

Regional Plan for the Northeast Kingdom 2015-2023



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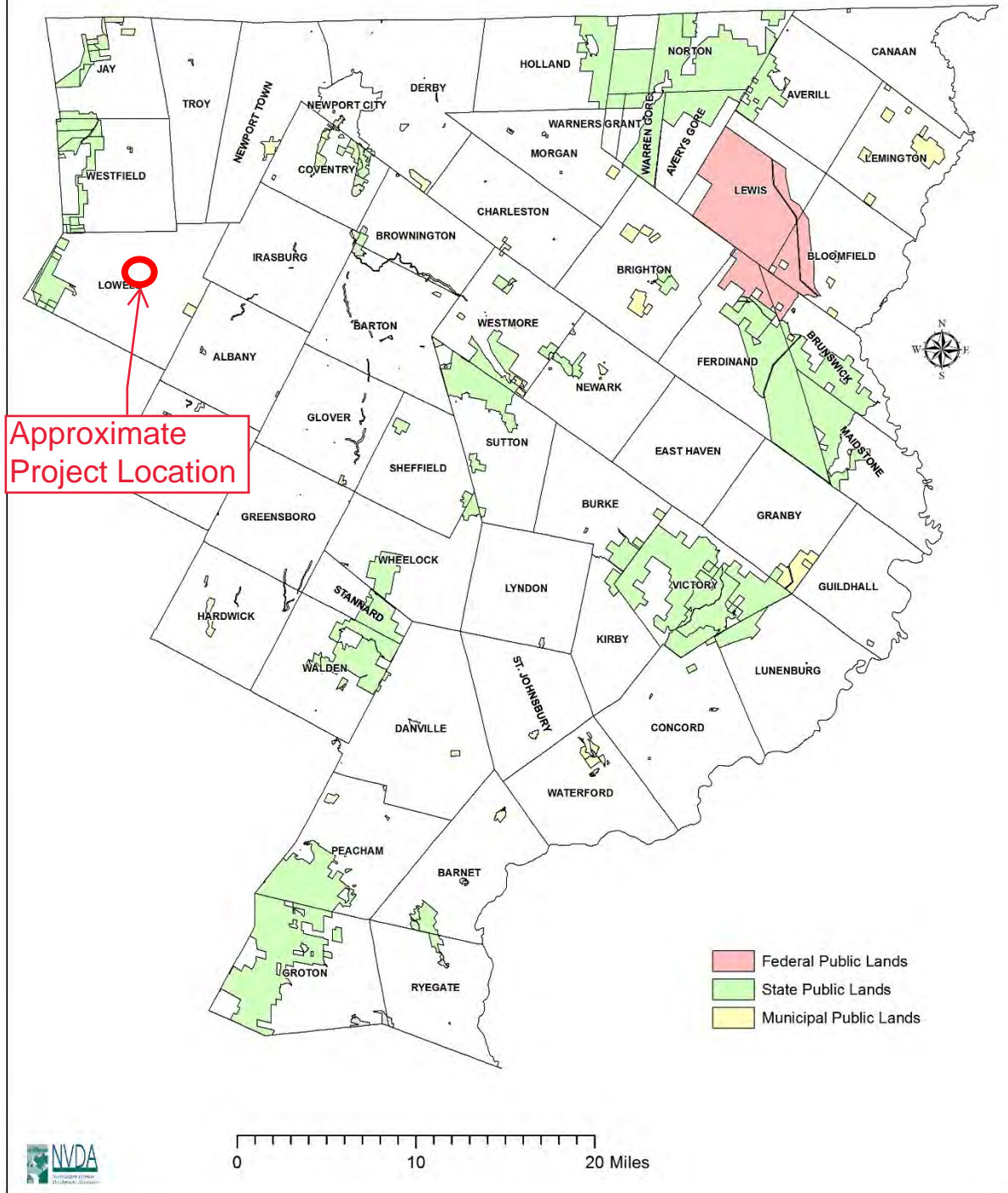
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NVDA Region: Public Lands

Figure 1.2

09/08/2017



that have land use regulations, encourage the use of planned unit development coupled with low density zoning to preserve larger blocks of forestland while facilitating efficient residential and commercial development.

- Connect municipalities with appropriate agencies and resources providing management assistance with municipal forests.
- Provide management, financial, and technical assistance to local forest product industries, including wood product manufacturers, sawmills, paper mills, and wood-powered electrical generators (cogeneration).
- Support the development and marketing of distinctive wood products identifiable with Vermont and/or the Northeast Kingdom.
- Support owners of forestland who implement sustainable forestry practices to market their wood and wood products.
- Expand usage of existing rail infrastructure for shipping and interface with trucking. Explore the creation of forest-related industrial zones (i.e. rail sidings for sawmills)

AGRICULTURAL LAND USE GOALS

- Farming and agriculture will remain an important and viable sector of the regional economy.
- Contiguous tracts of agricultural soils will be preserved.
- Development of residential and commercial uses will not significantly reduce the amount of open and productive farm land.

AGRICULTURAL LAND USE STRATEGIES

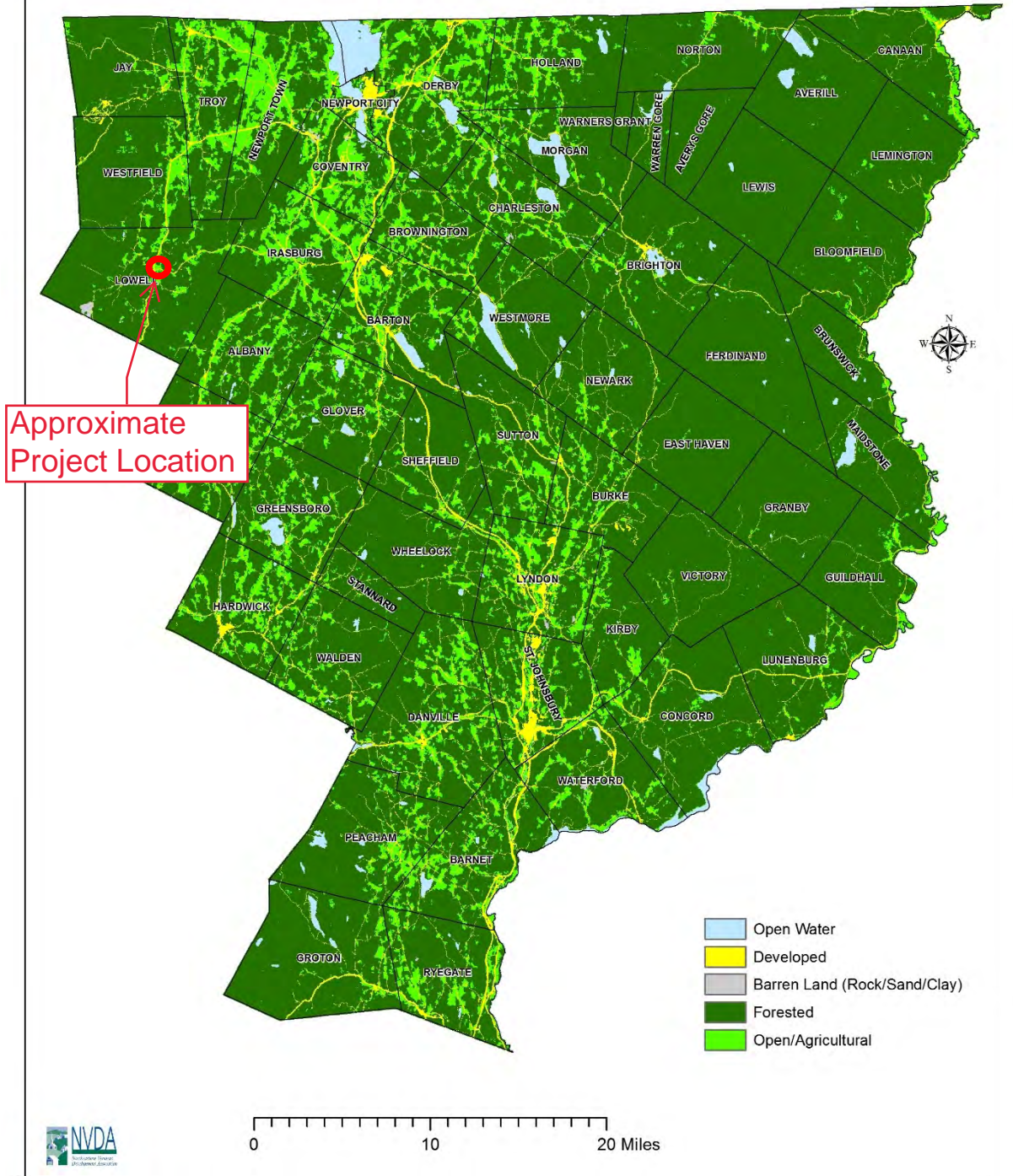
- Continue to provide planning assistance to communities seeking to conserve productive agricultural land. Encourage the use of “planned unit development” coupled with low density zoning and other tools to preserve agricultural resources.
- Provide technical assistance to towns seeking to encourage on-farm enterprises, through the use of land use regulations or incentives.
- Provide support to farmers interested in diversification and/or product development. Assist with grants and low-interest loans for value-adding businesses and diversification.
- Identify funding sources for, and market existing and new food ventures in the region.
- Support education efforts that teach sustainable agricultural practices, and the tax benefits of enrollment in the “current use” program.
- Support succession planning and efforts to connect new and expanding farmers with affordable farmland.

RECREATION LAND USE GOALS

- Sufficient open space will be available for current and future outdoor recreational pursuits.
- A variety of year-round and seasonal, indoor and outdoor recreation opportunities will be available for residents and visitors.
- Public access to water bodies will be protected.

NVDA Region: Current Land Use

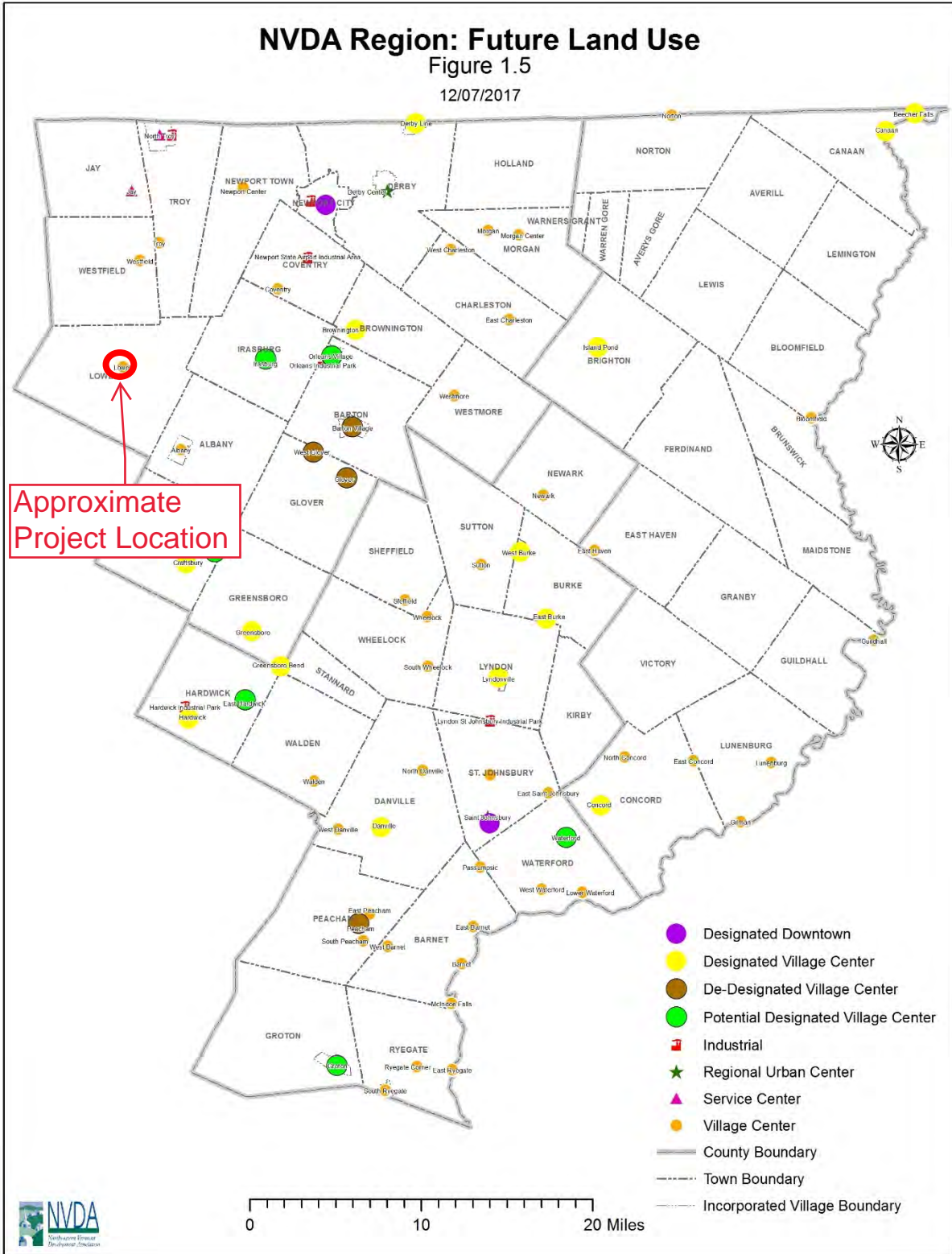
Figure 1.3
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NVDA Region: Future Land Use

Figure 1.5

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1
2

1 by highway, lack of coordination with surrounding land uses, and limited accessibility for pedestrians.” With
2 the addition of Criterion 9L to the Act 250 permitting process, it will be more difficult for commercial and
3 large residential developments to get state permits for developments perceived to be linear in nature.

4 However, it is not recommended that local zoning confine commercial or dense residential development to
5 the boundary of any State-designated center in the municipality. The State downtown and village center
6 designation process looks at existing commercial uses, not potential uses, because it is essentially a
7 rehabilitation and revitalization program for areas with aging building stock. Therefore, land that is
8 appropriate for denser development but is not yet developed as such is consequently excluded from the
9 delineation of a State-designated “center.”

10 The relatively newer “Neighborhood Development Area” is a complimentary state designation program for
11 areas adjacent to existing designated centers. This designation is intended to encourage municipalities and
12 developers to plan for new and infill housing in the area within walking distance of its designated downtown
13 or village center. It is recognized that the improvement and development of housing in these areas will
14 support the commercial establishments in the designated centers. Benefits of designation include the
15 exemption of certain mixed – income projects from Act 250 regulations; a 50% discount on Act 250 fees for
16 projects that are not exempt; a cap on the amount of State review fees for wastewater permits that will tie into
17 an approved municipal system; and exemption from the land gains tax.

18 Promoting neighborhood development areas will be a useful approach to directing new housing development
19 to existing centers, rather than undeveloped rural areas. In order for “neighborhood development areas” to
20 effectively provide alternatives to car-dependent residential subdivisions and combat sprawl, it must be
21 ensured that housing products for workforce (housing available to residents making up to 120% of the area
22 median income) and upper-income households are included in the mix of new housing that is developed. As
23 projected commercial development in the region is expected to bring middle and upper-wage earners to the
24 area, it will be important to provide desirable housing options in or near existing centers to combat
25 development pressure on rural lands. It will take considerable effort and long-range strategic planning to alter
26 the trend of new residential development occurring primarily outside of centers.

27 **Development Patterns in Rural Areas**

28 Just as the state designation programs mentioned above can help direct commercial and residential
29 development to existing centers, these programs also help retain the important agricultural, forestry and
30 recreation use of rural areas that lie outside of the commercial and residential cores.

31 When residential development occurs in rural areas, it should not result in the fragmentation of forestland or
32 agricultural land such that it impedes the economic feasibility of agricultural or forest-based enterprises.
33 Development in rural areas should also preserve, to the extent practicable, connections that facilitate the
34 passive recreational use of land (e.g., trails).

35 Promoting commercial development that is tied to the agricultural use of the land, though zoning measures
36 and/or educational outreach to residents, is one way to preserve the working landscape. Another way to
37 achieve this desired pattern of development is to keep overall residential densities low in agricultural areas
38 (e.g., one residential unit per 25 acres), coupled with clustering or “planned unit development” with an
39 established maximum building envelope size.

40 For rural areas that are on the fringes of downtown and village centers, permitting higher residential densities
41 and some commercial uses coupled with clear standards for pedestrian connections to the centers, is a way to
42 accommodate growth while encouraging sustainable design.

43 Agricultural soils in rural areas outside centers or industrial parks should be conserved to the maximum
44 extent practicable.

