticulture does occur in this region at some time in the future, it would be reasonable to request a boundary change to incorporate additional land in this region. The distinguishing features information applies to the entire region known as "Nashoba Valley," the proposed AVA will be limited to the following boundary.

1. The beginning point is on the Hudson map at the intersection of Route 62 and I-495 in Hudson, Massachusetts. From the beginning point, proceed west on Route 62 for 4.5 miles to the point where it intersects and becomes concurrent with Route 70 (also known as Boylston Street); then
2. Proceed north on Route 70/Route 62 for 2.09 miles to intersection with West Boylston Road Clinton, Massachusetts; then
3. Proceed south on Brook Street to its intersection with Route 62; then
4. Proceed westerly on West Boylston Road for 1 mile to its intersection with South Meadow Road in Clinton, Massachusetts; then
5. Proceed northerly along South Meadow Road for .95 miles to its intersection with Moffett Street in Lancaster, Massachusetts; then
6. Proceed along Moffett Street to its intersection with Chase Hill Road in Lancaster, Massachusetts; then

7. Proceed Chase Hill Road to its intersection with Route 62; the
8. Proceed along Route 62 for 1.7 miles to its intersection with Pratt Junction Road; then
9. Proceed northerly along Pratt Junction Road to its intersection with I-190; then
10. Proceed north along I-190 for 2.35 miles to its intersection with Route 117; then
11. Proceed easterly along Route 117 for 7.8 miles to its intersection with I-495; then
12. Proceed South along I-495 for 2.7 miles to the beginning point.

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Valley Weather. theweatherprediction.com/habyhints2/713/
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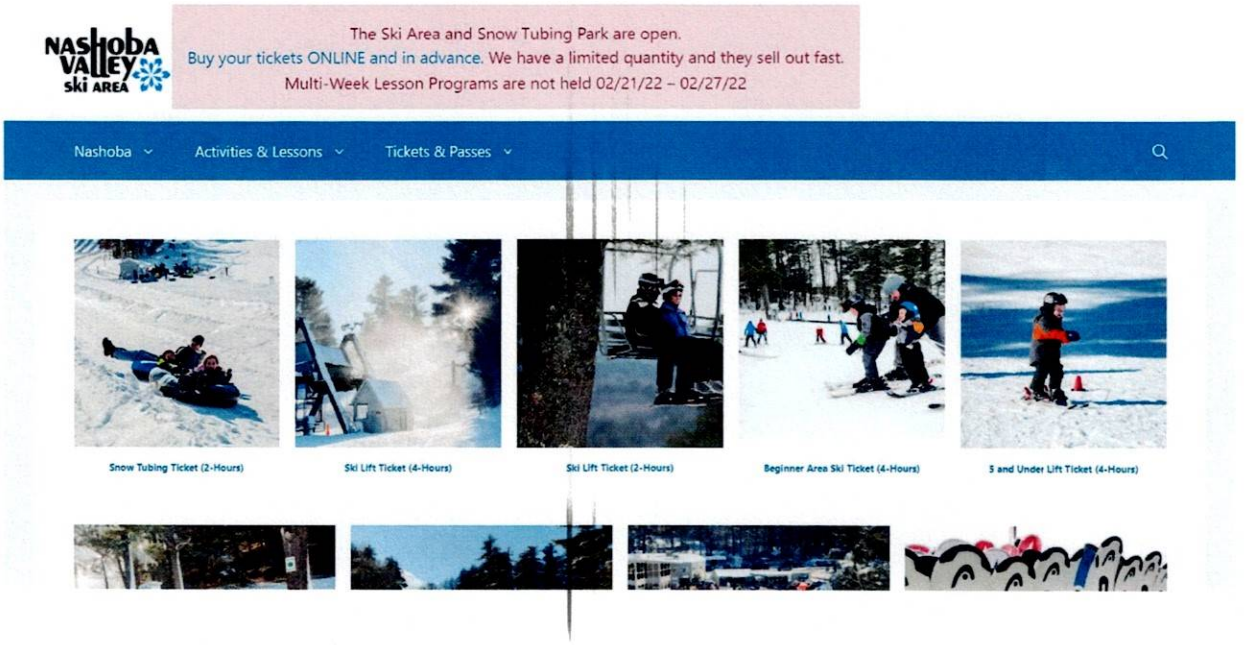
Appendix

APPENDIX A

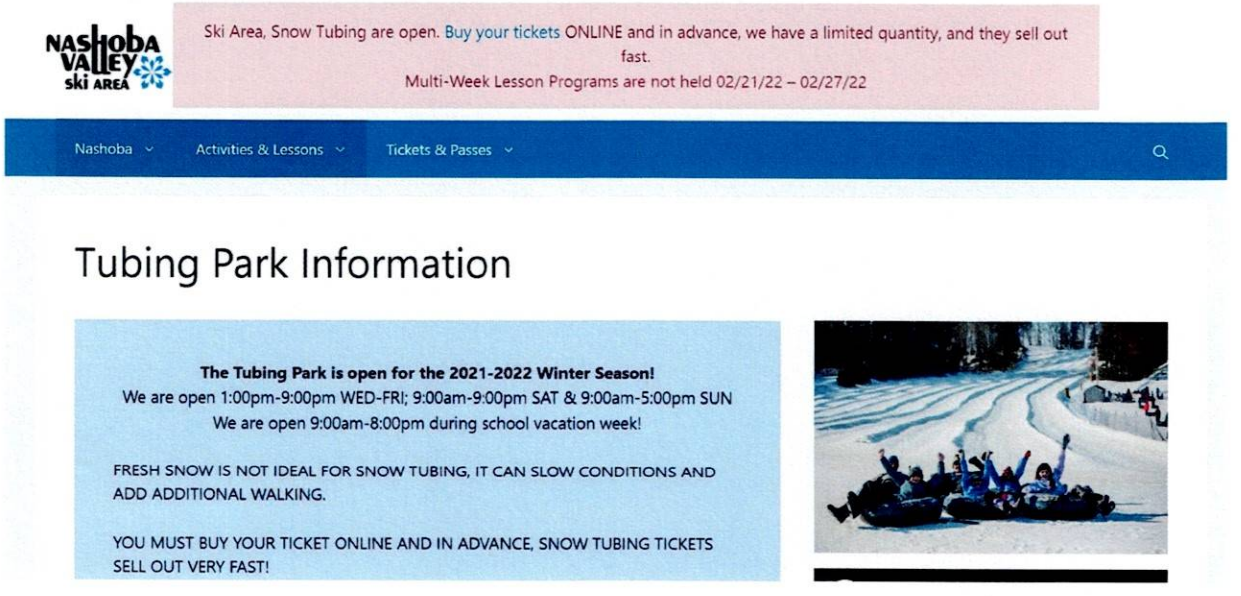
Nashoba Valley Winery- https://nashobawinery.com/

Nashoba Valley Spirits- https://nashobadistillery.com/

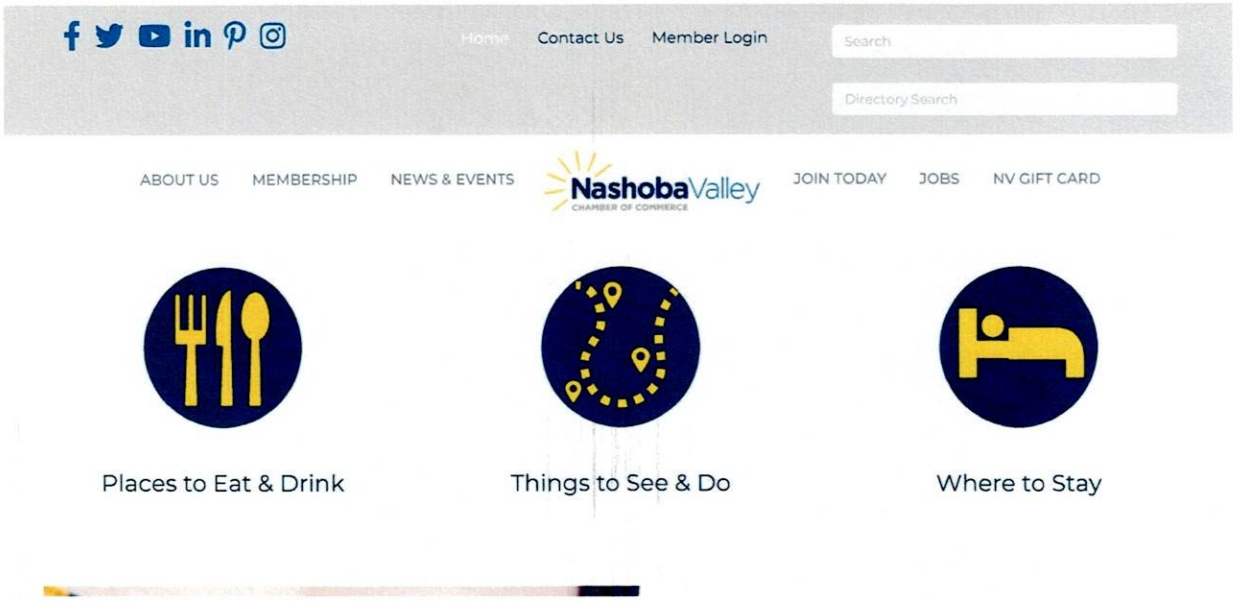
Nashoba Valley Ski Area- https://skinashoba.com/