45 As previously stated, the region’s rural areas should receive very little commercial or industrial development
46 unless it occurs in an established industrial park or in an area specifically designated, either in a local zoning

1 bylaw or in a local municipal plan as being well suited to such a use. Nevertheless, rural lands containing one
2 or more of the following conservation attributes, shall be considered exceptionally sensitive and shall
3 therefore not be designated as appropriate for commercial or industrial development that is not directly
4 related to the region’s lands-based economy (i.e. forestry, agriculture, and recreation):

- 5 • State natural areas and fragile areas: The region has two such areas, which are both designated as
6 National Natural Landmarks, the Willoughby Cliffs area and the Barton River Marsh.
- 7 • Lands managed by the Department of Forest Parks and Recreation
- 8 • Highest priority forest habitat blocks
- 9 • Forested coverage of Site Class 1, 2, and 3 soils of 25 acres or more
- 10 • Headwaters
- 11 • Upland areas of 2,000 or higher

12 Lands containing one or more of these attributes shall not be developed, as their best uses are a combination
13 of forest and conservation purposes. Appropriate uses include sustainable forestry and logging practices,
14 maple syrup production, wildlife habitat, and passive recreation. Maintaining forest and vegetation coverage
15 on upland areas is particularly important in that it provides natural floodwater attenuation and minimizes
16 contribution to flash flooding in downslope areas, as well as increased sediment loads to headwaters.
17 Ridgelines in these sensitive areas are a particular concern as developments can be seen from multiple
18 locations including neighboring communities. From our experience, distance is not an effective strategy to
19 mitigate impacts to such viewsheds. NVDA will not support proposed development or re-designation of
20 sensitive rural lands that include any of the following impacts:

- 21 • Loss of forest cover and introduction of impervious surface coverage
- 22 • Incursion of roads intended for uses other than resource-based activities (i.e. sustainable wood
23 harvesting and recreation) that result in the fragmentation of habitat
- 24 • Uses that introduce smoke or other emissions
- 25 • Uses that introduce light trespass or sustained noise

26 Any existing impacts in sensitive rural lands shall be considered non-conformities with this Regional Plan and
27 shall not be expanded.

28 **Development in Industrial/Business Parks**

29 Industrial/business parks should be sited in locations served by major federal or state highways, airports, or
30 railroads. Industrial/business parks are encouraged to be densely developed while allowing enough space for
31 business expansion. Infrastructure (water, sewer, and electric power) connections designed to serve industrial
32 parks should not contribute to strip development outside of the industrial parks.

33 Off-site mitigation of agricultural soils would be appropriate when new industrial/business parks are
34 developed. However, land in the region’s existing industrial/business parks should not be required to mitigate
35 for agricultural soils when they are developed as they are all locally zoned for commercial and industrial use.

36 There are some projects in the works and on the horizon in the Northeast Kingdom that could spur
37 increased development in towns throughout the region. An expansion to the Northeast Kingdom
38 International Airport in Coventry is underway. Jay Peak has seen a number of expansion in recent years. The
39 construction of a new, 116-unit hotel and conference center was recently completed for Burke Mountain,
40 which will draw increased numbers of tourists. It is expected that this major expansion will spur increased
41 commercial development catering to tourists and workers, and will place increased demands on services and
42 facilities, including police/emergency services and child care facilities. However, although more school-aged

1 regional and municipal geopolitical boundaries, so activities affecting a waterway in one community have the
2 potential to impact the water resource in another region.

3 As identified by the Vermont Department of Labor in 2015, the following Labor Market Areas (LMA) exists
4 in the Northeast Kingdom. Only the Derby and St. Johnsbury LMAs contain only NEK communities:

- 5 • Derby LMA
- 6 • St. Johnsbury LMA
- 7 • Morristown-Waterbury LMA (partial) – Craftsbury, Greensboro, Hardwick
- 8 • Colebrook NH-VT (partial LMA) – Norton, Averill, Canaan, Lemington, Bloomfield
- 9 • Littleton NH-VT (partial LMA) – Brunswick, Maidstone, Guildhall, Lunenburg
- 10 • Newbury LMA (partial LMA) – Groton, Ryegate

11 From working with local communities we know that NH towns (Colebrook, Lancaster, Littleton, etc.) along
12 the CT River attract VT residents for employment, tax-free goods, and services. We also know that
13 communities in the outer reaches of our region find it easier to travel to communities in adjacent regions for
14 the same things in communities like Morrisville and White River Junction. The cities of Montpelier and
15 Burlington also draw significant numbers of travelers from the NEK to access employment, state
16 government and agencies, larger cultural events, and expanded goods and services. Growth in any of these
17 adjacent or nearby areas has the potential to impact the NEK.

18 Lastly, an analysis of the impacts of the many large developments occurring or proposed in the Northeast
19 Kingdom is nearing completion. This was funded by a planning grant from the Vermont Agency of
20 Commerce, along with supplemental funds from USDA Rural Development. Drawing on data provided from
21 several sources, including local, State and federal agencies, NVDA is examining existing conditions and
22 assessing the potential impacts on emergency services, childcare, schools, infrastructure investments,
23 recreational resources and housing. The conclusions and recommendations of this impact study are
24 incorporated by reference into this Regional Plan.

25
26

27 GOALS AND STRATEGIES FOR FUTURE LAND USE AND DEVELOPMENT

28 FUTURE LAND USE & DEVELOPMENT GOALS

- 29 • Established centers will be an economically vital mix of commercial and residential uses, and will
30 offer a variety of housing types available at different price points to support long-term sustainability.
- 31 • Towns will be supported in identifying and implementing strategies that reverses the current trend of
32 new residential development occurring primarily outside of centers.
- 33 • Traditional development patterns will be maintained and linear “strip” development will be avoided.
- 34 • New development will be compatible with existing land uses, and consistent with local plans.
- 35 • Historic structures, community facilities, and other buildings will be preserved and adapted for re-
36 use.
- 37 • Brownfield sites will be reclaimed.
- 38 • Significant development proposals will consider the impact on adjacent regions.

1 **STRATEGIES - CENTERS (Regional, Service and Village)**

- 2 • Direct public investment and create financial incentives for the development of a balanced mix of
3 low-income, work-force, and upper-income housing in and adjacent to village centers and
4 downtowns, with the goal of allowing all communities to develop into high-opportunity areas.
- 5 • Direct public investment for new elderly and affordable housing to town and village centers in
6 locations with access to public transportation routes. Aside from promoting traditional settlement
7 patterns, this will put seniors closer to such amenities as shopping, and community facilities, and
8 enable income-stressed residents to have cost-saving access to services, employment centers, and
9 public transportation options to places of employment.
- 10 • Work with housing developers and communities to assure that all residents have the opportunity for
11 access to high-performing schools and economically-sustainable employment.
- 12 • Assist communities applying for designation under the Vermont Downtown, Village Center, and/or
13 Neighborhood Development Programs where appropriate to encourage mixed-use development
14 (residential, commercial and appropriate light-industrial) in centers.
- 15 • Encourage adaptive reuse of historic structures through tax incentives, tax credits, grants, and loans,
16 assistance in location of funding, etc.
- 17 • Encourage desired town center development through investment, maintenance, and expansion of
18 appropriate infrastructure (sidewalks, water and sewer, parking, public spaces, etc.).
- 19 • Support beautification efforts in town centers and downtowns.
- 20 • Encourage towns to plan for community recreational and social needs.

21 **STRATEGIES RURAL AREAS**

- 22 • Avoid the development of agricultural lands with auto-dependent residential subdivisions by
23 encouraging towns with land use regulations to lower the permitted residential density in agricultural
24 zones, coupled with planned unit development or clustering provisions to ensure efficient and well-
25 designed developments.
- 26 • Protect against the fragmentation of rural lands by the piecemeal development of residential lots by
27 providing financial incentives for the development of attractive work-force and upper-income
28 housing in and adjacent to village centers and downtowns.
- 29 • Support local conservation efforts.
- 30 • Encourage community open space plans and recreation infrastructure, recognizing that privately-held
31 land will not be available unless protected through the purchase of conservation and access
32 easements.

33 **STRATEGIES INDUSTRIAL PARKS**

- 34 • Assist Towns in identifying in their Town Plans appropriate areas for the development of industrial
35 or manufacturing uses, based on the location of natural resources and existing transportation and
36 utility infrastructure.
- 37 • Assist Towns in marketing potential locations for industry to the business community.
- 38 • Assist Towns with the assessment and remediation of Brownfields in order to revitalize and re-use
39 existing industrial infrastructure where appropriate for future industrial uses.

and in cold temperatures, battery storage, and affordability. Table 2.19 uses vehicle counts from American Community Survey to identify targets for achieving fuel switching goals for LDVs.

By Year	2025	2035	2050
Estimated number of light-duty vehicles	53,153	56,874	60,855
# of EVs	5,618	17,937	38,603
% of LDVs	11%	32%	63%

V. ENERGY RESOURCE ANALYSIS AND RECOMMENDATIONS

The 90x2050 projections – which will nearly eliminate the use of fossil fuels—will require transferring many of our uses to electricity. Therefore, even while electrical systems, appliances, and vehicles will likely continue to increase in efficiency, more electricity will need to be produced. Some of that will come from imported sources, such as hydroelectricity from Hydro Quebec and other providers, but much of it will also need to be generated by in-state renewable facilities as well.

90x2050 projections indicate that residential non-thermal electrical use alone could exceed 614,000 MWh by 2050. Additionally, conversion to light-duty EVs could require more than 135,000 MWh over that same period. Understandably, these projections counter earlier regional estimates, which showed only modest increases in regional electrical consumption to 462,353 MWh by 2020.¹⁵ It is important to remember that the 90x2050 projections incorporate sweeping and long-range changes to the way we live and work.

Where – and how -- would energy generation occur? In support of the 90x2050 goals, each region has a set of generation targets. Because our region already generates a disproportionate share of energy relative to our low population, the Northeast Kingdom’s new generation targets are the lowest in the state. (Table 2.19) While generation targets can be met through a variety of renewable technologies, the Northeast Kingdom does not have any generation targets specific to wind. Nevertheless, great care and consideration shall be given to the siting of new generation.

Policy Statements

This region has a responsibility to plan for adequate supply of energy to meet local energy demand. Planning activities may include the production, storage, siting, and distribution of energy. Individuals, businesses, organizations, and communities are encouraged to explore emerging energy supply, efficiency, and net-metering opportunities that meet accepted environmental standards in order to satisfy their power demand.

New industrial/utility energy development shall meet the highest standards required by law. Permitting authorities shall first consider current and historical land use and the culture of the region, community opinion, economic benefit, as well as the land owner’s rights. Any development shall to the extent possible be done so as to mitigate adverse impacts to the region. Any utility-scale energy generation project deemed acceptable by the Public Utility Commission shall

Regional	New MWh
Addison	172,978
Bennington	293,182
Central Vermont	418,530
Chittenden	845,236
Lamoille	185,927
Northeastern	18,680
Northwest	260,438
Rutland	439,276
Southern Windsor	194,612
Two Rivers	396,631
Windham	97,716

¹⁵ NVDA Wind Study Report, March 26, 2015

include a plan for distributing benefits to the towns in the region proportional to the adverse effects experienced by that town. Long term maintenance, safety issues, decommissioning, and land reclamation procedures required at the end of the energy project's life must also be included in the project plan.

This plan aims to balance environmental quality and important natural resources with energy production. Significant local and regional support and clearly demonstrated benefits should exist in any energy proposal. This is especially relevant when siting commercial- or utility-scale wind facilities, which could have impacts on neighboring communities. "Commercial" and "utility" are defined in this plan as:

Commercial-scale: facilities with a capacity of more than 10 kW (which would be considered residential), but less than 100 kW. These structures typically have a height of just over 120 feet. (The wind tower at Burke Mountain is 123 feet high.) These structures are referred to as "business-scale" in the Vermont Renewable Energy Atlas.

Utility-scale: Wind turbines with a capacity of 1MW or more. These structures are referred to "commercial scale" in the Vermont Renewable Energy Atlas.

The region has recently experienced a sharp increase in the number of renewable energy applications which will worsen already congested transmission, particularly in the Sheffield-Highgate Export Interface (SHEI), where several existing generators are frequently curtailed by the ISO. While NVDA encourages appropriately scaled renewable energy development, NVDA has a commitment to ensure that such development is sustainable and feasible and does not merely substitute one renewable resource with another. NVDA supports energy development that will not exacerbate curtailment at issue within the SHEI. It is unlikely that any single solution will solve congestion within the SHEI and, as such, it is anticipated that incremental progress will be achieved as partial solutions are implemented. In the meantime, NVDA will support projects that are consistent with the land use and conservation measures in this plan and in duly adopted plans of impacted municipalities. Additionally, we will expect project developers to work with utilities and other stakeholders to explore innovative strategies that shift generation away from the hours when generation exceeds load within the SHEI area or otherwise avoids exacerbating congestion on the grid. An example of such a project would pair a battery with a solar facility to control when the project's power is exported to the grid. In determining support for such a measure, NVDA will seek guidance from the long-range Transmission Plan and Integrated Resource Plans in the region and will consult with utilities, VELCO, and other stakeholders.

Siting Potential

This plan is accompanied by a series of maps (Appendix C) that can assist in the process of identifying potential areas for siting and quantifying generation output. Underlying assumptions were made about suitability factors, such as slope and direction of land, elevation and wind speeds, and access to three-phase power. Additional statewide layers identified *known* constraints and *possible* constraints, and a third layer has identified *regional* constraints:

Known constraints are areas not likely to be developed for renewable energy because they contain one or more of the following: vernal pools; river corridors; FEMA floodways; significant natural communities; rare, threatened and endangered species, national wilderness areas, wetlands (Class 1 and Class 2).

Possible constraints are areas that would likely require mitigation because they contain the one or more of the following: agricultural soils; special flood hazard areas (outside of the floodway); protected (conserved) lands; deer wintering areas; Act 250 mitigated agricultural soils; hydric soils, and highest priority forest blocks.

Regional constraint: NVDA’s regional plan has long held that rural areas should receive very little commercial or industrial development unless it occurs in an established industrial park, or in an area specifically designated in the local bylaw or plan as being well suited to such uses. Lands with an elevation of 2,000 feet or more merit consideration as a special class of rural lands that should be protected from any large-scale commercial or industrial development characterized by a constructed height of 100’ or more, and an acre or more of permanent site disturbance, such as clear-cutting. These lands, as indicated on attached siting potential maps, contain one or a combination of factors that make them unsuitable to such development – contiguous forest cover; sensitive wildlife and plant habitat; conservation lands and recreational assets; managed forestland; and headwaters and ephemeral surface waters, which are highly vulnerable to erosion and man-made disturbance. This high-elevation forest cover must be kept unfragmented for the attenuation of flood flows, the benefit of wildlife habitat and linkage, and public enjoyment through passive recreation.

The maps accompanying this plan do not carry the weight of zoning, and the siting of renewables on prime acreages (i.e. without known constraints) is not a foregone conclusion. Rather regional maps should be viewed as a starting point for our member municipalities to determine suitable and unsuitable locations for renewable energy development. This plan’s siting considerations for each specific energy technology on the following pages should not be considered exclusive. They too should be seen as a starting point for creating effective local specification and constraints.

Our estimates for potential generation outputs are therefore deliberately conservative to account for the designation of local siting constraints. In most instances, only *prime* acreage (areas with no constraints at all) were used to calculate output potential. Even with a highly conservative estimate, potential generation vastly exceeds the regional generation target. This plan strongly encourages municipalities to conduct additional site investigations to identify local constraints (as well as preferred sites in addition to existing statewide preferred sites) in order to address the environmental, aesthetic, civic, economic, and cultural concerns unique to each community.

	MW	MWh
Residential rooftop solar generation	15.0	18,412.2
Small commercial rooftop solar generation	3.0	3,343.2
Large commercial rooftop solar generation	5.9	7,225.9
Ground mounted solar	652.6	800,340.3
Wind (residential scale only)	13.6	23,405.2
Methane Digesters	430.0	2,260,080.0
Hydro	2.9	10,238.6
Total Generation	1,123.0	3,123,045.4

Solar

Total output potential:	829,321.6 MWh
Rooftop assumptions:	NVDA assumed one out of every 10 residential structures (including seasonal, many of which are inhabited part-time year-round). The region has relatively few commercial structures, so NVDA determined small commercial suitable for solar (less than 40,000 sq. ft.) for solar to be 10% of all commercial structures, and large commercial

Overall solar resources in Vermont are quite good, and solar energy can be harnessed effectively for primary and secondary energy needs. The two main types of solar energy systems are photovoltaic (PV), which generates electricity, and solar thermal, which generates hot air or hot water for water and/or space heating. For some

	structures suitable for solar (more than 40,000 sq. ft.) to be just 3% of all commercial structures. The number of commercial structures was determined with NAICS classification counts used for determining commercial thermal energy use. (See Appendix B.)
Ground mounted assumptions:	Approximately eight acres of land are required to produce one MW of solar energy. In order to account for contingencies (property owners not interested in leasing their land, interconnection costs that may be too high, and unsuitability of specific sites) NVDA estimated only 1MW for every 60 prime solar acres. Acres with possible constraints were not included in the calculation.

homeowners in our region, solar electricity systems have proven more cost effective than extending power lines to the home. A typical off-grid system consists of photovoltaic (PV) modules that convert solar energy to electricity, batteries that store the electricity (if off-grid), and an inverter that converts DC power to AC for use in conventional electric appliances. As a rough rule of thumb, a 1 kilowatt photovoltaic system can be expected to produce 3-3.5 kWh/day on average in Vermont.