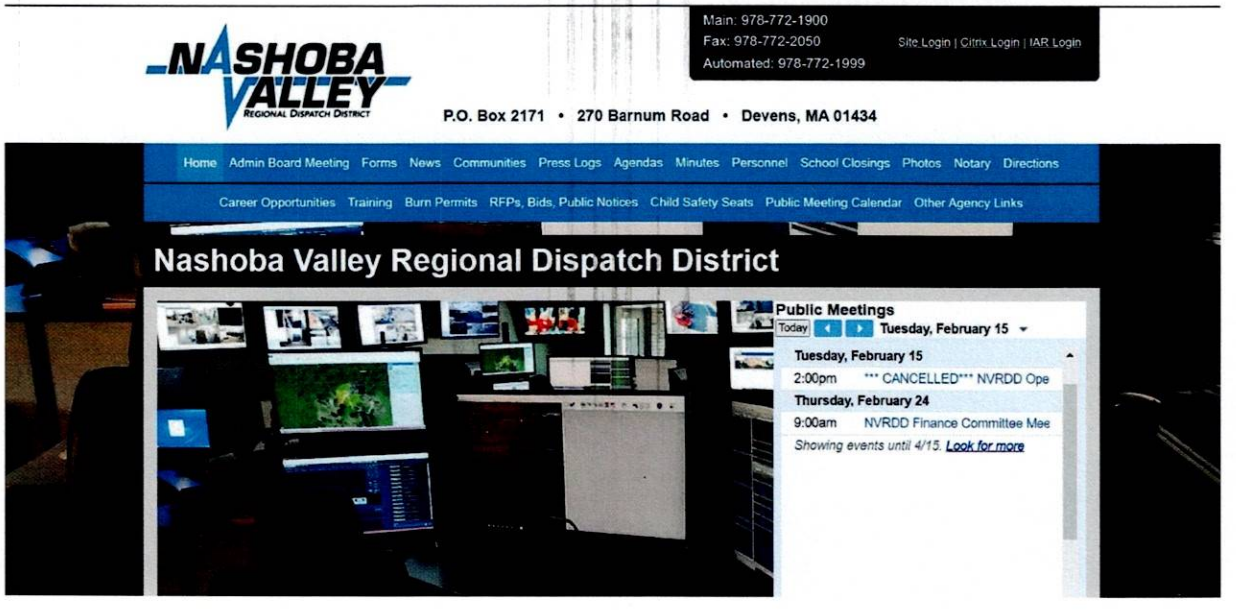
Nashoba Valley Tubbing park https://skinashoba.com/tubing-park-info/



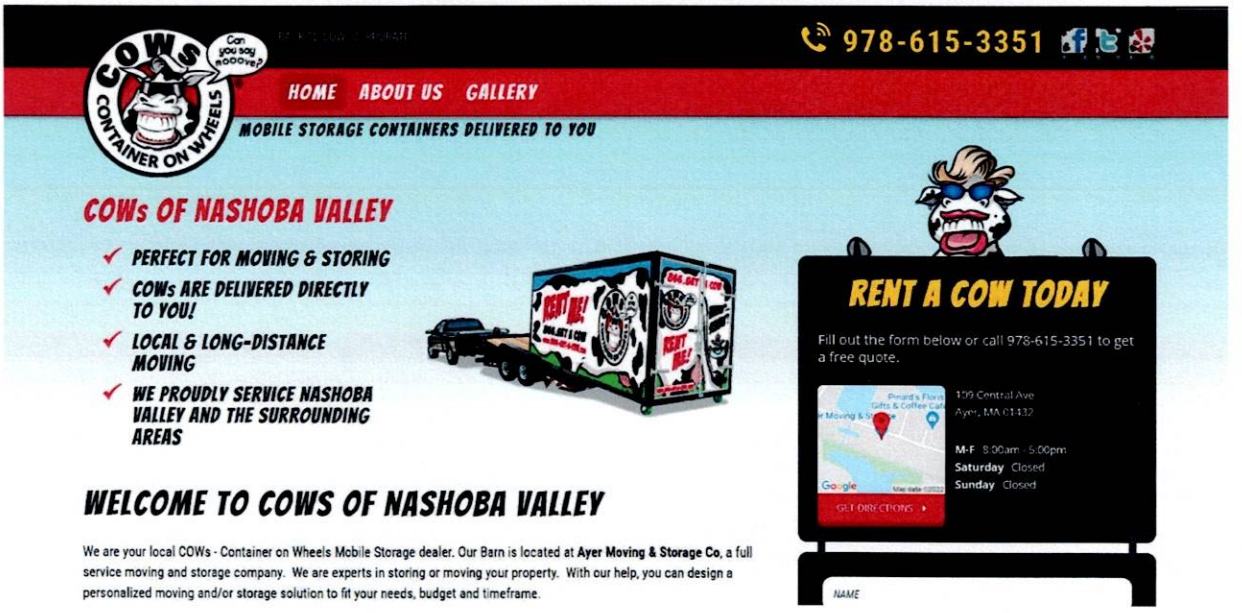
Nashoba Valley Chamber of Commerce https://www.nvcoc.com/



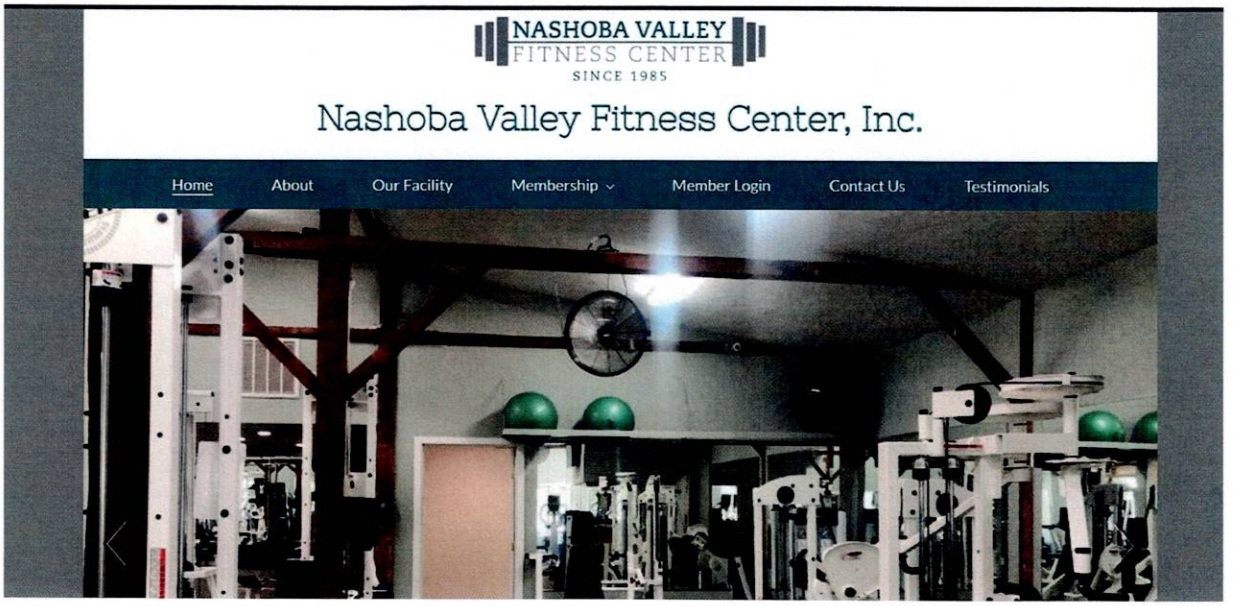
Nashoba Valley Regional district dispatch https://www.nvrecc.us/



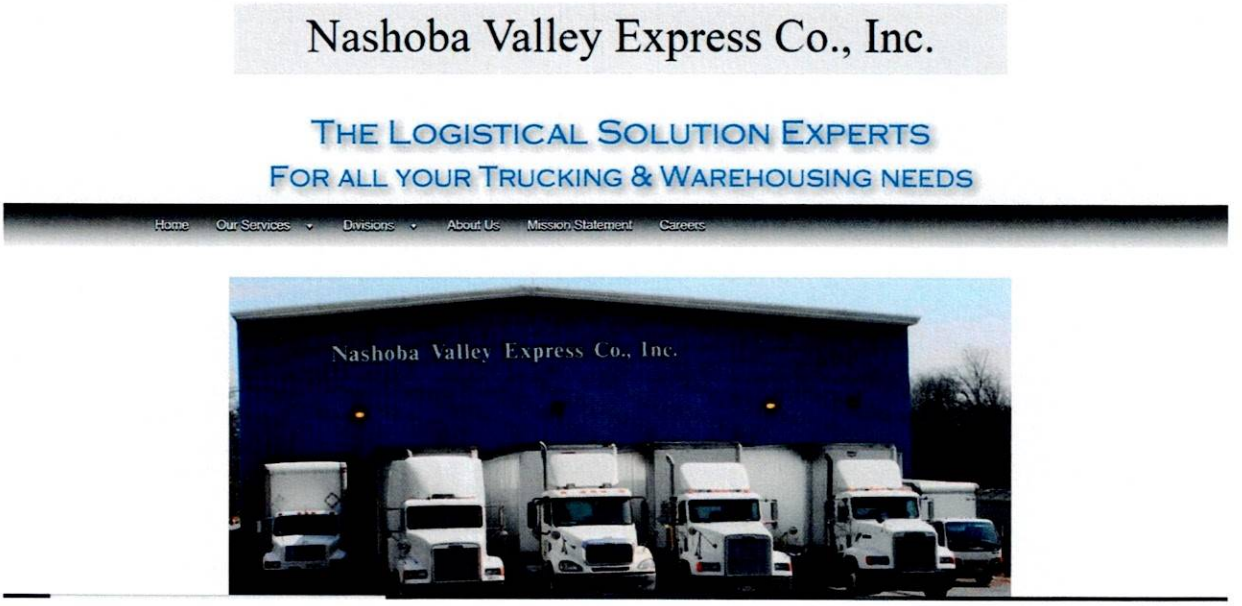
COWS of Nashoba Valley https://www.cowsofnashobavalley.com/



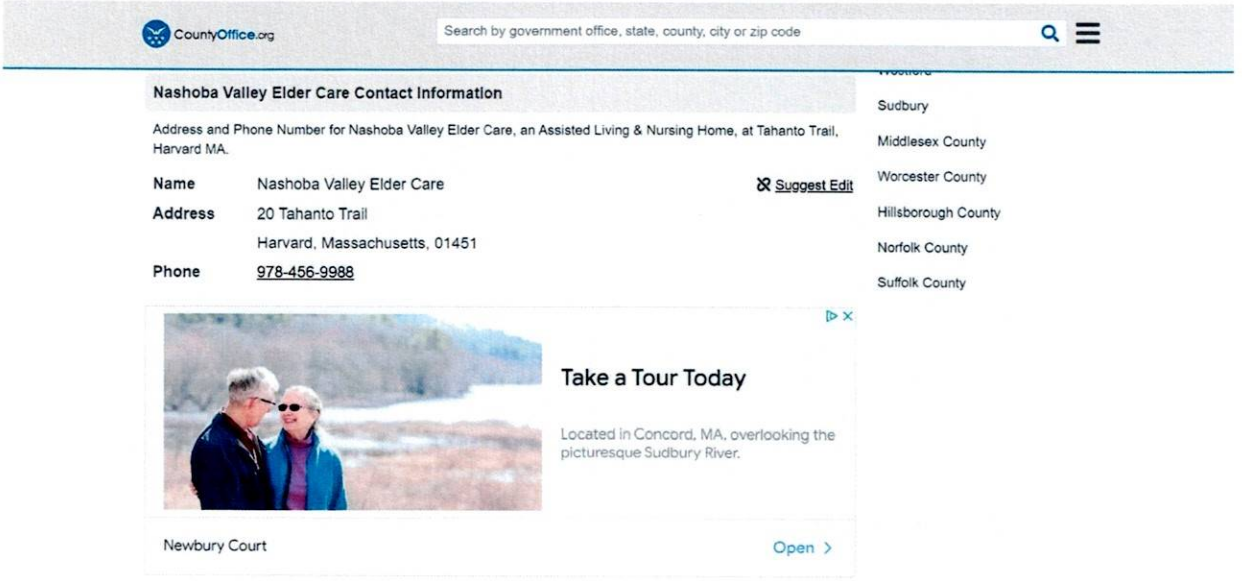
Nashoba Valley Fitness Center https://nashobavalleyfitnesscenterinc.vpweb.com/



Nashoba Valley Express Co https://nvec.com/



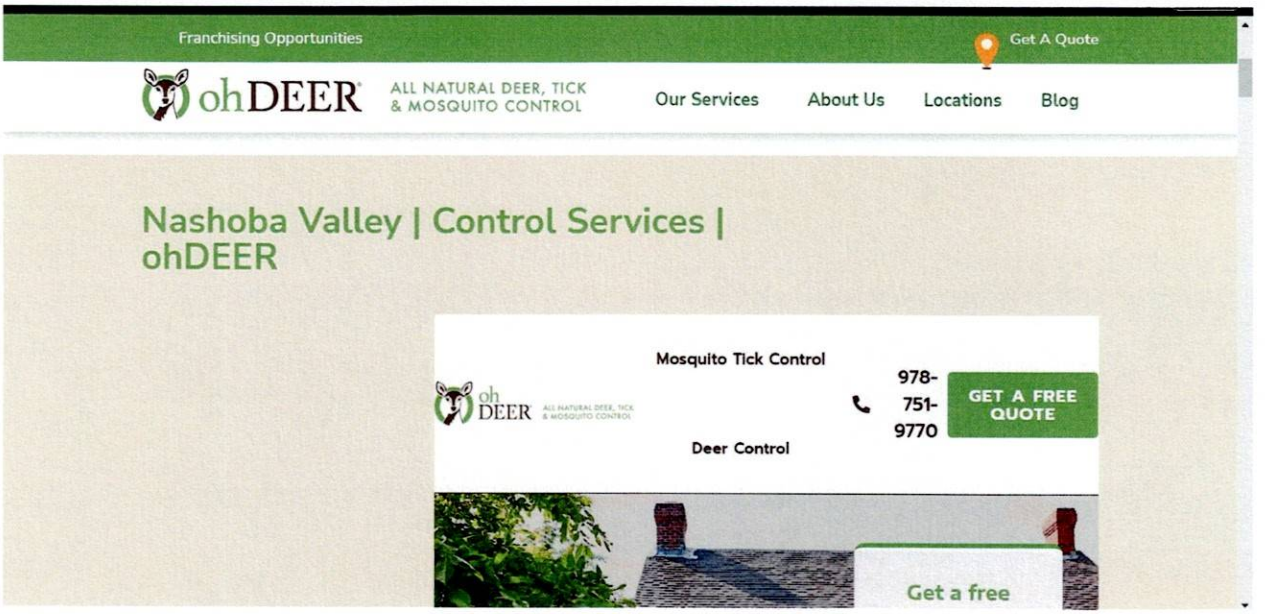
Nashoba Valley Elder care https://www.countyoffice.org/nashoba-valley-elder-care-harvard-ma-8c4/