Solar water heating systems typically utilize collectors to capture the sun’s energy, a pump to circulate a solution through the collectors to extract heat energy, and a well-insulated storage tank to hold the heated water for use as needed (this can be integrated with an existing water-heating system). An appropriate size solar water-heating system can provide one-half to two-thirds of a household’s annual hot water needs – typically 100% in summer, but as little as 25% in winter. In Vermont, these types of systems tend to pay themselves off in less than two decades.

Solar energy can also be harnessed through passive solar design (day-lighting and space heating) with Green Building Design. This includes orienting buildings close to true south, as well as using appropriate windows on the south wall, installing thermal mass (brick, concrete, or water) to store the sun’s energy, and using appropriate levels of insulation. Through these designs, as much as 60% of a building’s space heat can be derived from the sun. This type of heating is termed “passive solar” because no moving parts are needed, the collection and storage system is built into the structure. Green Building Design principles also attempt to maximize the amount of natural light a building receives, in order to reduce the energy costs associated with daytime lighting.

Active and passive solar systems are custom built based on the building site, building and purpose of the solar system. There are many factors that bear on siting solar systems. Many homes and businesses have good rooftop sites, or good sites nearby for ground mounted systems. Unfortunately, some do not, such as properties where there is limited southern exposure. One way to address this situation is through the development of “community-sized” PV projects or co-operative systems on the order of a few hundred kilowatts up to a few megawatts. There are a number of community solar sites in our region, which also allow renters and homeowners where rooftop solar will not work to take advantage of solar by “sponsoring” an off-site panel. Utility-scale PV developments are also becoming popular in other areas of the U.S. Often referred to as solar parks, farms, or ranches, these utility-scale PV installations are designed for the sale of merchant power (MWh) into the electric grid and can utilize several acres of land. Public concerns surrounding solar installations of this size usually focus on aesthetics and transmission line development.

Siting policies for solar:

- NVDA has determined that the following types of locations in the region should be prioritized for future solar generation. Even though these locations are not shown on the

regional solar maps due to a lack of GIS data, these sites should be considered “preferred locations” for siting solar:

- Rooftops of structures, residential and commercial. (Our conservative estimates show the region’s total potential output from rooftop solar alone could amount to 23.9 MW, or 6.3% of the high end of the LEAP model projections for solar for 2050 of 377.2 MW).
 - Brownfield sites not located in a designated downtown or village center
 - Earth extraction sites (e.g. gravel pits, quarries), active or abandoned
 - Parking lot canopies and surface parking lots
 - Farms, where more than 50% of the power generated is used by the farm
 - Industrial parks, where more than 50% of the power generated is used by the tenants of the industrial park
 - Undersized lots and otherwise undevelopable land in existing industrial parks
- The Northeast Kingdom has a robust agricultural economy, and NVDA discourages siting ground-mounted solar in a manner that fragments productive agricultural soils, effectively removing farmland from production for decades. To this end, NVDA encourages municipalities to explore and identify local constraints that minimize farmland fragmentation. These measures may include agricultural overlays (regulatory), as well as conservation easements (non-regulatory). A number of land exploration tools, such as land evaluation and site analyses (LESAs) can help municipalities prioritize agricultural lands for protection. NVDA will assist local planning commissions to identify local constraints as appropriate.
 - Notwithstanding the above concern, NVDA recognizes that successful integration of solar into active agricultural uses can help farms reduce expense, generate extra income, and remain viable. NVDA encourages on-farm solar that, to every extent feasible, uses existing farm structures, or is sited in a manner that supports grazing, the establishment of pollinator crops, or simply to create buffers between organic and non-organic production areas. NVDA will showcase best on-farm generation practices in the region and will cite “[Guide to Farming Friendly Solar](#),” produced by the Two Rivers Ottauquechee Regional Planning Commission, as a vital resource.

Wind

Total output potential:	23,405.2 MWh
Assumptions:	In accordance with Act 174 guidelines published in March of 2017, regional plans are allowed to submit plans to the Department of Public Service that do not establish targets for utility scale wind. This is especially important for the Northeast Kingdom, which has no targets for wind generation due to the existing level of production. When accounting for NVDA’s regional constraint, the balance of prime wind acreages is just over 38,000. We estimate that new generation will be primarily farm- and residential-scaled. Even though no significant acreage is required for a farm- or residential scaled turbine, NVDA’s estimate

REGIONAL ENERGY GOALS & STRATEGIES

An adequate, reliable, diverse, and secure energy supply will benefit the region.

- Promote a diversified energy portfolio for the region.
- Support the upgrade of regional transmission systems to continue to reduce constraints.
- Support the maintenance and upgrade of existing energy generation facilities and related infrastructure.
- Encourage local responders to plan for emergency energy resources (VEM Emergency Generator Grant Program generators).

Affordable energy alternatives will be available for the region's users that decrease the region's reliance on fossil fuel.

- Assist in the development of businesses that support alternative energy use.
- Work with Tier 3 energy service providers to promote the installation of cold climate heat pumps and geothermal systems by facilitating outreach and education on their benefits.
- Partner with Efficiency Vermont and Tier 3 energy service providers to increase the use of efficient wood heat and biomass systems.
- Support the development of small-scale renewable resources, such as wind and solar, and the use of supplemental sources (wood) to stabilize energy costs.
- Promote and support rail infrastructure as a cost-effective transportation resource for the energy industry.
- Encourage and support agricultural production of biofuels and oilseed crops and explore ways to broaden access to processing infrastructure.
- Identify potential users of district heating and wood heating systems and provide assistance to communities seeking to develop them.
- Encourage the legislature to increase incentives and rebates for efficient wood heat systems.
- Provide outreach and education among vendors, contractors, and the general public through venues such as tradeshow and workshops.
- Provide communities with an analysis of potential areas that are suitable for ground source heat pumps.
- Support upgrade and trade-out programs and incentives for older, higher emission wood burning stoves and boilers.

Decrease the region's reliance on single occupancy vehicle trips and gas/diesel powered vehicles.

- Continue to advocate for better telecommunications infrastructure so employees can work from home.
- Encourage local employers to reduce VMTs through programs such as ride sharing and Go Vermont.

Energy generation that provides the best cost-benefit to the region will be promoted.

- Promote wood-based energy generation to support the region's forest industry.
- Encourage the development of energy facilities and resources that help sustain local agriculture and forestry (i.e. grass/wood-pellets, small-wind, solar, farm-methane, wood-chip, biodiesel).

Environmental and aesthetic impacts of energy generation and usage will be considered.

There will be broad public participation in the decision-making process.

- Encourage the Vermont Legislature to develop policies that support the development of solar, small-wind, hydro-electric, farm methane, biodiesel and biomass generation facilities, while respecting current local land use and the culture of the region.
- Encourage the PUC to examine the long-term sustainability of proposed facilities.

Assessment of local needs and values on new energy development will be encouraged.

- Encourage towns to address energy development in town planning and zoning.
- Provide assistance to businesses/municipalities to develop cogeneration and other alternative energy strategies.

Reduce the region's carbon footprint through the expansion of a closed loop soil-to-soil regional food system that sustains and feeds the people of the Northeast Kingdom.

- Coordinate movement and storage of goods to achieve maximum efficiency.
- Redirect food scraps and other organics from the waste stream in a manner that maximizes efficiency and minimizes hauling.
- Support and further the goals and strategies of the NEK Food System Plan through its Leadership Group.
- Identify and publicize opportunities for shared truck space among existing growers and producers.
- Generate better awareness of existing distribution resources, such as freight service.
- Identify and publicize opportunities for shared storage space among existing growers and producers.
- Explore the feasibility of establishing a leased storage facility.
- Assess market demand for products and existing shippers and distributors already moving to external (New York and Boston) markets (including opportunities for backhauling).
- Identify infrastructure needed to maximize inbound, outbound, and internal freight movement.
- Promote the use of and increase the amount of on-farm power and community energy generation and the use of renewable energy for farming and food production (such as

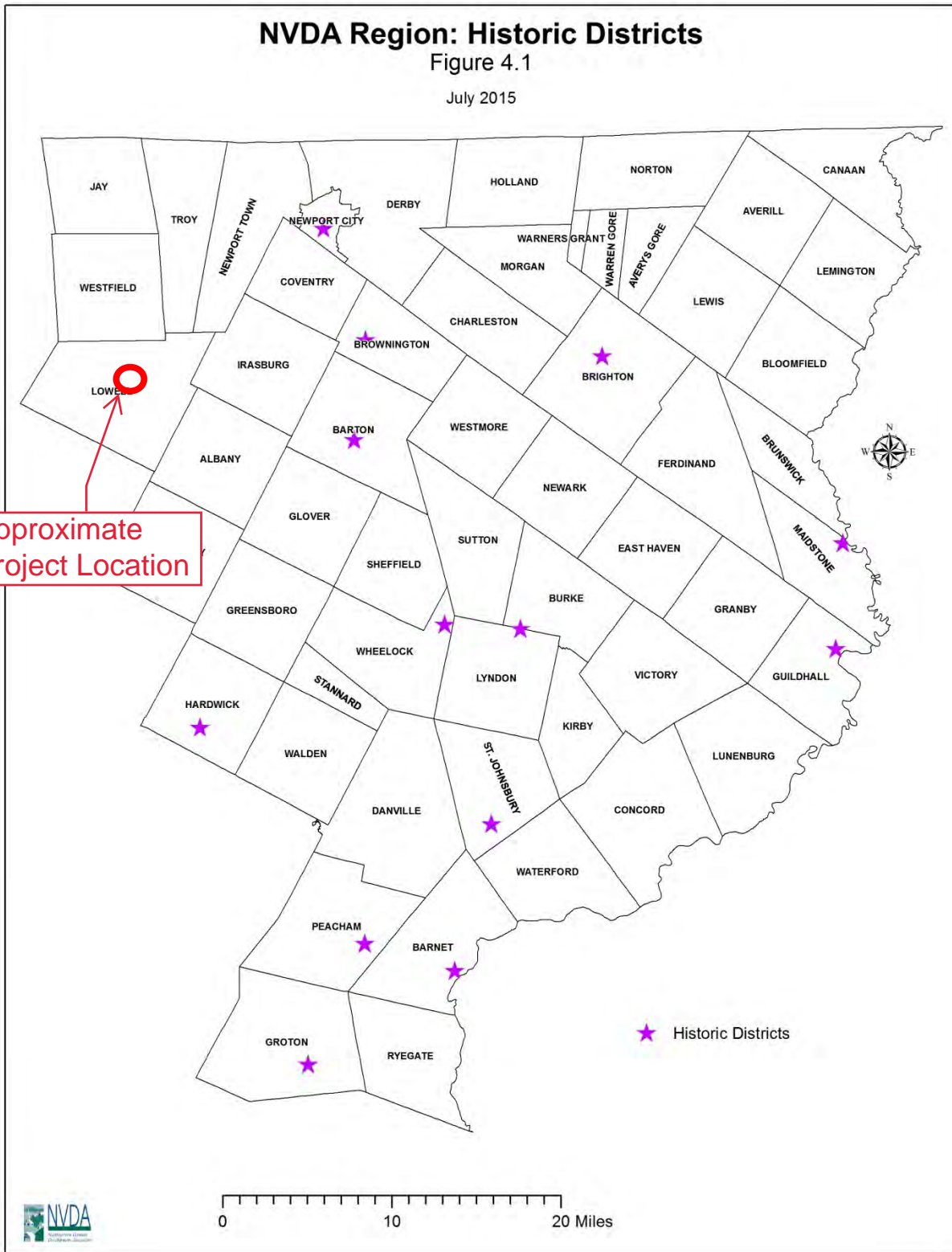
Chapter Four: Historic, Cultural & Scenic Resources

I. HISTORIC & SCENIC RESOURCES

Preserving historic, archeological, and scenic resources enables communities to retain links to their past, maintain their traditions (including quality of life), and can bring economic benefits through increased property values and tourism. Indeed, there are federal and state programs to assist communities with preservation. Tourism has been increasingly beneficial for much of the New England region, and particularly for Vermont due to its abundance of scenic resources. The Northeast Kingdom is fortunate to have communities that have already identified some of their assets and protected a significant number of historic resources. These include historic districts, a large number of historic buildings, archeological sites, covered bridges, barns, and areas of natural or scenic beauty. Despite the work that has already been done, there are many historic, community buildings and meeting houses still in need of restoration and preservation. Table 4.1 gives some representation of the existing historic and cultural resources within the region. For more information on individual properties listed on the state and national registers, go to <http://orc.vermont.gov/Resource/Show-Resource-Table.aspx>

Table 4.1: Northeast Kingdom Historic Districts and State Parks Listed on the National Register of Historic Places

Caledonia County:	Date
Barnet Center Historic District	07-12-1984
Darling Estate Historic District, Burke and Lyndon	08-23-2011
Downtown Hardwick Village Historic District	09-30-1982 Boundary increased 03-10-2004
Hardwick Street Historic District, Hardwick	06-22-1979
Maple St./Clarks Ave. Historic District, St. Johnsbury	04-05-1994
Peacham Corner Historic District, Peacham	12-18-2003
Railroad Avenue Historic District, St. Johnsbury	06-25-1974
Ricker Pond State Park, Groton	03-29-2002
St. Johnsbury Historic District (extension of Railroad Street district to include Eastern Avenue and connect with Main Street)	04-28-1980
St. Johnsbury Main Street Historic District (along Main Street, Eastern and Western Avenues, Park and Belvidere Streets, and Summer Street Common)	05-28-1975
Stillwater State Park, Groton	02-29-2002
Wheelock Common Historic District, Wheelock	08-30-2007
Essex County:	
Guildhall Village Historic District	09-27-1980
Maidstone State Park	11-29-2001
Island Pond Historic District, Brighton	01-31-1979
Orleans County:	
Brownington Village Historic District	05-09-1973
Crystal Lake Falls Historic District, Barton	07-07-1994
Crystal Lake State Park, Barton	08-30-2005
Newport Downtown Historic District, Newport City (Main, Coventry, Central, Second Summer, Third, School, Bayview, Eastern, Field, Seymour, Fyfe)	09-28-2006
Source: National Park Service	



2
3

Each historic district also contains a number of properties listed on, or eligible for the National Register.

1 Fairbanks, and Maple museums in St. Johnsbury. Each of these has a wide array of exhibits and programs for
 2 all ages. Table 4.5 lists the region's resources for historic information and museum collections.

3

Table 4.5: Historical and Museum Collections in the Northeast Kingdom	
	Location
Barnet Historical Society – Goodwillie House	Barnet
Crystal Lake Falls Historical Society - Pierce House	Barton
Old Stone House Museum / Orleans County Historical Society	Brownington
Alice Ward Library	Canaan
Concord Historical Society (http://www.concordvthistorical.noconek.com/)	Concord
Craftsbury Public Library	Craftsbury
Derby Historical Society	Derby
Hardwick Historical Society (Memorial Bldg.)	Hardwick
Haskell Library and Opera House	Derby Line
White School Museum	East Burke
Bread and Puppet Museum	Glover
Greensboro Historical Society	Greensboro
Holland Historical Society	Holland
Island Pond Historical Society	Island Pond
Shores Memorial Museum	Lyndon Center
Goodrich Memorial Library	Newport
Missisquoi Valley Historical Society	North Troy
Peacham Historical Society	Peacham
Maple Grove Museum and Factory	St. Johnsbury
St. Johnsbury Athenaeum	St. Johnsbury
St. Johnsbury History & Heritage Center	St. Johnsbury
Fairbanks Museum and Planetarium	St. Johnsbury
Stannard Historical Society	Stannard
Hitchcock Memorial Library and Museum	Westfield
Source: NVDA 2015	

4

5 **GOALS AND STRATEGIES FOR HISTORIC, CULTURAL & SCENIC RESOURCES**

6 **HISTORIC, CULTURAL & SCENIC RESOURCE GOALS**

- 7 • Future development should follow traditional development patterns, while providing for economic
 8 development opportunities and livable communities.
- 9 • Significant historic, cultural, and scenic resources within the region should be identified and
 10 preserved.

11 **HISTORIC, CULTURAL & SCENIC RESOURCE STRATEGIES**

- 12 • Promote local and regional tourism, since it is an important part of our economic base.
- 13 • Assist communities to preserve and maintain historic downtowns, village centers, buildings, and rural
 14 and scenic landscapes.

agriculture and forestry. The forestry subcommittee of the WLEB has created an “asset map” that includes information on the location and scale of facilities and businesses within the primary and secondary forestry industry. (<http://workinglands.vermont.gov/node/736>) Additionally, the Vermont Department of Forests, Parks, and Recreation hosts an online searchable directory of Vermont sawmills and veneer mills which is intended to help connect wood-using industries in the state to other businesses, as well as to policy and decision makers. (http://fpr.vermont.gov/forest/forest_business/sawmills) As of 2017 there were a total of 83 sawmills in the state, 19 of which were in the Northeast Kingdom: 9 in Caledonia County, and 10 in Orleans County.