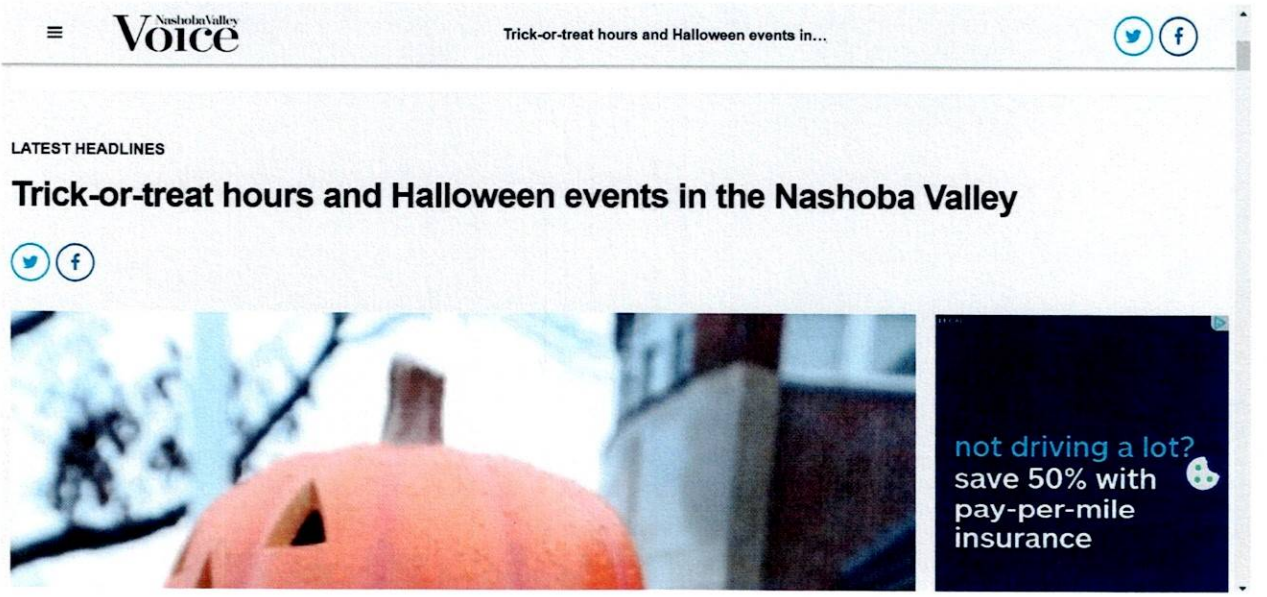
Life Care center of Nashoba Valley https://lcca.com/locations/ma/nashoba-valley/

Nashoba Valley Movement https://www.nashobavalleymovement.com/

Oh Deer- All natural Deer, tick and Mosquito control for Nashoba Valley https://oh-deer.com/nashoba-valley/

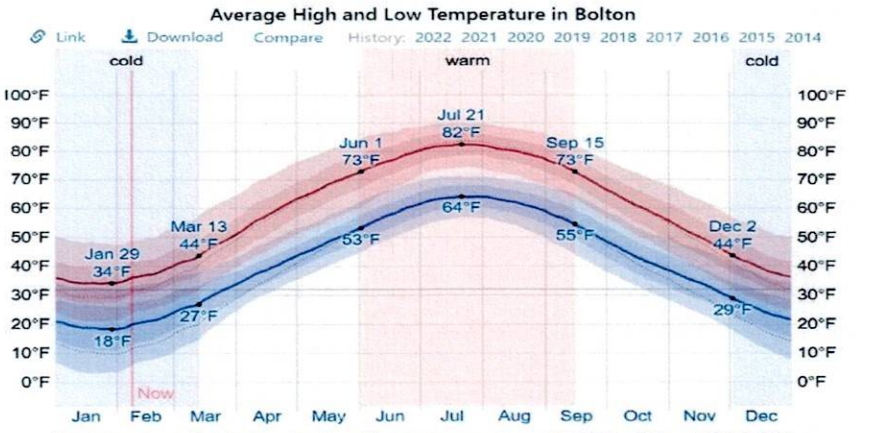


Nashoba Valley Voice- https://www.nashobavalleyvoice.com/2021/10/29/trick-or-treat-hours-and-halloween-events-in-the-nashoba-valley/



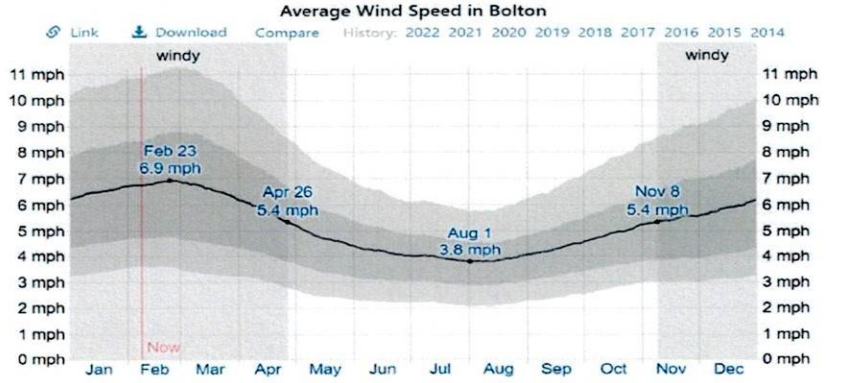
Appendix B

Bolton/ Nashoba Valley. Historical Data- 3 year average GDD 1679 zone III Winkler Index



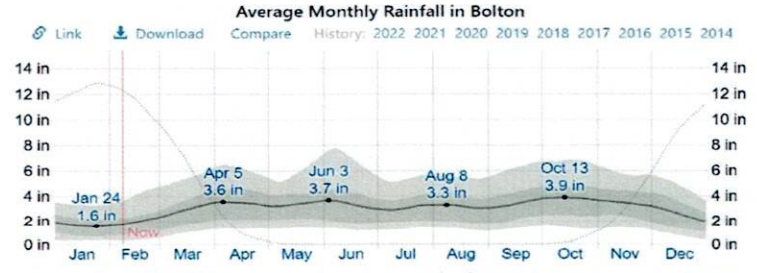
The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	35°F	37°F	46°F	58°F	68°F	77°F	82°F	80°F	72°F	61°F	50°F	39°F
Temp.	26°F	29°F	36°F	47°F	58°F	67°F	72°F	71°F	63°F	51°F	42°F	32°F
Low	19°F	21°F	29°F	39°F	49°F	58°F	63°F	62°F	54°F	43°F	34°F	25°F



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

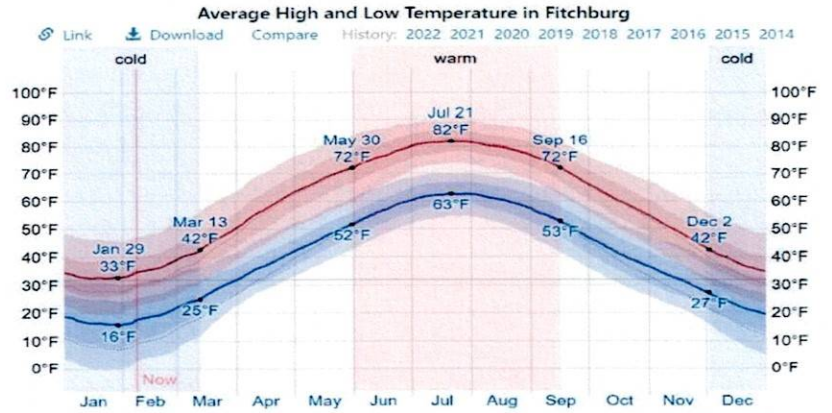
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind Speed (mph)	6.5	6.8	6.6	5.7	4.7	4.2	3.9	3.9	4.3	4.9	5.5	5.9



The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average snowfall.

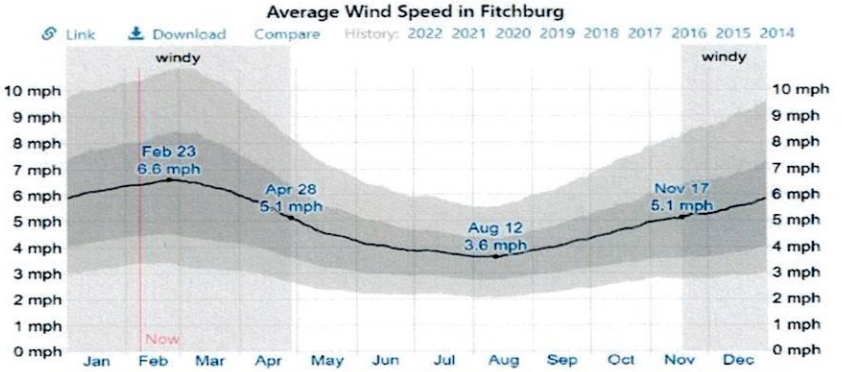
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	1.6"	1.9"	3.0"	3.5"	3.4"	3.4"	3.0"	3.2"	3.4"	3.9"	3.5"	2.6"

Fitchburg (North)- Historical Data- 3 year average GDD 1536 zone II Winkler Index



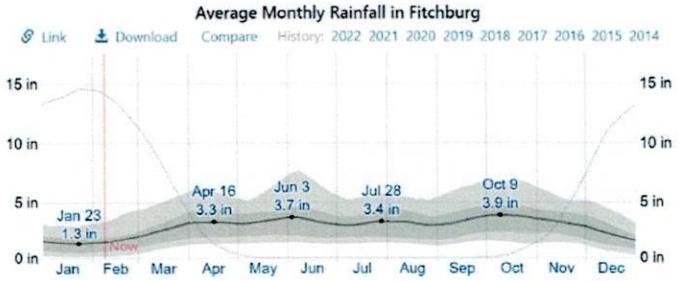
The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	33°F	36°F	45°F	58°F	68°F	77°F	82°F	79°F	72°F	60°F	49°F	38°F
Temp.	24°F	27°F	35°F	46°F	57°F	66°F	72°F	70°F	62°F	50°F	40°F	30°F
Low	17°F	19°F	27°F	37°F	47°F	57°F	62°F	60°F	52°F	41°F	32°F	23°F



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind Speed (mph)	6.1	6.5	6.3	5.5	4.5	4.0	3.8	3.7	4.1	4.6	5.1	5.6



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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	1.4"	1.6"	2.7"	3.3"	3.4"	3.5"	3.1"	3.2"	3.4"	3.9"	3.3"	2.3"

Worcester (South)- Historical Data- 3 year average GDD 1598 GDD zone II Winkler Index

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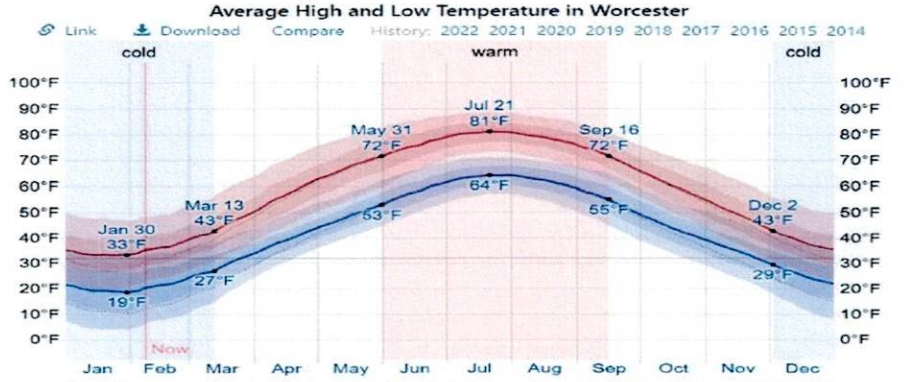
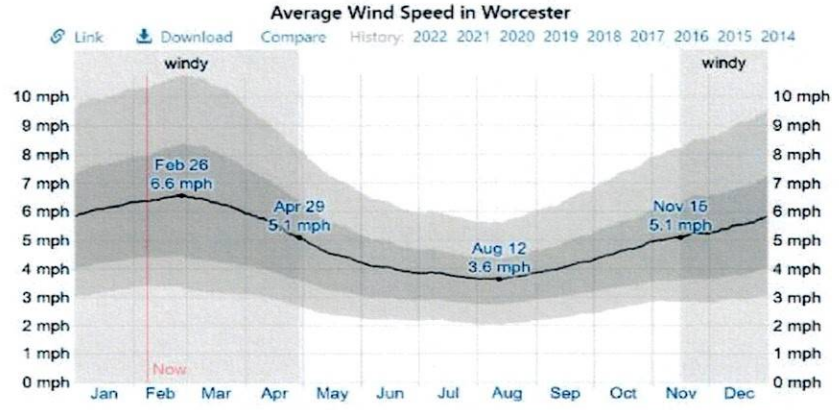


The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	34°F	36°F	45°F	57°F	68°F	76°F	81°F	78°F	71°F	60°F	49°F	39°F
Temp.	26°F	28°F	36°F	47°F	58°F	66°F	72°F	70°F	62°F	51°F	41°F	31°F
Low	20°F	21°F	29°F	40°F	49°F	58°F	64°F	62°F	54°F	44°F	34°F	25°F



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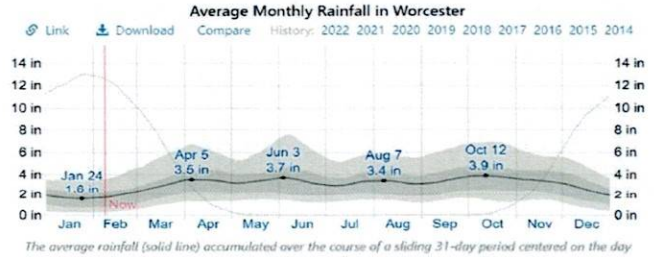
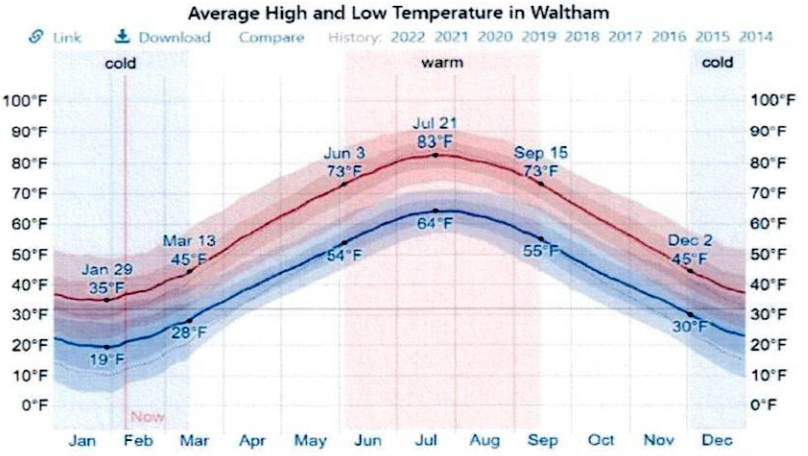
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind Speed (mph)	6.1	6.5	6.3	5.5	4.6	4.0	3.8	3.7	4.1	4.7	5.1	5.5



The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average snowfall.

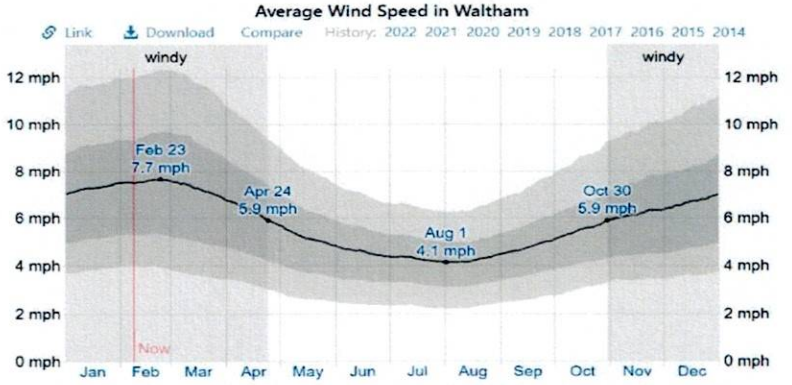
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	1.6"	1.8"	2.9"	3.5"	3.4"	3.4"	3.1"	3.3"	3.4"	3.9"	3.4"	2.6"

Waltham- (East) Historical Data- 3 year average GDD 1738 GDD zone III Winkler Index