Other industry support groups and programs include the Vermont Wood Manufacturer’s Association, Vermont Technical College, the Vermont Community College System, the University of Vermont’s Forestry Department, and the Small Business Development Center Program.

Sustainable Forestry

Keeping forests healthy simply makes economic sense. Many Vermont landowners already practice what is considered "sustainable" management without being certified. However, for consumers wishing to promote good environmental stewardship, certification is the only way to distinguish between wood products from an ecologically-sound forestry operation and wood from a less ecologically-sound operation. A growing number of consumers are willing to pay higher prices for certified wood from the former, and it may benefit landowners and manufacturers to be recognized for their responsible practices.

There are a number of certification programs available to landowners and forest product manufacturers. Third party certification involves an independent audit of forest management practices and certification that forestland is being managed in a sustainable fashion. Once certified, landowners can gain access to markets for sustainably produced wood products.

Certification programs are available through the Forest Stewardship Council, Vermont Family Forests, Sustainable Forestry Initiative and the Vermont Tree Farm Program. Because the cost of certification can be prohibitive for small operations, there is certification available for groups of landowners at lower costs. Certification is also available to groups of manufacturers.

The Vermont Sustainable Jobs Fund created the “Green Guide Specs,” last updated in 2009, for use by architects, builders, facility managers and communities as a way to assist them in sourcing third-party-certified Vermont forest products for construction projects.

Visitor and Tourism (Star)

This industry cluster, which consists of leisure, hospitality, and recreation, has experienced significant growth, due in part to investments that have helped to make the region a year-round destination. Though these developments will continue to add jobs to its solid base of nearly 1,000 workers; wages remain relatively low within this industry.

The cluster thrives on a nexus with farming and forestry, which lend authenticity to the visitor experience. The working landscape has a noted “multiplier effect” on visitor and tourism businesses. Agri-tourism, which includes farm stays and tours and direct marketing of local agricultural products, is a growing trend within the region, as is eco-tourism. Forest-related recreation and tourism contribute about \$1.9 million annually to the state’s economy.⁶

Among the leading leisure and hospitality industries in the area, the Jay Peak Resort continues its expansion with the addition of new facilities, equipment and new ski runs. From the continuing development of seasonal homes, hotels, condominiums, and recreational facilities Jay Peak Resort has become a four-season vacation resort. To provide some perspective on Jay’s contribution to the regional economy, rooms tax

⁶ 2013. The Economic Importance of Vermont’s Forest-based Economy, Northeast State Foresters Association.

receipts in Jay (town wide) account for more than 83% of all room tax receipts in the Essex/Orleans area. Burke Mountain has also made recent expansions, including a 100+ unit hotel, and recreation facilities.

The regional tourism industry also incorporates activities such as: biking, snowmobiling, hunting, cross-country skiing, and hiking to attract numerous visitors to the Northeast Kingdom. Along with the Jay Peak Resort and Burke Mountain, the four-season destinations mentioned above, there are numerous cross-country ski and cycling centers in the region. Kingdom Trails, the Craftsbury Outdoor Center, the Northwoods Stewardship Center, Lyndon Outing Club, Mempremagog Ski Touring Association, and Jay Peak include a thorough network of cross-country ski and cycling trails. The Vermont Association of Snow Travelers (VAST) has an extensive system of trails throughout the region for snowmobiles. As the Lamoille Valley Rail Trail continues to develop, this will bring additional visitors to the NEK region.

Fishing and boating are popular activities on the region's many lakes and streams. Recognized water trails located within the Northeast Kingdom include the Passumpsic Valley Riverway, a 20-mile water trail from East Burke to Barnet; the Northern Forest Canoe Trail, a 723-mile historic trail, follows a route used by native Americans to move from Lake Champlain to the Connecticut River Watershed; and the recently designated Connecticut River Water Trail are all popular canoeing waters. In the northwest part of the region, the Missisquoi River was recently designated as Wild & Scenic River by the federal government.

Fall foliage and scenic landscapes continue to be popular attractions. The Northeast Kingdom has developed a reputation as one of the best places to bicycle in the country. Many cyclists come during the foliage season or during the summer months, and most tour along the state highways. NVDA, with Agency of Transportation financing assistance, has identified a network of on and off-road bicycle touring routes throughout the Northeast Kingdom, consisting of a “loop and link” system, with courses ranging from 10 miles to 80 miles. Kingdom Trails, in East Burke, has an extensive all-season trail network, which is nationally popular with mountain bike enthusiasts (60,000+ visitors annually) and cross-country skiers. Other bicycle path projects are still in the planning stages including paths in St. Johnsbury and Newport.

Education and Knowledge Creation (Opportunity Cluster)

Composed of private education services, publishers and other information services, the education and knowledge creation cluster is in its incipient stage. This cluster showcases a number of nationally (and internationally renowned) educational institutions such as the St. Johnsbury Academy, Burke Mountain Academy, and Sterling College. While connections with other sectors of the regional economy are currently limited, forging stronger partnerships with these institutions (as well as the region's Career and Technical Centers) will be critical to building a skilled labor force.

Other Sectors

Health Care

The Northeastern Vermont Regional Hospital in St. Johnsbury and the North Country Hospital in Newport are among the largest employers the Northeast Kingdom. Employee counts in Essex are suppressed, but this sector, along with social assistance and education, make up the largest employment sector in the Northeast Kingdom.

Retail

Retail trade remains a challenge for many Northeast Kingdom communities. Taking into account the region's low population densities and changes in the retail industry, it has been difficult to attract or retain retailers of all sizes. There has been some growth through the ‘dollar store’ chains in a number of communities – Island Pond, North Troy, Hardwick, and Orleans. Other retail businesses that have located or remained in the region have often found the best strategy is to identify and concentrate on “niche” markets for specialty goods and services. These are areas where large retailers typically cannot compete efficiently or effectively. With a new Wal-Mart Supercenter in Derby, this strategy may make sense. Local merchants have been able to

Chapter Seven: Natural Resources

I. OVERVIEW

The Northeast Kingdom is recognized for its diverse wildlife, large undeveloped areas, and vast woodlands. The region's natural resources (depicted in Figure 7.1 on the following page) provide residents and others a variety of benefits. The largest source of revenue in the region is from outdoor recreation, and much of the tourism industry relies on the healthy and scenic environment to remain viable.

Therefore, the natural resources in the Northeast Kingdom have intrinsic scenic and economic values that require careful consideration when making planning decisions. The overarching goal for the region is to balance local economic needs with the protection of the resources that so many of region's residents enjoy and depend upon.

The Northeast Kingdom lies mostly within three physiographic regions:

- *The Northeast Highlands*, an extension of New Hampshire's White Mountains, make up most of Essex County and northern Caledonia County. On average, this area is cooler than the rest of the state. The growing season here averages less than 90 days and snowfall accumulation frequently exceeds 36 inches.
- In much of Orleans County and parts of Caledonian County the topography is primarily *rolling hills* interspersed with occasional plains of fertile agricultural soils. Both of these physiographic regions have extensive glacial deposits.
- The third region is the *Connecticut River Valley*, which extends the length of the region along its eastern border. Level topography and rich alluvial soils well suited for agriculture characterize this physiographic region.

The forests are mainly northern hardwoods with large stands of red spruce and balsam fir. Black spruce and succession species such as white pine and aspen fill recent clearings. The region contains some of the State's largest bog and wetlands complexes, with fabulous stands of red pine, black spruce, hemlock, northern white cedar and hardwoods dispersed throughout. Essex County has more wetlands than any other county in Vermont.

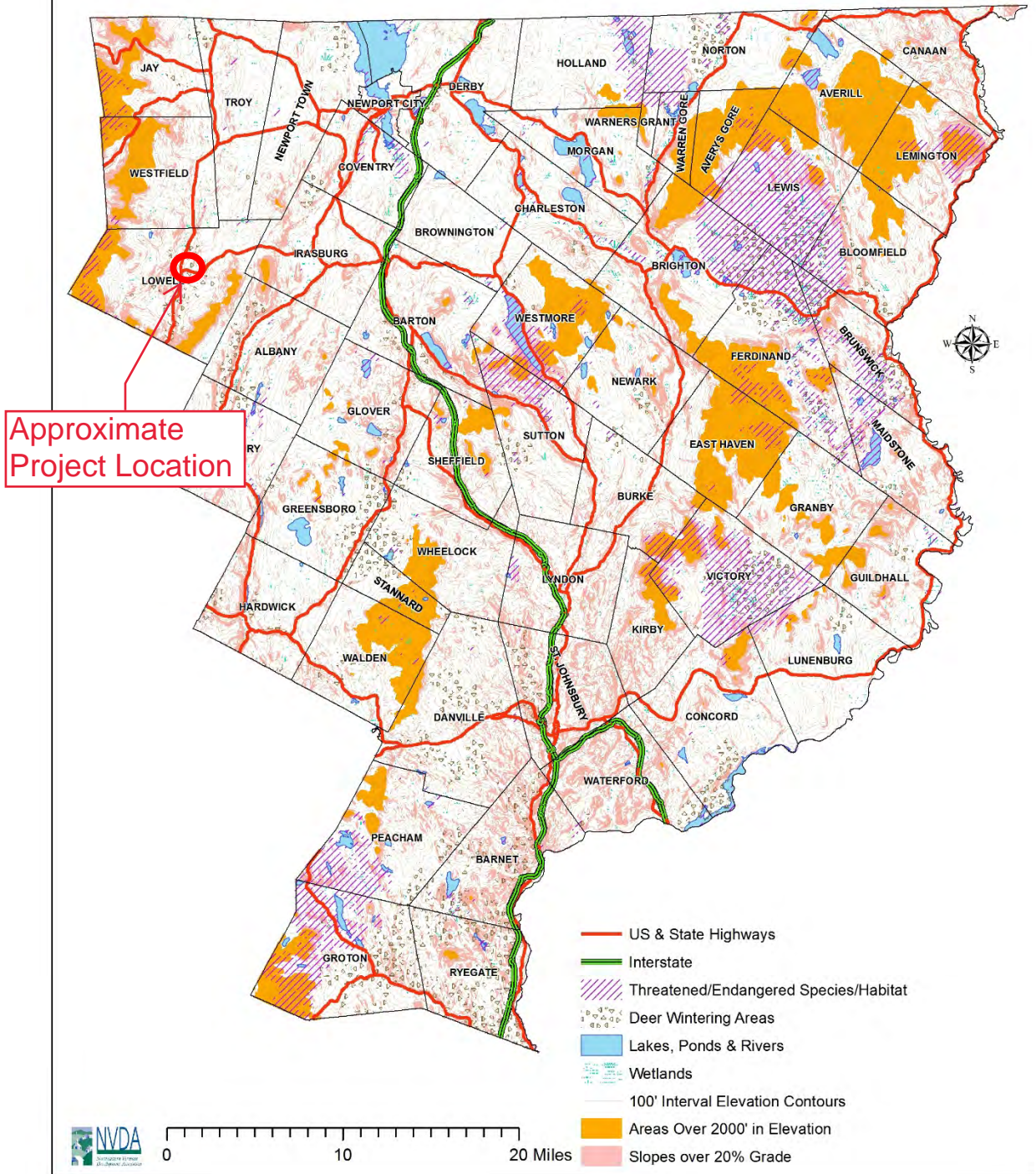
The majority of the region's water drains either north to Quebec as part of the St. Francois River watershed or east and south as part of the Connecticut River watershed. Much of the region's western edge drains north and west as part of the vast Lake Champlain basin. The region's lakes, ponds, streams and rivers are famous for the excellent and diverse fishing opportunities they offer. The more than 130 lakes and ponds found concentrated in the region represent a disproportionately high share of the State's total. This region is home to most of Vermont's larger, deeper lakes and the legendary 20-30 pound lake trout that have inhabited them since the last ice age.

This combination of forest and water resources creates prime habitat for many wildlife species, and draws many tourist and visitors to the Northeast Kingdom to enjoy them.

NVDA Region: Natural Resource Constraints

Figure 7.1

January 2018



Open Space

The Northeast Kingdom is composed of rolling hills, farmlands, lakes and rivers, forests, country roads, and compact village centers. These areas combined create an open, picturesque landscape unlike any other. Open space provides not only scenic beauty and wildlife habitat, but is necessary for the numerous outdoor activities enjoyed by the region's residents and visitors, and is key to the agricultural and forestry traditions of the region. The region contains more than 1,300,000 acres of land. Almost 200,000 acres are either publicly owned or have public recreation/access easements. Many recreational activities rely on private landowners allowing access to their properties, so it is the responsibility of users to respect the landowner and their land. Vermont landowner liability law (12 V.S.A. 5793) maintains "an owner shall not be liable for property damage or personal injury sustained by a person who, without consideration, enters or goes upon the owner's land for a recreational use unless the damage or injury is the result of the willful or wanton misconduct of the owner." Still, according to the Vermont Department of Forests, Parks & Recreation, posting of private land in the state doubled in the last decade from approximately 100,000 acres in 1988 to approximately 250,000 acres in 1997.

Public Lands

The region contains many conserved public lands. Recently, more than 132,000 acres of remote forestland, primarily in Essex County, was conserved by Vermont's largest land conservation project. Of this, 84,000 acres was resold to Essex Timber Co. LLC, with easements to ensure that these lands are conserved as a working forest for the sustainable production of wood products as well as to maintain public access. In the same transaction, U.S. Fish and Wildlife Service formed the Silvio O. Conte National Wildlife Refuge in the towns of Lewis, Ferdinand, Bloomfield and Brunswick totaling nearly 28,000 acres. The 23,000 acre West Mountain Wildlife Management Area was created in this land transfer, as well. The goals of this purchase were to protect public access to the land; conserve and protect biological diversity, wildlife habitat and natural communities; and conduct sustainable management and utilization of forest products.

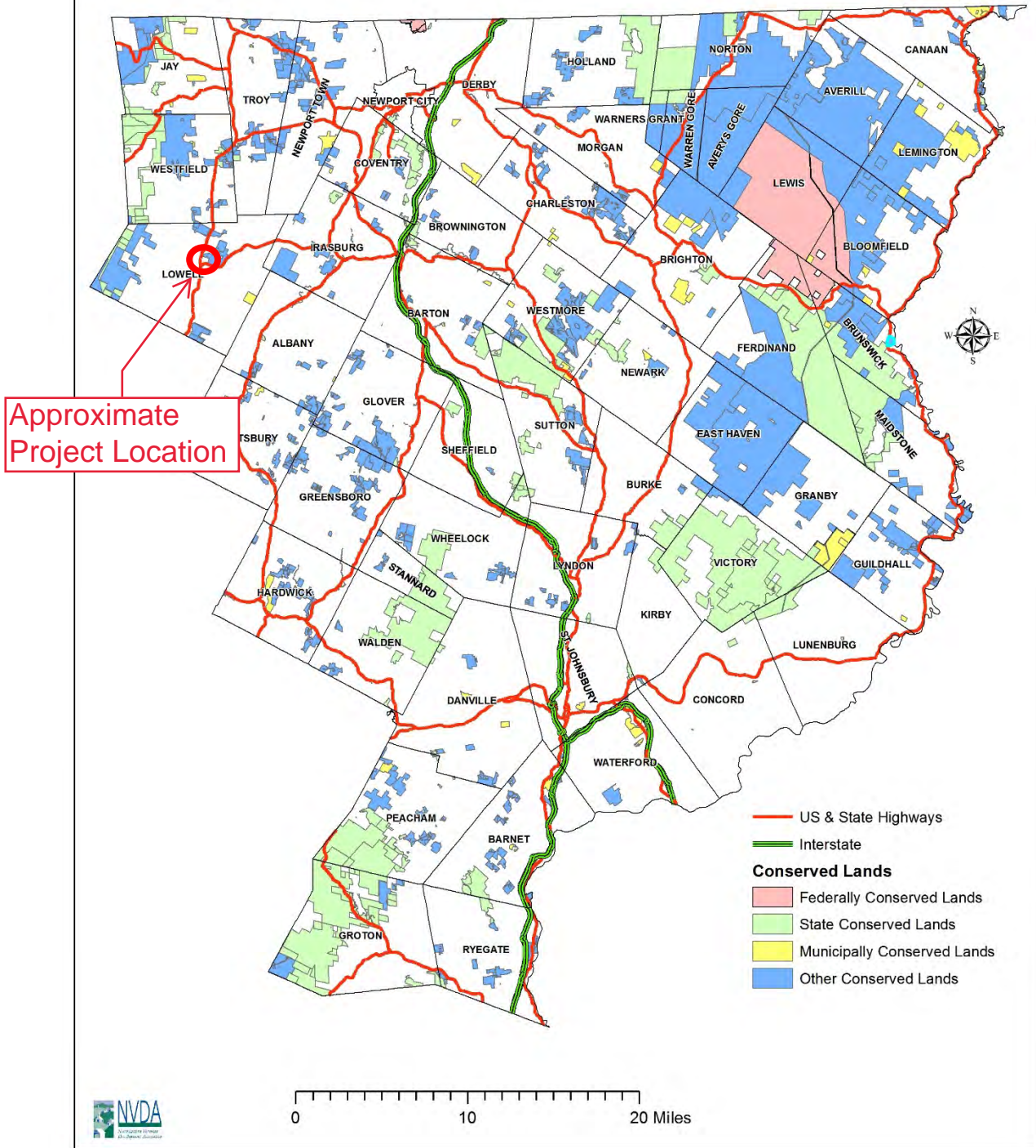
Town	Parcel Name	Acres
Averill	Averill Mountain WMA	510
Newark	Bald Hill Wildlife Management Area	932
Troy	Big Falls SP	16
Holland	Bill Sladvk WMA	9,496
Norton	Black Turn Brook SF	593
Brighton	Brighton SP	152
Sutton	Calendar Brook WMA	340
Barton	Crystal Lake SP	16
Burke	Darling State Park	1,997
Groton, Peacham	Groton SF	23,706
Burke	Hazens Notch SP	307
Sheffield	Holbrook SP	202
Jay	Jay SF	3,877
Peacham	Levi Pond WMA	260
Jay	Long Trail SF	2,774
Lyndon	Lyndon State Forest	72
Maidstone	Maidstone SF	475
Wheelock, Sheffield	Mathewson SF	795
Ryegate, Barnet	Roy Mountain WMA	1,590
Westmore	Sentinel Rock SP	330
Irasburg	South Bay WMA	1,515
Walden, Stannard, Wheelock	Steam Mill Brook	10,421
Victory	Victory Basin WMA	4,970
Victory, Lunenburg	Victory SF	15,997
Barton	Wenlock WMA	1,994
Brunswick, Ferdinand, Maidstone	West Mountain WMA	22,738
Barton	Willoughby Falls WMA	130
Westmore, Sutton	Willoughby SF	7,300

Source: NVDA, 2002

NVDA Region: Conserved Lands

Figure 7.3

January 2018



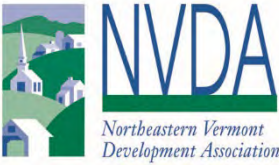
GOALS AND STRATEGIES FOR NATURAL RESOURCES

NATURAL RESOURCE GOALS

- The overarching goal for the region is to balance local economic needs with the protection of the natural resource that so many of the region's residents enjoy and depend upon.
- The quality and quantity of the region's surface waters should be protected, maintained, and restored.
- The quality and quantity of existing and potential groundwater resources should be protected and improved.
- Significant wetlands within the region should be protected. The region's mineral and soil resources should be used in a manner that will support the sustainable growth and development of the region.
- A consistently high level of air quality should be maintained for the health, safety, and enjoyment of the region's residents and visitors.
- Adequate resource information for the region should be maintained to improve the region's ability to plan for protection of wildlife resources in the area.
- Critical wildlife habitat should be protected.
- The native biodiversity of the region should be maintained, and restored when appropriate.
- Private, public and community interests should be considered in matters affecting local recreation and open space.

NATURAL RESOURCE STRATEGIES

- Provide public education on state and local water quality issues as they relate to local planning and development.
- Discourage inappropriate development in flood hazard areas and floodplains. Support compatible land uses in flood areas, such as agriculture and passive recreation.
- Support the efforts of watershed organizations working in the region.
- Coordinate the region's basin planning efforts with local plans and related activities.
- Encourage and assist communities to identify and protect community water supplies. Education on water conservation and resource protection should accompany these efforts.
- Prevent the degradation of significant wetlands through public education.
- Minimize the negative impacts of mineral and earth resource extraction and processing facilities.
- Support development of new markets and uses for local mineral resources. Encourage the use of locally obtained minerals for building construction and highway construction and maintenance.
- Support efforts to reduce air pollutants generated in the region from the residential, commercial, industrial, and transportation sectors.



Memo

TO: Department of Housing and Community Development,
Agency of Natural Resources
Agency of Agriculture, Food and Markets
Chairs of the Legislative Bodies of the Northeast Kingdom
Executive Director of Northwest Regional Planning Commission
Executive Director of Central Vermont Regional Planning Commission
Executive Director of Lamoille County Regional Planning Commission
Executive Director of Two Rivers-Ottawaquechee Regional Commission

FROM: David Snedeker, Executive Director

DATE: June 20, 2023

RE: Update and Readoption of Northeastern Vermont Regional Plan

The Northeastern Vermont Development Association is proposing to re-adopt the Regional Plan for the Northeast Kingdom 2015-2023. The current plan expires August 27, 2023. Per 24 VSA 117 § 4348b, the following assessment report is included:

(A) The extent to which the plan has been implemented since adoption or re-adoption.

Since adoption of this Plan in 2015, the Northeast Kingdom has continued to experience limited yet incremental growth. As noted in the Plan, the natural beauty and wholesome quality of life in the Northeast Kingdom continues to drive growth and change. The Regional Plan notes that while we are “within a day’s drive of more than 70 million people, the region has become a recreational playground for many out-of-area visitors. Others are seeking to permanently escape the rigors of urban life elsewhere and relocate to the region.” Climate and affinity migration, which intensified during the pandemic, as well as major recreational investments such as the completion of the Lamoille Valley Rail Trail, have intensified those outside interests noted in the 2015 plan, presenting both challenges and opportunities.

As noted in the 2015, we recognize that the cumulative effects of unplanned or uncoordinated growth will have a deleterious effect on our rural communities -- and may negatively affect local economies and the quality of life our residents have come to enjoy and expect. Therefore, our overarching goals remain unchanged:

- **We strive to retain and strengthen existing businesses while creating new economic and employment opportunities for residents from all walks of life.** To this end, we have engaged in public and private partnerships to expand commercial and industrial opportunities such as the repurposing of the Bogner Building in Newport. NVDA also receives and administers funds from EPA to remediate brownfields and provides grant writing and administration to support economic and community development projects. NVDA’s region is part of the 115 municipalities of the Northern Vermont Economic Development District (NVEDD), which consists of

Caledonia, Essex, Franklin, Grand Isle, Lamoille, and Orleans Counties. The district maintains an approved Comprehensive Economic Development Strategy approved by the Economic Development Administration.

- **We must provide quality educational opportunities and skills training for all jobs seekers to make the region’s workforce more attractive to employers.** NVDA has supported Do North Coworking to facilitate KickstartNEK, a 10-week program that uses the nationally recognized Co.Starters curriculum to guide emerging ideas and small businesses through a process to build a sustainable and profitable entity. We also supported and sponsored the Forest Products Accelerator.
- **With an economy that is to a great extent linked to our natural resources base, we will continue to embrace strategies to protect the environmental quality in the Northeast Kingdom.** We continue to provide technical support to regional Tactical Basin Planners, local water quality associations, and municipal conservation commissions. We have also worked with our towns to provide ongoing technical assistance on instilling best practices for promoting flood resilient development.
- **Our regional goal to expand housing availability continues to be shared by every local community, and the upgrade of existing, substandard housing is a particularly urgent priority.** The high cost of heating our older, often substandard housing stock remains a challenge. During this period, our partnerships with local energy committees, HEAT Squad, and Northeast Employment Training Organization expanded participation in weatherization efforts. Like the rest of the state, the availability of quality, affordable housing has been severely strained in this post-pandemic economy. To that end, we have supported and served on a local housing commission and have assisted municipalities in applying for Bylaw Modernization Grants to eliminate needless barriers to housing.
- **We encourage our communities to work with their local, regional, and state agencies and officials to revitalize downtowns, village centers, and cultural institutions to preserve our cherished way of life.** Our communities continue to participate in the Downtown Designation and Village Center Designation programs, which provides incentives for reinvestment in traditional centers of development. Hardwick, which has maintained a Village Center Designation since 2003, became a Designated Downtown in early 2023, joining St. Johnsbury and Newport City. Our region currently has 38 Village Centers. NVDA also provides outreach and support to applicants seeking tax credits through the Designation programs.
- **Local communities and state agencies must continue to upgrade public infrastructure in a coordinated manner, to protect the health, safety, and welfare of local residents.** To this end, we assist communities with feasibility studies and master plans. We also direct communities to wastewater planning programs with the Department of Environmental Conservation and community facilities planning and construction programs, such as USDA Rural Development. Through emergency planning, we work with communities to develop and implement Local Emergency Management Plans and Local Hazard Mitigation Plans.
- **We strive to provide a reliable and safe transportation system with improved access to destinations within and outside the region for a greater number of people.** NVDA coordinates the Transportation Planning Initiative (TPI) through an annual contract with VTrans to provide a statewide framework for public involvement in planning improvements to Vermont’s transportation system, with communities represented through regional

Transportation Advisory Committees (TACs). The TAC prioritizes projects, identifies local and regional transportation needs, and provides the platform for public involvement in the planning and development of the state's transportation system. NVDA also supports our communities with traffic counts, speed counts, and bike/pedestrian counts, Municipal Roads General Permit reporting and compliance, and training for local road foremen. NVDA serves on the board of directors for Rural Community Transportation (RCT), the nonprofit transportation serving the Northeast Kingdom and Lamoille County. We also co-facilitate RCT's Elders and Persons with Disabilities committee with the Lamoille County Regional Planning Commission.

(B) An evaluation of the goals and policies and any amendments necessary due to changing conditions of the region.

The readoption changes no plan policies, goals, or objectives. The purpose of the plan readoption is to give the NVDA the time it needs to deeply engage with the towns and the public in a substantial update to the Regional Plan. Without readoption, the current plan will expire on August 27, 2023. Readoption will allow the NVDA to take the time that is necessary to update the regional plan, which we anticipate will take 18 to 24 months after the current plan is readopted.

The current Regional Plan (as well as its prior iterations) contains all the required elements of 24 V.S.A 4348a and has served the region well as a resource to local planning commissions as well as Act 250 and Section 248 hearings. In 2018, the plan was amended to receive substantial deference in Section 248 hearings.

NVDA's current Regional Plan for the Northeast Kingdom is here: <http://www.nvda.net/regional-plan.php>

C) an evaluation of the land use element and any amendments necessary to reflect changes in land use within the region or changes to regional goals and policies;

The vast majority of the Northeast Kingdom remains forested, and the region still retains a substantial holding of agricultural lands. The land use element of NVDA's Regional Plan strongly supports the statewide goal of maintaining traditional centers of development while minimizing the fragmentation of surrounding open lands. While the Land Use plan acknowledges that recent development patterns may be contributing to incremental sprawl, the Plan proposes to work with Towns to identify and implement strategies that reverse the current suburbanization trend. The Plan also promotes an economically vital mix of commercial and residential uses in established centers of development, as well as a variety of housing types at different price points to support long-term sustainability.

Our land use classifications remain in the Plan remain unchanged, including the Plan's specifications for sensitive rural lands containing one or more of the following attributes:

- State natural areas and fragile areas: The region has two such areas, which are both designated as National Natural Landmarks, the Willoughby Cliffs area and the Barton River Marsh;
- Lands managed by the Department of Forest Parks and Recreation;
- Highest priority forest habitat blocks;
- Forested coverage of Site Class 1, 2, and 3 soils of 25 acres or more;
- Headwaters;
- Upland areas of 2,000 or higher;

As stated in our 2015 Plan, lands containing one or more of these attributes shall not be developed, as their best uses are a combination of forest and conservation purposes. Appropriate uses include sustainable forestry and logging practices, maple syrup production, wildlife habitat, and passive recreation.

NVDA is aware that the Department of Housing and Community Development (DHCD) is developing guidelines for all 12 regional planning commissions to map future land uses in a consistent manner. NVDA staff participated in an advisory group to develop recommendations, and those recommendations were shared with the Vermont Association of Planning and Development Agencies. Last week, VAPDA sent the recommendations to the DHCD. The new Regional Plan, which is currently under development, will adhere to whatever guidelines are ultimately adopted by the regional planning commissions. However, we do not anticipate that our land use goals and strategies will change.

(D) Priorities for implementation in the next five years.

Priorities for implementing the plan include continuing to work with member municipalities to enact the policies set out in the Plan; guiding growth into compact settlements while preserving and encouraging agricultural, natural resource, silvicultural, and recreational activities; fostering economic opportunities through new and expanded businesses that enhance the region’s economic base; and completing the Regional Plan amendment to reflect current needs and trends.

(E) Updates to information and data necessary to support goals and policies.

The updated Regional Plan will use information and data in a more meaningful way. While the current Regional Plan has a wealth of data, it can feel overwhelming to the citizen planner. Our substantial update to the Regional Plan therefore proposes to make the content more accessible, while still meeting state requirements for content. We intend to clearly explain the key issues affecting the NEK from a single voice. (The current regional plan has an entirely separate Transportation Plan, making it difficult for readers to see the interrelated goals and impacts between transportation, land use, energy, housing, and utilities and facilities.) Our new plan will break down these silos by organizing core planning concepts and issues around major themes that include equity, sustainability, community empowerment, and relevance and usefulness to the community. Supporting the last theme, the Plan will contain case studies on local actions and outcomes. Additionally, data will be integrated into the plan more thoughtfully to support the plan’s narrative and recommendations. Relevant data tables and studies will be available to readers in appendices.

We also anticipate that an update to the information in the housing element will be necessary to meet the requirements of Act 47, also known as the HOME Act.

Information accompanying the energy element has been updated and attached to this Report and Assessment. The standards for regional plans to receive Substantial Deference from the Public Utilities Commission in Section 248 proceedings have been revised since the update to the Regional Plan in 2018. While not all the information regarding new projections for weatherization and fuel switching is available, we believe that this interim update will allow the updated and readopted Regional Plan for the Northeast Kingdom to continue to receive Substantial Deference.

A copy of the Regional Plan, as well as the Update and Assessment Report is being electronically mailed to all parties identified in 24 V.S.A 4348a, 30 days prior to the first hearing. If you have any questions about readoption of the Regional Plan for the Northeast Kingdom, please contact me at dsnedeker@nvda.net or 802-748-8303.

Two Public Hearings are Scheduled:

St. Johnsbury: Thursday, July 20th, 36 Eastern Avenue, 6:00 p.m.

Newport: Friday, July 21st, Gateway Center, 4:00 pm

NVDA Regional Energy Plan Assessment and Report – June 2023

Note: NVDA is proposing an update and re adoption of its regional plan in accordance with [24 V.S.A. § 4348b](#). If readopted, this plan will remain in place until a new regional plan is proposed. Since NVDA last amended its energy plan to meet the requirements for Substantial Deference under Act 174, the requirements for certification to receive Substantial Deference from the Department of Public Service have changed. This Assessment and Report, which accompanies the readopted plan, addresses the updated requirements.

NVDA's Energy Plan aims to guide the region's energy development for the next eight years in support of Act 174, aligning with [Vermont's 2022 Comprehensive Energy Plan](#) (CEP), and [Vermont's 2021 Climate Action Plan](#). To meet state energy and climate goals, Vermont is planning for a major shift away from fossil fuels in the transportation and heating sectors to renewable sources of energy, efficiency in all sectors, and increase in-state renewable energy generation. Equity and justice must be integrated into all planning aspects; and as regional goals, objectives and actions are considered and implemented, it is critical to consider to three questions to empower more inclusive decision-making in the NEK:

1) Who is helped?

2) Who is harmed?

3) Who is missing?

NVDA strives to be consistent with the following state goals and policies:

- Greenhouse gas (GHG) reduction requirements under [10 V.S.A. § 578\(a\)](#)
 - 26% from 2005 levels by 2025
 - 40% from 1990 levels by 2030
 - 80% from 1990 levels by 2050
- The 25 x 25 goal for renewable energy under [10 V.S.A. § 580](#)
 - 25% in-state renewables supply for all energy uses by 2025
- Building efficiency goals under [10 V.S.A. § 581](#)
 - e.g., reduce fossil fuel consumption across all buildings by 10% by 2025
- State energy policy under [30 V.S.A. § 202a](#) and the recommendations for regional and municipal planning pertaining to the efficient use of energy and the siting and development of renewable energy resources contained in the State energy plans adopted pursuant to [30 V.S.A. §§ 202](#) and [202b](#)
- The distributed renewable generation and energy transformation categories of resources to meet the requirements of the Renewable Energy Standard under [30 V.S.A. §§ 8004](#) and [8005](#)

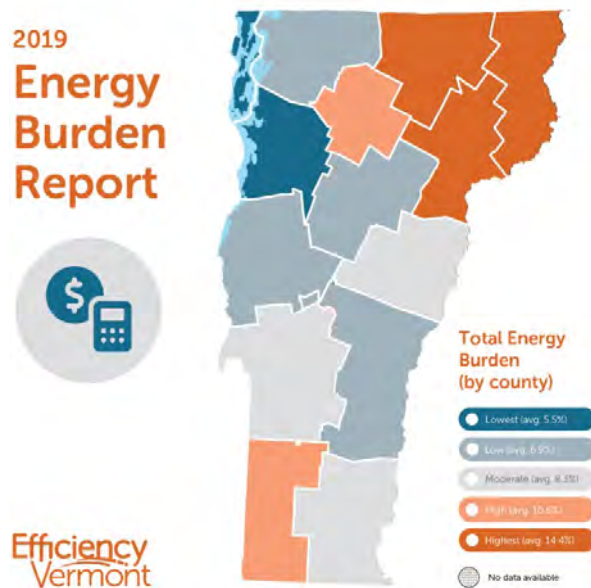
In addition, NVDA's Energy Plan aspires to follow the overarching goals and principles detailed in the [Energy Equity Project \(EEP\) Framework](#):

- Everyone has continuous access to energy.
- Everyone lives in a healthy, safe, and comfortable home.
- No one spends more than 6% of their income on energy bills.
- Those who are most impacted have the most powerful voice in decision making and receive a share of benefits.