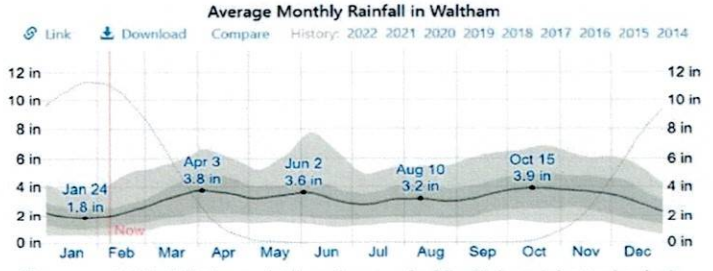
The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	36°F	38°F	46°F	58°F	68°F	77°F	82°F	80°F	72°F	61°F	50°F	40°F
Temp.	27°F	29°F	37°F	48°F	58°F	67°F	73°F	71°F	63°F	52°F	42°F	33°F
Low	21°F	22°F	30°F	40°F	49°F	58°F	63°F	62°F	54°F	44°F	35°F	26°F



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

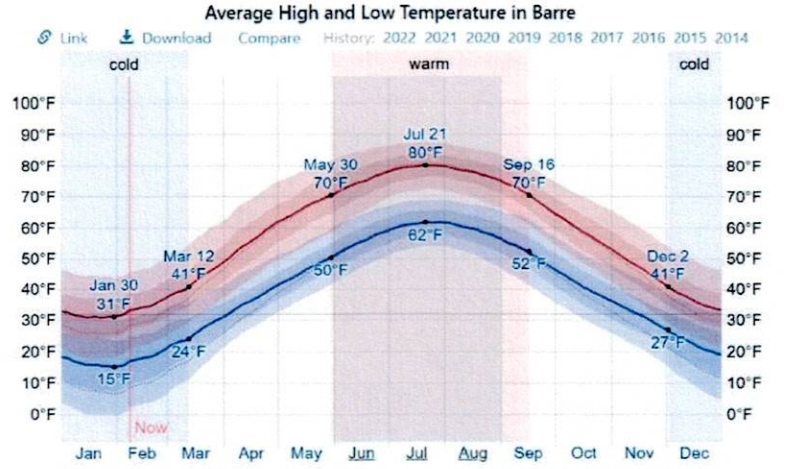
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind Speed (mph)	7.3	7.6	7.2	6.2	5.2	4.6	4.3	4.3	4.8	5.5	6.2	6.7



The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average snowfall.

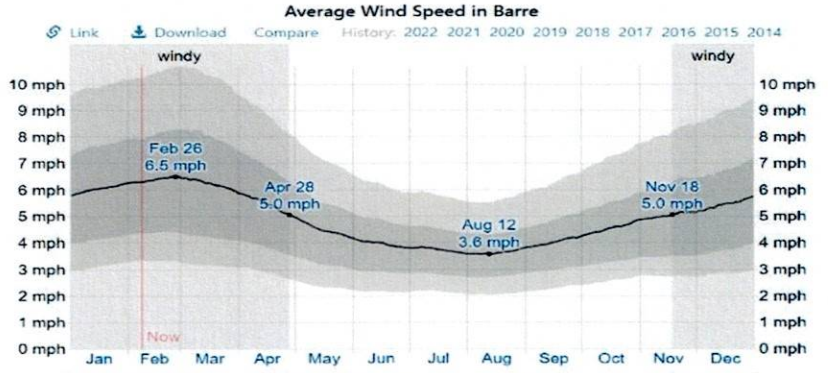
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	1.9"	2.2"	3.3"	3.6"	3.4"	3.3"	2.9"	3.1"	3.3"	3.9"	3.7"	2.9"

Barre- (West) Historical Data- 3 year average GDD 1548 Zone II Winkler Index



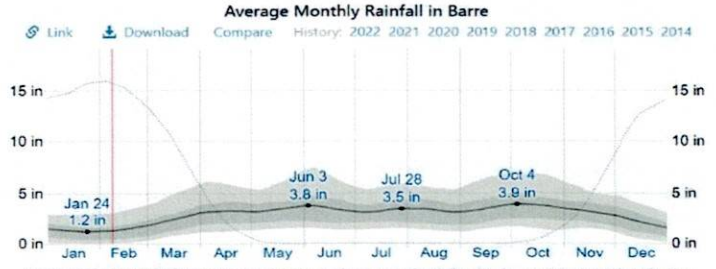
The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	32°F	34°F	43°F	56°F	67°F	75°F	80°F	78°F	70°F	58°F	47°F	36°F
Temp.	23°F	26°F	34°F	45°F	56°F	65°F	70°F	68°F	61°F	49°F	39°F	29°F
Low	16°F	18°F	26°F	37°F	47°F	56°F	61°F	59°F	52°F	41°F	31°F	22°F



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

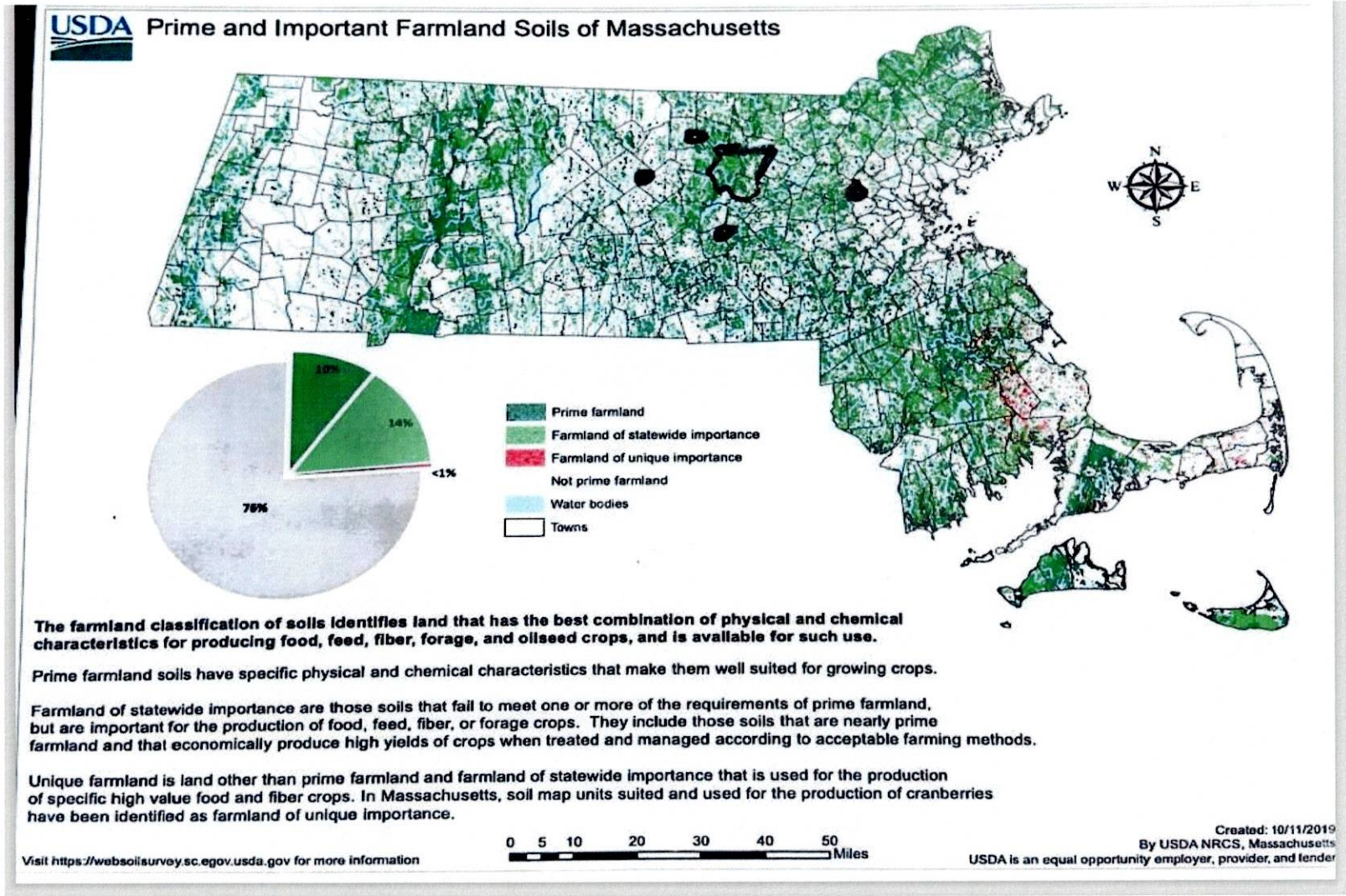
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind Speed (mph)	6.1	6.4	6.2	5.4	4.5	3.9	3.7	3.7	4.0	4.6	5.0	5.5