Ultimately, NVDA's Regional Energy Plan strives to improve the outcomes for **environmental justice populations**, as defined by [Act 154](#), meaning "any census block group in which: (A) the annual median

household income is not more than 80 percent of the State median household income; (B) Persons of Color and Indigenous Peoples comprise at least six percent or more of the population; or (C) at least one percent or more of households have limited English proficiency.” Priority populations also include older, and chronically ill Vermonters and people with disabilities. For more information on how to internalize equity into policy and a list of populations vulnerable to the impacts of climate change, see the State of [Vermont Climate Council's Guiding Principles for a Just Transition](#).

For the Northeast Kingdom (NEK), one strategy for enhancing environmental justice means reducing energy burden, defined as the proportion of household income spent on energy costs, because the NEK experiences the highest energy burden in the state ([Efficiency Vermont 2019 Report](#)).



While Vermont's average energy burden is 10%, the NEK experiences some of the highest energy burdens (14-20%) statewide, reflecting around \$5,500 in household annual energy expenses. Of NEK household average energy costs, nearly half (46%) is spent on transportation, followed by heating, then electricity expenses. Essex County has the highest total energy burden in the NEK, followed by Orleans County, then Caledonia County. Nationally, an energy burden greater than 6% is considered high and is correlated with a “greater risk for respiratory diseases, increased stress and economic hardship, and difficulty in moving out of poverty” ([ACEEE](#)).

The 2019 Efficiency Vermont report uses 2017 data and was undergoing an update in 2023; while there are considerations that could improve this methodology and alternative proxies for energy burden, this is currently the most comprehensive Vermont data set available. Best available energy burden data continues to inform state, regional and local energy programs and strategies and is intended to steer resources to reach those greatest in need.

In Vermont, energy expenses disproportionately hurt those who are rural, lower-income, non-white, and non-homeowners ([UVM](#)). It is also important to note how energy spending often competes with other basic needs such as housing, healthcare, and food. As shown in [EAN's](#) chart (right), households earning less than \$27,800 pay an estimated 18% of their income towards heating and electricity bills, compared to less than 5% for households earning more than \$80,000. Lower-income households are

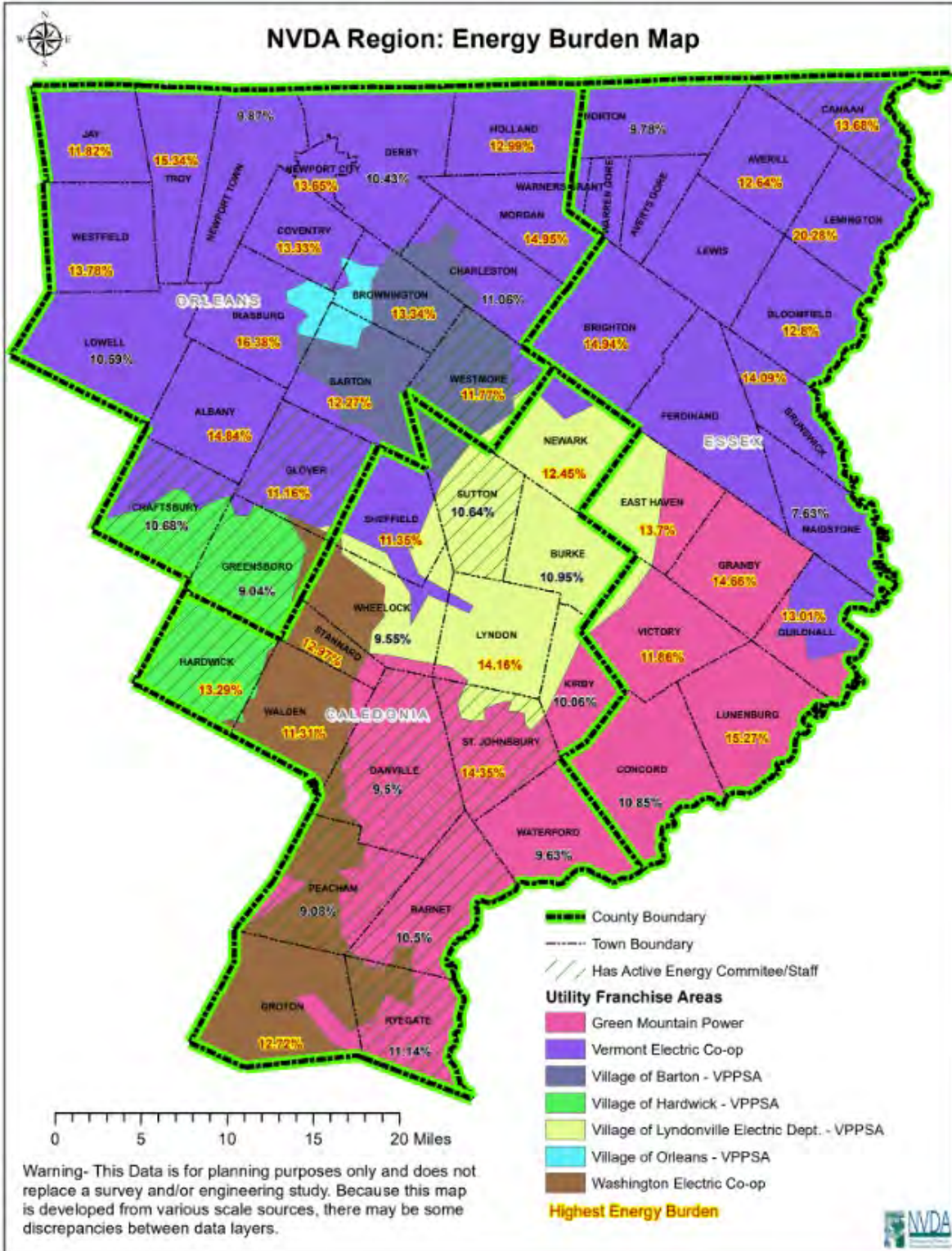
more likely to rent or own older homes, which in turn are less efficient and more expensive to heat and cool ([VHFA](#)).

NVDA prepared the [NEK Energy Burden Map](#) below to explore in more detail where the highest energy burdens are experienced in our region.

Combined heating and electricity energy burden in Vermont, by income quintile



Source: U.S. Census Bureau, American Community Survey, 2018.



HOW TO USE THIS ASSESSMENT & REPORT

The 2023 NVDA Regional Energy Plan includes the data required to meet the State of Vermont’s Act 174 energy planning standards and to inform the region’s advancement of the state’s energy and climate goals; it is divided into the following three sections:

- Section 1 – Updated NEK Energy Data & Analysis
- Section 2 – Renewable Energy, Storage, Transmission & Distribution Resources
- Section 3 – Pathways: Goals, Objectives, & Actions

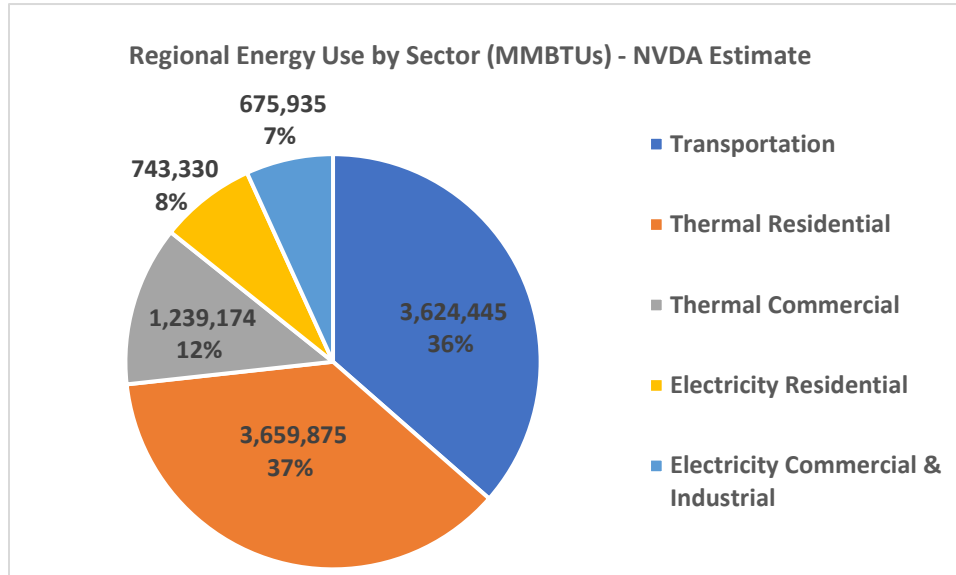
NVDA analysis in Sections 1 & 2 provide estimates for current regional energy use across all sectors: transportation, heating (thermal), and electricity. The data estimates also include renewable energy generation targets, anticipated for siting within the Northeast Kingdom (NEK), to contribute to the state’s energy and climate goals. Check NVDA’s website for the latest regional and local energy analysis including updated mapping of renewable resources, and forecasting from the Low Emissions Analysis Platform (LEAP), a software tool for energy system modeling and emissions accounting, across residential, commercial, industrial and transport energy use.

Section 3 Pathways lay out NVDA’s recommended goals, objectives, and actions for achieving the targets and addressing the challenges described in Sections 1 & 2. When it comes to equitable energy planning, NVDA recommends prioritizing access, affordability, and participation among high energy burden and environmental justice community members *first*. As evidenced in the [2023 Vermont Health Equity Toolkit](#), ensuring access to clean, affordable energy can lead to more resilient and sustainable communities. Transitioning away from fossil fuels, promoting energy efficiency, weatherization, and renewables, while addressing energy burden will have direct and positive impacts for all Vermonters.

SECTION 1 – UPDATED NEK ENERGY DATA & ANALYSIS

The data in this section is intended to provide an overview of current Northeast Kingdom (NEK) energy use and a sense of the trajectories and pace of change needed to meet the State’s goals. According to NVDA estimates, residential and commercial thermal use (heating space and water) is still the largest

energy use at 49%. Transportation¹ is still the second largest energy use in the NEK, accounting for 36% of total usage measured in MMBTUs, followed by electricity at 15%. Seen below, these estimates of regional energy use by sector have remained relatively consistent since the last NVDA plan, changing only a percentage or two, with the exception of residential electricity use, which increased by 4% since 2018.



The regional estimates were developed using multiple sources, including the Vermont Department of Public Service, American Community Survey, Vermont Department of Labor. For more information about how these estimates were developed, please visit NVDA.net.

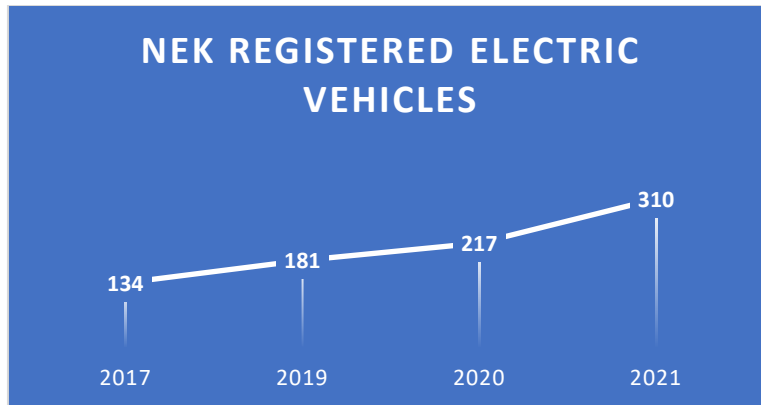
Current Energy Use

The data below are from various data sources and represent actual current consumption and generation in the NEK, rather than estimates from the Low Emissions Analysis Platform (LEAP), currently being updated by the Department of Public Service (PSD). Visit NVDA’s website (NVDA.net) for updates on the 2025, 2035, and 2050 LEAP Targets across all energy sectors.

Transportation Energy

The following data provides an overview of the passenger vehicle fleet composition by fuel source in the Northeast Kingdom and serves as a proxy for transportation energy use. Based on ACS 2015-2020 data, the NEK has around 48,247 fossil-fuel burning, light-duty vehicles. As of 2021, the NEK has 310 electric vehicles (EVs) registered, this includes all-electric and plug-in hybrid vehicles. Since NVDA’s last Regional Energy Plan, the number of EVs registered in the NEK has more than doubled – going from 134 (in 2017) to 310 (in 2021).

¹ Transportation data only includes light-duty vehicles, and commercial transportation data is not available.



Sources: VTrans, American Community Survey, Drive Electric Vermont, DMV

Public EV Charging Infrastructure

As of 2023, there are over 350 public EV charging stations listed on Drive Electric Vermont website ([view the map](#)). NEK options for public EV charging have more than doubled since NVDA’s previous Regional Energy Plan, which listed only seven (7) charging stations for the region. While most EV drivers will charge at home (typically overnight) or sometimes at their place of employment, public charging infrastructure still will be needed for longer trips, visitors, or for those without charging access at home. NVDA continues to encourage municipalities and local businesses to install EV charging stations at convenient and desirable locations, such as in front of restaurants, stores, tourist and recreation destinations, and community sites such as libraries, where users would want to park for several hours. NVDA also recommends the development of electric vehicle supply equipment (EVSE), like Level 2 and 3 charging stations, in our regional downtowns, village centers, and opportunity zones, as well as along key interstate and state highway corridors in the NEK.

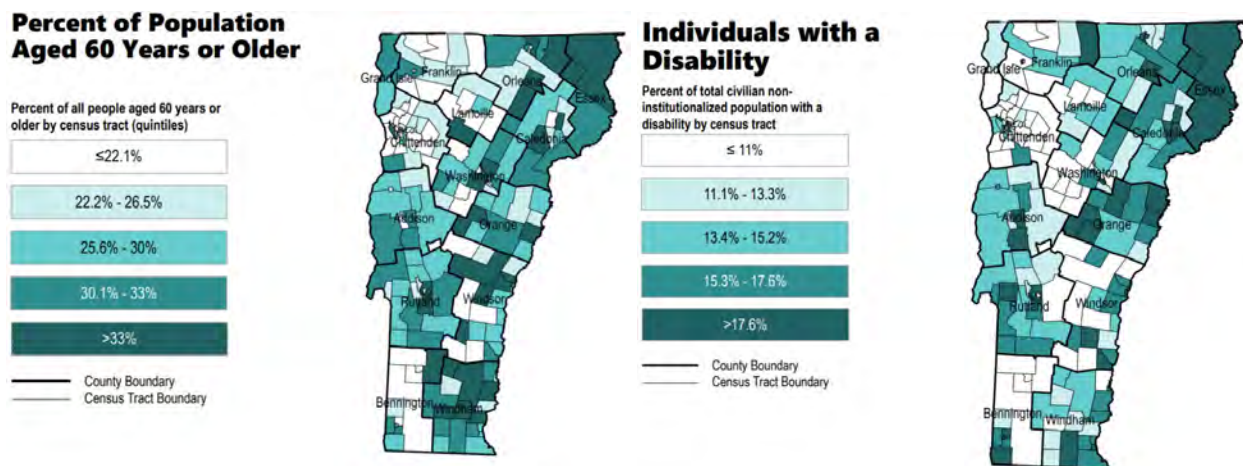
Equity considerations must be thoughtfully integrated throughout ESVE planning process to ensure benefits and costs are fairly distributed throughout the NEK. Historically, clean energy and transportation innovations have not been deployed evenly across communities -- resulting in higher energy burden and rural, lower-income communities being left behind. EVSE equity concerns that can come up include a project’s affordability, accessibility, reliability, location, safety, and related employment and economic opportunities. The VTrans [NEVI program](#) and the U.S. Department of Transportation’s [Toolkit for Planning and Funding Rural Electric Mobility Infrastructure](#) offers helpful equity planning considerations and strategies relevant to the NEK. When assessing where EV charging stations should be located, engagement with rural, underserved, and high energy burden communities is essential to prevent delayed and diminished access to clean energy and transportation infrastructure vital to a healthy economy.

According to the U.S. Department of Energy (DOE), over the long term, EV ownership is usually less expensive than ownership of fossil-fuel vehicles. Additionally, low operation costs make some EVs less expensive on a monthly basis compared to equivalent fossil-fuel vehicles (when the vehicle purchase is financed). Therefore, increased EV adoption in the NEK could contribute to community-wide reductions in transportation energy cost burdens, of which our region has some of the highest rates. As stated by [Drive Electric Vermont](#), “It costs less to own an EV. Plugging in is like paying \$1.50 a gallon, and EVs need less maintenance than gasoline cars.” Energy stored in electric vehicle batteries, combined with bidirectional capabilities, shows promise for powering critical services in an emergency and potential to help to balance the grid.

Increasing Transportation Equity - Transportation Demand Management (TDM)

Transportation infrastructure that increases the quality and types of available transportation choices is referred to as Transportation Demand Management, or TDM, and is a priority of the Vermont Comprehensive Energy Plan. Multi-modal choices like public transit, ride share, bicycling, and walking — all of which provide alternatives to getting around by single-occupancy vehicle — can increase the affordability of transport for Vermonters, encourage economic development in downtowns and village centers and promote an active and healthy lifestyle. “These choices make the transportation system more accessible and equitable. They also create more livable, vibrant communities, and they can reduce transportation-related energy use and emissions.” ([CEP 2022](#))

According to the Vermont Department of Health, the NEK has some of the highest percentages of the state population aged 60 years or older, as well as individuals with a disability. Lack of transit and safe walking infrastructure makes it harder for older adults to stop driving, even if they want to. Long travel distances in the NEK amplify the challenges of aging. Transportation is the top concern of people who want to age in place. Low-income people, children, older adults, people with a disability and those who can’t or choose not to own a car benefit most from safer streets and other mobility options. Infrastructure for walking, biking, and rolling makes rural communities more attractive places for young people to live, work, and start businesses.



Source: 2022 Analysis by the Vermont Department of Health for the Vermont SNAP-Ed Needs Assessment (ACS 2019 5-year estimates, Tables S0101 & S1810 respectively)

Multi-modal transportation that connects people to jobs and services (affordably and conveniently) can reduce single-occupancy trips, lower transportation costs and fossil fuel pollution, while improving health and economic opportunities.

As transportation and land use policies are considered for the NEK, it will be important to closely work and plan *with*, not just for, our most impacted community members. This will help ensure that NEK transportation energy burden, the highest in the state, is reduced equitably and that people with low incomes, disabilities, older Vermonters, and renters do not struggle to afford electric vehicles, electric bikes/scooters, charging equipment, and other desired mobility options.

Development Patterns and Transportation Use

Understandably rural development patterns directly impact transportation energy usage, especially regarding individual behaviors. With limited transit infrastructure, the region is dominated by single-

occupancy fossil-fuel vehicles. Residents typically commute to disparate labor market areas, reducing opportunities for carpooling. VTrans offers guidance and grant assistance to municipalities who wish to establish park and rides on municipal, state, or leased property on or near state highways, as well as other TDM options. Mixed-use, higher density neighborhoods encourage more pedestrian and micro-mobility options. The following land use² and mobility principles encourage not only reduced transportation energy consumption, but also offer important health equity benefits:

- Encourage the location of new development in or near traditional village and city centers to reduce both sprawl and the number of vehicle miles driven.
- Support transit-oriented development that fosters the expansion of public transportation, micro-mobility (e.g., bikes, e-bikes/scooters), and rail use.
- Encourage the construction of Park and Ride facilities to support carpool and rideshare efforts.
- Encourage the expansion of bicycle and pedestrian facilities such as safe sidewalks and bike lanes, as well as secure parking options for micro-mobility.
- Promote the development of EV charging stations (also known as electric vehicle supply equipment, or EVSE) in NEK village centers and downtowns like Hardwick, Newport and St. Johnsbury.

Additionally, improved telecommunications infrastructure in this region has the potential to reduce annual vehicle miles traveled (VMTs) by allowing more workers to telecommute.

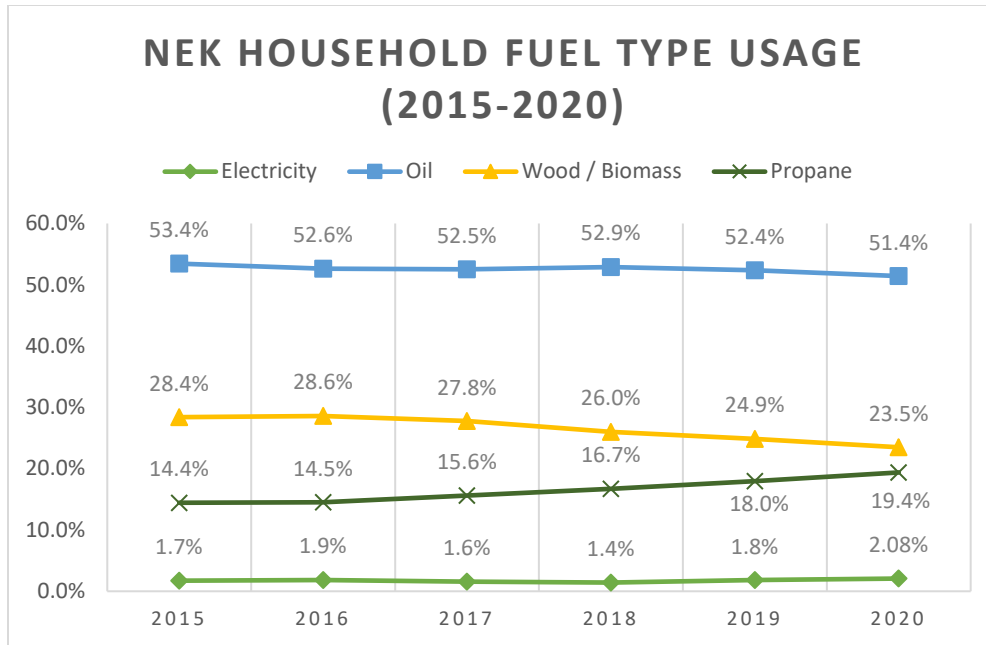
Commercial Transportation

Commercial shipping is one of the highest consumers of transportation fuels and another area in which the region can reduce consumption. As gas prices started to climb in the past decade area, businesses looked for alternative shipping methods and inquiries into the region's rail infrastructure grew. Railroad shipping is most desirable for non-perishable commodity goods. Upon further review it was found that regional rail infrastructure has the potential for growth, with room for increased traffic and a number of underutilized sidings. The Kingdom may also be able to attract additional rail usage if rail beds are upgraded to meet the 286,000 lb. weight limit standard and bridge heights are increased. Both improvements will allow rail cars to be filled to capacity and allow for the double stacking of rail cars, which is now standard across the country. NVDA also supports the re-establishment of the Twin State Line to better connect the Kingdom with greater rail markets in New England. Additionally, as [CAE Farm Connex](#) expands its capacity to help connect local agricultural producers to more regional and external markets, NVDA supports improved efficiency and reduced fossil fuel emissions for freight services.

Heating (Thermal) Energy

The data below describe how homes are heated in the Northeast Kingdom. Fossil fuel oil continues to be the most widely consumed residential heating fuel, followed by wood/biomass. In 2020, of the NEK's approximate 27,178 occupied households, 51.4% burned oil, followed by 23.5% wood/biomass. In fact, oil is often the back-up fuel source for homes that heat primarily with wood. While the region has no utility fossil gas, propane was used by 19.4% of homes in 2020. Electricity is used least, at just 2 percent for NEK household heating needs.

² See the Transportation, Land-Use, and Housing Sections of the *Regional Plan for the Northeast Kingdom* for additional energy-related recommendations.



Source: American Community Survey 2015-2020

Challenge: The age of the Northeast Kingdom’s housing stock is likely the most significant contributor to the overall thermal usage. According to most recent American Community Survey Five-Year Estimates (ACS), nearly one-third of housing units were built prior to 1940. Older homes are likely to be poorly insulated and leakier, driving up energy consumption and costs.

Weatherization

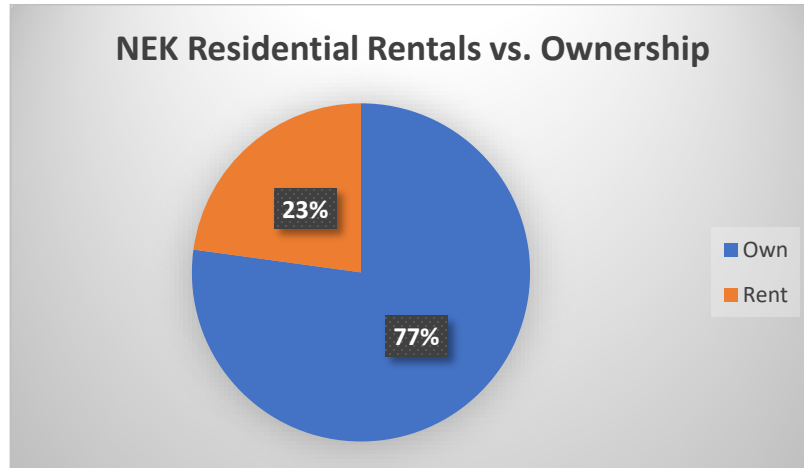
The Energy Action Network (EAN) estimated that Vermont needs to weatherize 13,400 homes each year (or at least 90,000 total) by 2030 to meet its climate goals ([Efficiency Vermont](#)). Currently, less than 2,000 homes are weatherized a year in Vermont. According to 2020 Census data, there are approximately 27,000 homes in the Northeast Kingdom.

Challenge: To meet these weatherization goals, EAN estimates the weatherization workforce needs to increase five-fold in the next five years.

Energy-burdened Vermonters spend more of their income on energy and their health is more likely to be affected by asthma, cold and heat. Additionally, [research](#) shows multiple, interrelated health risks linked to and intensified by energy burden. For example, high and/or overdue energy bills can contribute to stress and mental health concerns, that lead to unfavorable decision-making about how much to heat or cool the home, which can then further exacerbate health issues such as asthma, heart disease, and malnutrition, as well as physical inactivity.

Most weatherization assistance funds in Vermont are available to homeowners, leaving renters out of the resulting health, comfort, and financial savings. Rental housing represents about 30% of Vermont’s housing stock and almost 75% of people who rent their homes have incomes under Vermont’s median household income of approximately \$63,500. Tenants often cannot weatherize their homes because it is

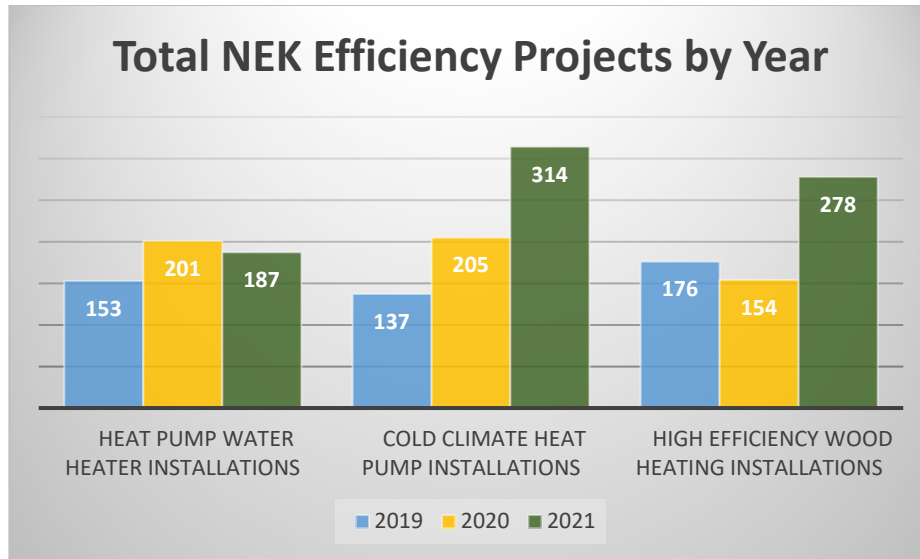
cost-prohibitive, but also because major structural changes to a building must include a willing landlord to participate. ([Rights & Democracy VT](#))



Source: American Community Survey 2020

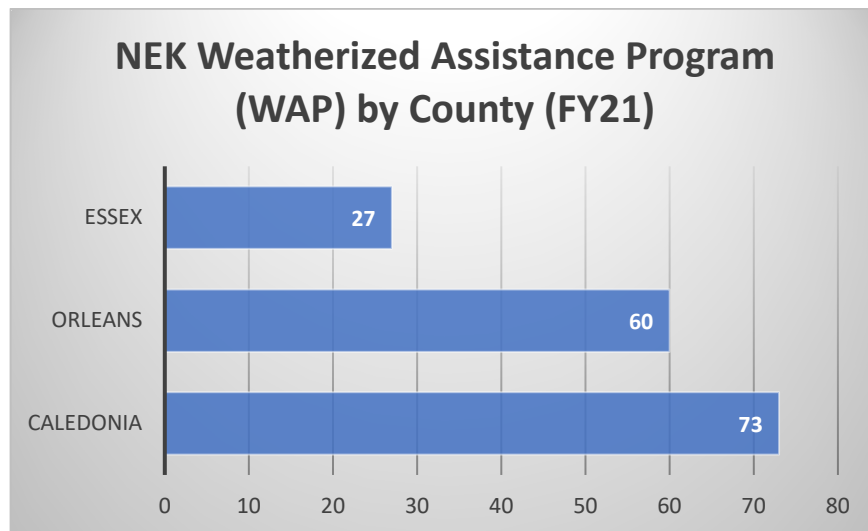
The best available data source for home weatherization implementation is Efficiency Vermont. Efficiency Vermont only monitors home weatherization programs done through the Home Performance with ENERGY STAR® (HPwES) program. HPwES is a comprehensive whole-house approach to diagnosing and addressing thermal and health/safety issues in the home to ensure a more energy efficient, comfortable, safe, and healthy home. A project is a collection of one or more energy efficient measures that have been implemented at a customer's physical location. A customer can be associated with one or more projects and in some cases, a project may be associated with multiple customers. Efficiency Vermont's data does not capture do-it-yourself projects or projects that do not go through the HPwES program. The data below indicates the number of weatherization and energy efficiency projects completed per year across the NEK (2019-2021). It is not intended to represent the total number of homes weatherized.

NEK Total Residential Weatherization by Year	2019	2020	2021	Total
Home Performance with ENERGY STAR® Projects	70	165	116	351
Other Weatherization Projects	55	39	40	134
Residential New Construction Projects	8	3	8	19



Source: Efficiency Vermont Summary Report for NVDA region, June 2022

In FY2021, only 160 NEK homes (less than 1%) participated in the Weatherization Assistance Program (WAP), out of 1,050 statewide WAP projects, further detailed in the [Performance Indicators for the Vermont Weatherization Assistance Program Report](#) to the Vermont Legislature in 2022. The mission of the Vermont WAP is to help low-income Vermonters save fuel and money by improving the energy efficiency, health and safety of their home while reducing carbon emissions. In the NEK, WAP is free for all income-eligible participants and is administered by NETO. On average, the program makes about \$10,000 worth of improvements per home, installs about 1,500 square feet of insulation, and reduces drafts by about 40 percent.



Source: Performance Indicators for the Vermont Weatherization Assistance Program Report, Vermont Legislature 2022

NEK Commercial Thermal Energy Use

	# of Commercial Establishments	Average Heating Load (MMBTUs)	Total MMBTUs
Caledonia	722	829	598,292
Essex	103	1,118	115,174
Orleans	631	833	525,708
TOTAL	1,456	851	1,239,174
Source: Department of Public Service, Vermont Department of Labor			

Challenge from WAP report above: “The largest barrier to low-income home weatherization continues to be the presence of vermiculite insulation, a material known for containing asbestos. Unfortunately, there are also many other structural issues present in Vermont’s older housing stock which can prohibit Weatherization such as leaky roofs, wet basements, knob and tube wiring, and other structural issues. Historically, these issues would “defer” weatherization of a home indefinitely. Vermont’s Weatherization Program has adopted a “zero deferral” policy in recognition that addressing non-energy related issues that otherwise prevent weatherization is a critical equity policy. OEO secured \$125,000 of Vermont Low Income Trust for Electricity (VLITE) funds for vermiculite remediation and continues to leverage Zonolite Trust Funds. Additional funding to address deferral issues comes from the Vermont Community Foundation, as well as ARPA State Fiscal Recovery (SFR) funds.”

Commercial/Industrial Thermal

Most of the region’s commercial/industrial energy usage can be attributed to space heating and process heating. This table identifies average heating load per establishments and total MMBTUs consumed annually. Heating loads vary significantly and may be highly specific to the type of industrial processes. NVDA’s estimates were developed using assumptions about business patterns. For example, types of businesses that tend to employ more workers per establishment can be expected to be the larger consumers of heat energy – schools, hospitals and clinics, hotels, and restaurants. On the other hand, businesses that have few on-site employees – like real estate agencies – use significantly less.

Electricity

An estimate of current electricity consumption by residential and commercial/industrial sector in the Northeast Kingdom is shown in the table below.