The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average snowfall.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	1.3"	1.4"	2.4"	3.2"	3.4"	3.6"	3.2"	3.3"	3.4"	3.8"	3.2"	2.1"

Appendix C


USDA
Prime and Important Farmland Soils of Massachusetts
N
W
E
S
10%
14%
<1%
76%
Prime farmland
Farmland of statewide importance
Farmland of unique importance
Not prime farmland
Water bodies
Towns
The farmland classification of soils identifies land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, and oilseed crops, and is available for such use.
Prime farmland soils have specific physical and chemical characteristics that make them well suited for growing crops.
Farmland of statewide importance are those soils that fail to meet one or more of the requirements of prime farmland, but are important for the production of food, feed, fiber, or forage crops. They include those soils that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods.
Unique farmland is land other than prime farmland and farmland of statewide importance that is used for the production of specific high value food and fiber crops. In Massachusetts, soil map units suited and used for the production of cranberries have been identified as farmland of unique importance.
0 5 10 20 30 40 50
Miles
Visit https://websoilsurvey.sc.egov.usda.gov for more information
Created: 10/11/2019
By USDA NRCS, Massachusetts
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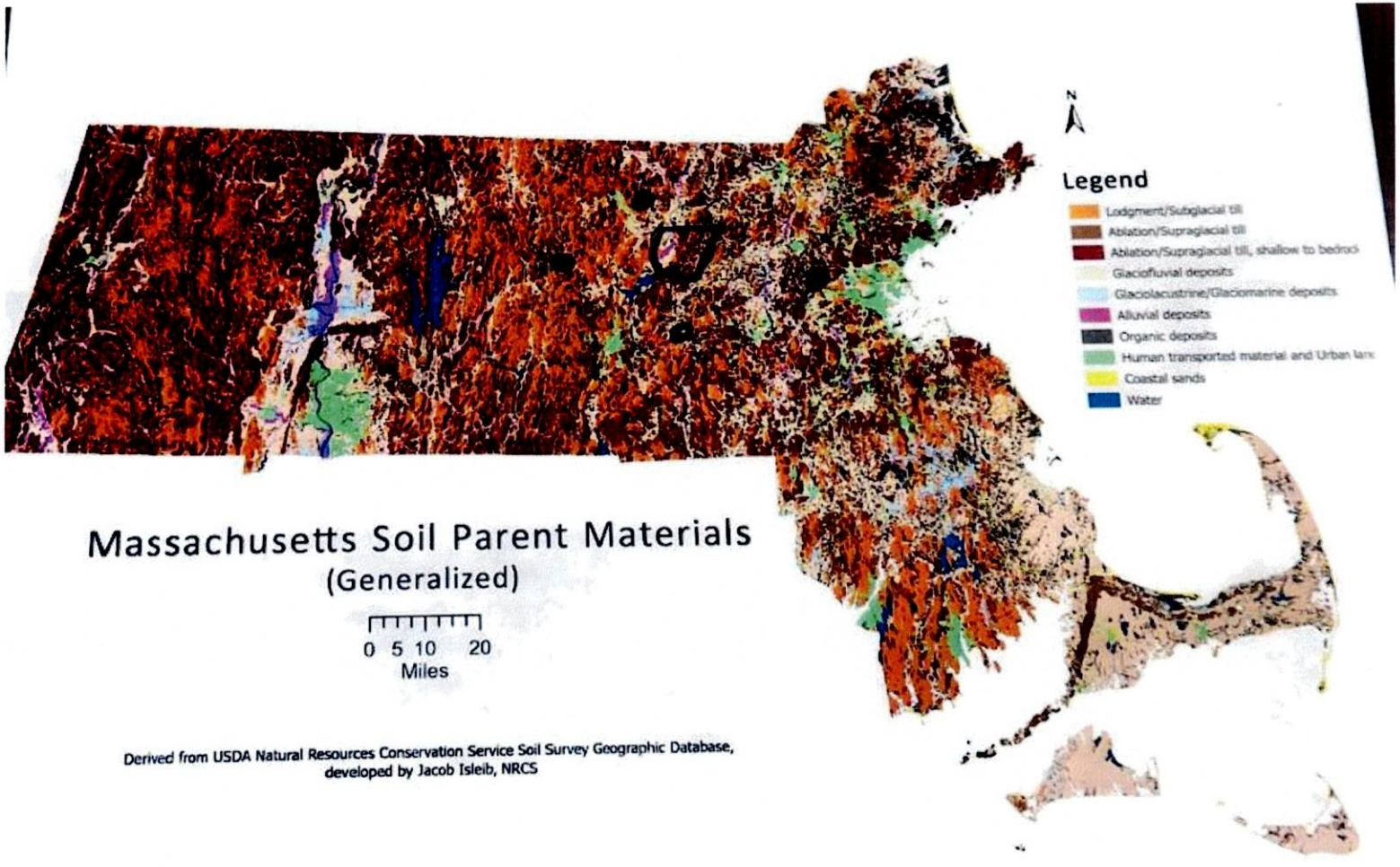
Appendix D


Legend
Lodgment/Subglacial till
Ablation/Supraglacial till
Ablation/Supraglacial till, shallow to bedrock
Glaciofluvial deposits
Glaciolacustrine/Glaciomarine deposits
Alluvial deposits
Organic deposits
Human transported material and Urban land
Coastal sands
Water
Massachusetts Soil Parent Materials
(Generalized)
0 5 10 20
Miles
Derived from USDA Natural Resources Conservation Service Soil Survey Geographic Database,
developed by Jacob Isleib, NRCS

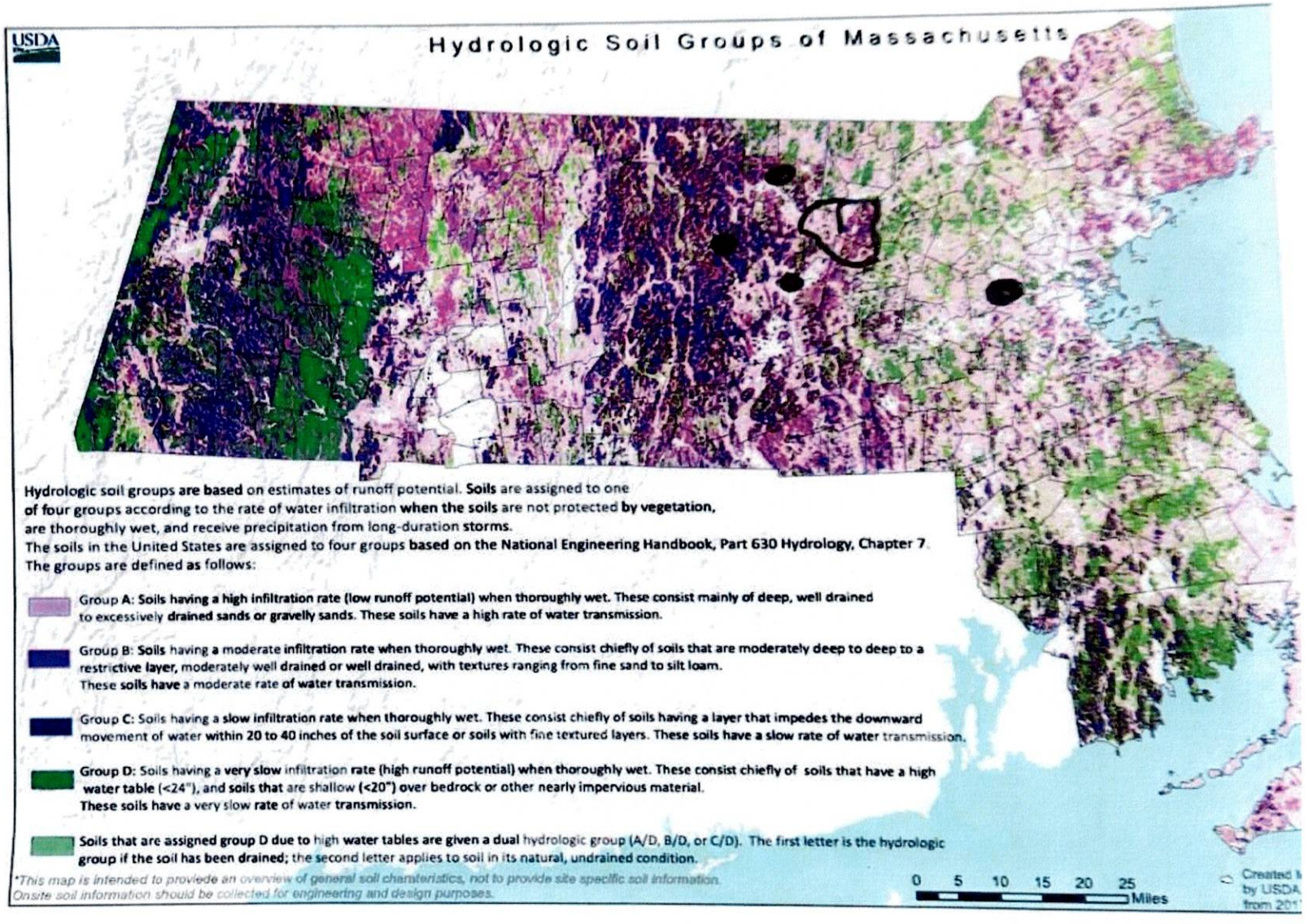
Appendix E- Soil Make up of the different areas in the proposed AVA

5A	Saco silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded	867.3	0.3%
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	2,466.8	1.0%
8A	Limerick silt loam, 0 to 3 percent slopes, frequently flooded	1,186.1	0.5%
30A	Raynham silt loam, 0 to 3 percent slopes	429.1	0.2%
31A	Walpole sandy loam, 0 to 3 percent slopes	3,399.8	1.3%
51A	Swansea muck, 0 to 1 percent slopes	2,187.0	0.9%
52A	Freetown muck, 0 to 1 percent slopes	8,414.0	3.3%
53A	Freetown muck, ponded, 0 to 1 percent slopes	696.3	0.3%
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	1,153.7	0.5%
70B	Ridgebury fine sandy loam, 3 to 8 percent slopes	648.0	0.3%
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	2,119.7	0.8%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	3,452.6	1.4%
72A	Whitman fine sandy loam, 0 to 3 percent slopes	1,026.7	0.4%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	4,138.9	1.6%
96A	Hadley very fine sandy loam, 0 to 3 percent slopes, occasionally flooded	294.3	0.1%
97A	Suncook loamy fine sand, 0 to 2 percent slopes, occasionally flooded	448.7	0.2%
98A	Winooski very fine sandy loam, 0 to 3 percent slopes, occasionally flooded	1,297.9	0.5%
102C	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	24,524.5	9.6%
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	10,571.1	4.1%
226B	Hinesburg loamy sand, 3 to 8 percent slopes	336.7	0.1%
245A	Hinckley loamy sand, 0 to 3 percent slopes	1,787.7	0.7%
245B	Hinckley loamy sand, 3 to 8 percent slopes	8,272.2	3.2%
245C	Hinckley loamy sand, 8 to 15 percent slopes	4,381.4	1.7%
245D	Hinckley loamy sand, 15 to 25 percent slopes	1,895.6	0.7%
245E	Hinckley loamy sand, 25 to 35 percent slopes	2,988.3	1.2%

248B	Amostown and Belgrade soils, 3 to 8 percent slopes	398.5	0.2%
249A	Deerfield loamy fine sand, 0 to 3 percent slopes	807.6	0.3%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	1,807.9	0.7%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	9,837.8	3.9%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	2,364.1	0.9%
254D	Merrimac fine sandy loam, 15 to 25 percent slopes	379.8	0.1%
255A	Windsor loamy sand, 0 to 3 percent slopes	1,255.0	0.5%
255B	Windsor loamy sand, 3 to 8 percent slopes	2,919.4	1.1%
255C	Windsor loamy sand, 8 to 15 percent slopes	1,442.8	0.6%
255D	Windsor loamy sand, 15 to 25 percent slopes	964.0	0.4%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	1,207.0	0.5%
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	1,105.0	0.4%
262A	Quonset loamy sand, 0 to 3 percent slopes	580.8	0.2%
262B	Quonset loamy sand, 3 to 8 percent slopes	2,347.5	0.9%
262C	Quonset loamy sand, 8 to 15 percent slopes	1,205.3	0.5%
262D	Quonset loamy sand, 15 to 25 percent slopes	887.4	0.3%
275A	Agawam fine sandy loam, 0 to 3 percent slopes	256.3	0.1%
275B	Agawam fine sandy loam, 3 to 8 percent slopes	1,332.8	0.5%
275C	Agawam fine sandy loam, 8 to 15 percent slopes	364.6	0.1%
276A	Ninigret fine sandy loam, 0 to 3 percent slopes	529.8	0.2%
290B	Hinckley loamy sand, 3 to 8 percent slopes, very stony	193.0	0.1%
290C	Hinckley loamy sand, 8 to 15 percent slopes, very stony	284.1	0.1%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	10,469.0	4.1%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	7,024.6	2.8%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	2,406.1	0.9%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	5,972.3	2.3%
306C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	5,908.8	2.3%

306D	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	2,464.1	1.0%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	5,365.9	2.1%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	7,550.4	3.0%
307D	Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony	4,803.0	1.9%
307E	Paxton fine sandy loam, 25 to 35 percent slopes, extremely stony	2,217.1	0.9%
310A	Woodbridge fine sandy loam, 0 to 3 percent slopes	839.1	0.3%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	8,208.0	3.2%
310C	Woodbridge fine sandy loam, 8 to 15 percent slopes	652.5	0.3%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	5,388.4	2.1%
311C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	575.0	0.2%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	7,246.5	2.8%
312C	Woodbridge fine sandy loam, 8 to 15 percent slopes, extremely stony	1,356.4	0.5%
322B	Poquonock loamy sand, 3 to 8 percent slopes	355.4	0.1%
322C	Poquonock loamy sand, 8 to 15 percent slopes	142.7	0.1%
323B	Poquonock loamy sand, 3 to 8 percent slopes, very stony	318.9	0.1%
420B	Canton fine sandy loam, 3 to 8 percent slopes	2,567.6	1.0%
420C	Canton fine sandy loam, 8 to 15 percent slopes	1,111.0	0.4%
421B	Canton fine sandy loam, 0 to 8 percent slopes, very stony	2,533.0	1.0%
421C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	1,781.4	0.7%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	4,502.0	1.8%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	4,288.1	1.7%
422D	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	1,726.0	0.7%
600	Pits, gravel	2,232.8	0.9%
601	Pits, quarry	257.0	0.1%
602	Urban land	8,645.9	3.4%
622C	Paxton-Urban land complex, 8 to 15 percent slopes	4,010.9	1.6%
625C	Hinckley-Urban land complex, 0 to 15 percent slopes	1,914.1	0.8%

Appendix F


USDA
Hydrologic Soil Groups of Massachusetts
Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.
The soils in the United States are assigned to four groups based on the National Engineering Handbook, Part 630 Hydrology, Chapter 7. The groups are defined as follows:
Group A: Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
Group B: Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of soils that are moderately deep to deep to a restrictive layer, moderately well drained or well drained, with textures ranging from fine sand to silt loam. These soils have a moderate rate of water transmission.
Group C: Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water within 20 to 40 inches of the soil surface or soils with fine textured layers. These soils have a slow rate of water transmission.
Group D: Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of soils that have a high water table (<24"), and soils that are shallow (<20") over bedrock or other nearly impervious material. These soils have a very slow rate of water transmission.
Soils that are assigned group D due to high water tables are given a dual hydrologic group (A/D, B/D, or C/D). The first letter is the hydrologic group if the soil has been drained; the second letter applies to soil in its natural, undrained condition.
*This map is intended to provide an overview of general soil characteristics, not to provide site specific soil information. Onsite soil information should be collected for engineering and design purposes.
0 5 10 15 20 25
Miles
Created by USDA from 201

Appendix G-

Viticulture areas withing th eproposed AVA