NEK Electricity Consumption	kWh Usage by Year		
	2019	2020	2021
Commercial & Industrial	226,584,720	207,838,094	219,150,067
Residential	190,079,533	199,280,474	204,955,840

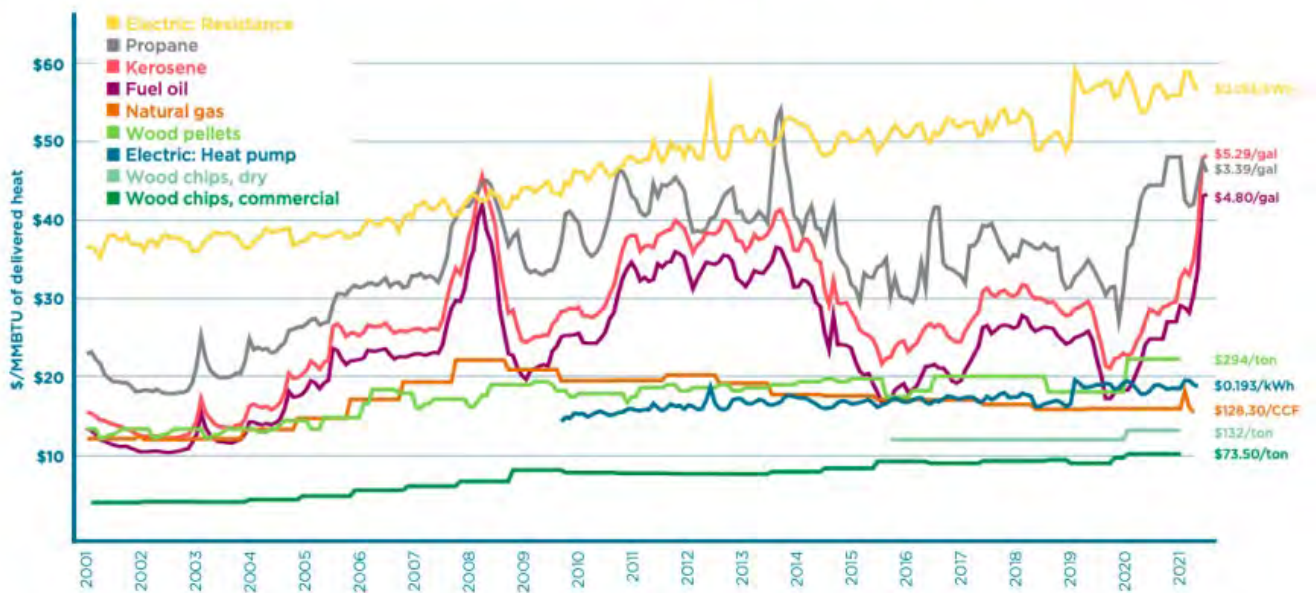
Total	416,664,253	407,118,568	424,105,907
Average Residential Usage	5,903	6,161	6,292

Source: Efficiency Vermont Summary Report for NVDA region, June 2022

As a comparison to the NEK’s 6,292 kilowatt hours (kWh) per year, the United States’ average residential electricity usage was 10,632 kWh in 2021, an average of about 886 kWh per month (EIA). Electricity consumption patterns are expected to increase as more beneficial electrification takes place.

In Vermont, renewable heat sources have historically seen less price volatility over time than fossil fuel options. The following EAN chart shows the cost of various Vermont heating fuels through April 2022.

Cost comparison of different heating options over time



Sources: Fuel Oil, Propane, Kerosene, Gasoline, Diesel, Wood Pellets: VT Department of Public Service, Fuel Price Report, 2021. Fossil Gas, Electricity: EIA, 2021. Wood Chips: Biomass Energy Research Center, 2021. Note 1: Electricity prices presented here are a statewide average. Electricity prices vary by utility territory. Note 2: The reason propane is more expensive per MMBTU than fuel oil but less expensive on a per gallon basis is because propane has a lower energy content per gallon. Propane’s energy content is 66% that of fuel oil, by gallon (EIA).

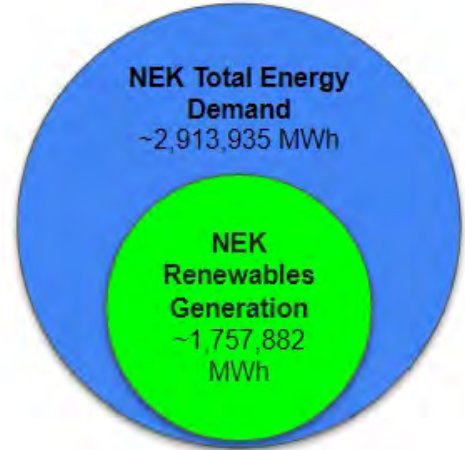
SECTION 2 - RENEWABLE ENERGY, STORAGE, TRANSMISSION & DISTRIBUTION RESOURCES

The 90x2050 projections – which will nearly eliminate the use of fossil fuels—will require transferring many of our uses to electricity. Therefore, even while electrical systems, appliances, and vehicles will likely continue to increase in efficiency, more electricity will need to be produced to meet our total regional energy demand. Some of that will continue to come from imported sources, such as hydroelectricity from Hydro Quebec and other sources from the New England Power Grid (ISO-NE), of which Vermont is connected. To meet energy, climate, and equity goals much of our power will also

need to be generated by in-state renewable facilities that prioritize access and affordability to reduce energy burden.

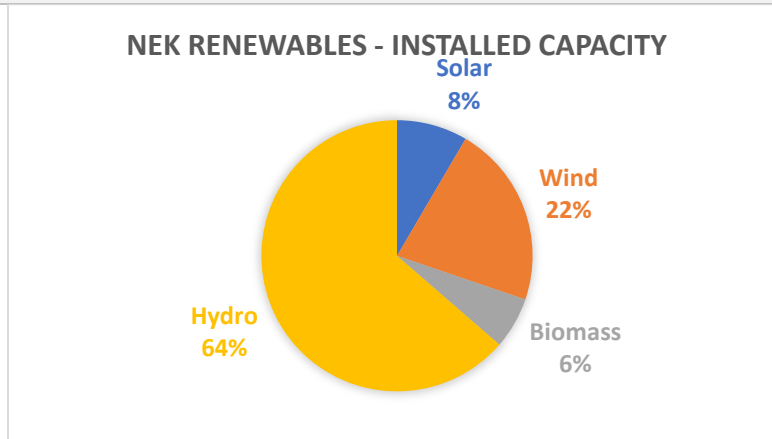
The NVDA infographic to the right shows the Northeast Kingdom’s total energy demand across all sectors (transportation, thermal, and electricity), compared to current renewable energy generation located within the region. It is an important reminder that the NEK hosts a lot of existing renewables and not much load (relative to other regions).

The following data shows existing renewable energy generation in the NEK, and a visualization of regional installed capacity in megawatts (MW), with hydroelectricity dominating at 64%, followed by wind (22%), then solar (8%) and biomass (6%).



NEK Existing Renewable Energy Generation			
	Sites*	Installed Capacity (MW)	Annual Production (MWh)
Solar	737	40	50,663
Wind	34	103	203,763
Hydroelectric	21	302	1,322,554
Biomass (Wood)	5	29	178,901
Total	797	474 MW	1,757,882 MWh

*These sites represent facilities that have been permitted.



Sources: PSD Generation Scenario Tool, 2023 & VT Community Energy Dashboard, 2021

In support of the 90x2050 goals, each region has a set of generation targets. Generation targets can be met through a variety of renewable technologies, including solar, wind, hydro and biomass. Because our region already generates a disproportionate share of renewables relative to our low population, the Northeast Kingdom is well on track for its contributions to the 2050 targets for renewable energy generation, based on our population and energy resource potential. See the updated NEK Energy Maps

for a full analysis (online at NVDA.net). Nevertheless, great care and consideration shall be given to the siting of new energy generation in the NEK.

VT LEAP Targets	In-state gen: 10%	In-state gen: 25%	In-state gen: 50%	Units
Target Year: 2032	811,165	2,027,912	4,055,825	MWh
Target Year: 2040	1,073,186	2,682,965	5,365,930	MWh
Target Year: 2050	1,194,382	2,985,954	5,971,908	MWh

Source: Vermont Public Service Department (PSD) Generation Scenario Tool, 2023

NEK Policy on the Development of Renewable Energy Resources

This region has a responsibility to plan for adequate supply of energy to meet local energy demand and reduce energy burden. Planning activities may include the production, storage, siting, and distribution of energy. Individuals, businesses, organizations, and communities are encouraged to explore emerging energy supply, efficiency, and distributed energy resource (DER) opportunities that meet accepted environmental and social standards and contribute to Vermont’s climate and energy goals.

New renewable energy development shall meet the highest standards required by law, while prioritizing safety, reliability, grid stability, affordability, equity, and environmental stewardship. Permitting authorities shall first consider current and historical land use and the culture of the region, community opinion, economic and health benefits, as well as the landowner’s rights. Any development shall, to the extent possible be done to mitigate adverse impacts to the region. Any utility-scale energy generation project deemed acceptable by the Public Utility Commission shall include a plan for distributing benefits to the towns in the region proportional to the adverse effects experienced by that town. Long term maintenance, safety issues, decommissioning, and land reclamation procedures required at the end of the energy project’s life must also be included in the project plan.

This plan aims to balance environmental quality and important natural resources with energy production, with special emphasis on the value of forest lands in sequestering and storing carbon. Significant local and regional support and clearly demonstrated benefits, especially affordability and accessibility, should exist in any energy proposal.

NVDA has a commitment to ensure that such development is equitable, affordable, feasible and ideally results in additionality. NVDA supports energy development that will not worsen already congested transmission, particularly in the Sheffield-Highgate Export Interface (SHEI), where several existing generators are frequently curtailed by the ISO. It is unlikely that any single solution will solve congestion within the SHEI and, as such, it is anticipated that incremental progress will be achieved as partial solutions are implemented. In the meantime, NVDA will support projects that are consistent with the land use and conservation measures in this plan and in duly adopted plans of impacted municipalities. Additionally, we will expect project developers to work with utilities and other stakeholders to explore innovative strategies that shift generation away from the hours when generation exceeds load within the SHEI area or otherwise avoids exacerbating congestion on the grid. An example of such a project would pair battery storage with a solar system to control when the project’s power is exported to the grid. In determining support for such a measure, NVDA will seek guidance from the long-range Transmission Plan and Integrated Resource Plans in the region and will consult with utilities, VELCO, and other stakeholders.

NEK Siting Guidelines for Renewable Energy Generation

NVDA Energy Maps have been updated to be consistent with the Climate Action Plan and 2022 Act 174 standards, with an emphasis on the value of forest lands for sequestering and storing carbon. NVDA Energy Maps, available online at NVDA.net, can be used to identify areas unsuitable for development, but more importantly guide decision-making around identified potential (and preferred) areas for renewable energy development to meet regional energy demand, reduce energy burden, and contribute to the state energy and climate goals.

Underlying assumptions were made about suitability factors, such as slope and direction of land, elevation and wind speeds, and access and proximity to grid-related infrastructure. Additional statewide layers identified known constraints and possible constraints, and a third layer has identified regional constraints:

Known constraints are areas not likely to be developed for renewable energy because they contain one or more of the following: vernal pools; river corridors; FEMA floodways; significant natural communities; rare, threatened and endangered species, national wilderness areas, wetlands (Class 1 and Class 2).

Possible constraints are areas that would likely require mitigation because they contain one or more of the following: agricultural soils; special flood hazard areas (outside of the floodway); protected (conserved) lands; deer wintering areas; Act 250 mitigated agricultural soils; hydric soils, highest priority forest, connectivity, and physical landscape blocks, and highest priority surface water and riparian areas.

Regional constraint: NVDA's regional plan has long held that rural areas should receive very little commercial or industrial development unless it occurs in an established industrial park, or in an area specifically designated in the local bylaw or plan as being well suited to such uses. Lands with an elevation of 2,000 feet or more merit consideration as a special class of rural lands that should be protected from any large-scale commercial or industrial development characterized by a constructed height of 100' or more, and an acre or more of permanent site disturbance, such as clear-cutting. These lands, as indicated on NVDA's renewable energy maps, contain one or a combination of factors that make them unsuitable to such development – contiguous forest cover; sensitive wildlife and plant habitat; conservation lands and recreational assets; managed forestland; and headwaters and ephemeral surface waters, which are highly vulnerable to erosion and man-made disturbance. High-elevation forest cover must be kept unfragmented for the attenuation of flood flows, carbon storage/sequestration potential, the benefit of wildlife habitat and linkage, and public enjoyment through passive recreation. It is NVDA's position that no further development of industrial-scale wind turbines should take place in the Northeast Kingdom (see the 2018 Energy Plan for more details).

The maps accompanying this plan do not carry the weight of zoning, and the siting of renewables on prime acreages (i.e., without known constraints) is not a foregone conclusion. Rather regional maps should be viewed as a starting point for our member municipalities to determine suitable and unsuitable locations for renewable energy development. NVDA strongly encourages municipalities to conduct additional site investigations to identify local constraints (as well as preferred sites in addition to existing statewide preferred sites) in order to address the environmental, aesthetic, civic, economic, and cultural concerns unique to each community.

Equity Strategies for Renewable Energy Access & Affordability

Renewed efforts across Vermont are focusing on reducing energy burdens and improving access to heating and cooling, broadband, healthy and affordable food, transportation options, and reliable well-compensated work. All these efforts increasingly depend on clean, reliable, and affordable energy

infrastructure, as do many of the recommendations in this plan. Black, Indigenous, People of Color, (BIPOC), as well as low-income, and rural Vermonters have largely been left out from major economic, social, and environmental benefits associated with investments in climate resilience and renewable energy infrastructure. BIPOC Vermonters were seven times more likely to have gone without heat in the past year, over two times more likely to have difficulty affording electricity, and seven times less likely to own solar panels than white Vermonters ([Act 154 Sec 1.10](#)), while rural and low-income communities consistently carry the highest energy burden.

For healthy communities to thrive, local leaders should look to programs and policies that encourage locally generated and managed fossil-fuel-free energy, while prioritizing access and affordability for historically underserved community members. Providing renewable power and services close to where it is used, also known as [distributed energy resources](#) (DERs), has multiple benefits including the potential to lower costs for consumers, improve the reliability and resilience of the grid, and increase equity among community members. DERs like community-owned solar and utility-led energy programs that promote energy savings and [energy storage](#) are both strategies that can lead to improved health and equity in Vermont communities, and are explored in more depth below. NEK communities are encouraged to work with NVDA to assess local potential renewable energy projects and adopt an enhanced energy plan that identifies and prioritizes energy efficiency and generation goals and renewable energy siting that is desirable and beneficial to the community at large.

- **Community-Owned Solar** has the ability to provide a number of meaningful benefits to participants and their communities, especially increased access for [low- to moderate-income households](#), greater bill savings, resilience, community ownership and wealth-building opportunities, and equitable workforce development. For rural areas, solar arrays can have a positive multiplying effect when combined with agriculture, also known as agrivoltaics. Additionally, siting renewable generation (possibly combined with storage) in proximity to key food resources like food shelves, community gardens/fridges, grocery stores, etc. can be a way to improve access to local, more affordable, and healthier food options.
- **Utility-led Energy Programs:** Increasingly, distribution utilities must play a role in providing fossil fuel-free energy infrastructure and storage to ensure reliable, affordable clean energy for all. Some utilities offer programs for income-eligible Vermonters to help lower the cost of energy at home. For example, and further detailed by the Vermont [Department for Children and Families](#), a household of four earning less than \$50,000 a year can receive a 20-25% discount on their monthly energy bill.
- **State-led Energy Programs:** The Vermont [Clean Energy Development Fund](#) (CEDF), with its Affordable Community Renewable Energy (ACRE) program is encouraging distribution utilities to connect more income-qualified customers to renewable energy. Programs like these will help thousands of eligible community members reduce energy burden costs while growing new Vermont community solar.

SECTION 3 – NEK PATHWAYS: GOALS, OBJECTIVES & ACTIONS

The following policy pathways outline NVDA’s recommended goals, objectives, and actions for achieving the targets and challenges addressed in Section 1 & 2. Furthermore, these pathways are aligned with the goals of Vermont Climate Action Plan and Comprehensive Energy Plan. NVDA regional energy planning aspires to internalize the overarching goals and principles from the [Energy Equity Project](#) (EEP):

- Everyone has continuous access to energy.
- Everyone lives in a healthy, safe, and comfortable home.
- No one spends more than 6% of their income on energy bills.
- Those who are most impacted have the most powerful voice in decision making and receive a share of benefits.
 - Use Vermont's [Guiding Principles for a Just Transition](#) (Scoring Rubric)
 - Use [Initiative for Energy Justice Scorecard](#) (+ [Interactive PDF](#))
 - Use the [EPA Environmental Justice Screening and Mapping Tool](#)
 - Use [UVM's Vermont Environmental Disparity Index](#)

GOAL - Move the Region's Energy System to meet the goals of Vermont's energy and greenhouse gas reduction goals while balancing economic vitality and affordability.

Objective:

Reduce regional energy burden and fossil fuel pollution to support the State's climate and weatherization goals.

ACTIONS:

- Continue and evaluate partnerships with existing utilities and other energy and conservation programs and funding sources to facilitate weatherization, fuel switching, and increased energy savings and comfort within NEK housing and other building stock.
- Decrease fossil fuel heating and increase affordable electrification by working with Energy Committees and other NEK Energy Network partners to raise awareness among homeowners, renters, landlords, developers, etc. on the benefits of fossil-fuel-free technology such as cold-climate heat pumps, advanced wood heating and geothermal systems. Examples include thermal-led combined heat and power (CHP), biomass district heating and biogas generation (capturing the methane produced by landfills or farms and using it instead of fossil fuels).
- Support upgrade and trade-out programs and incentives for retiring outdated, higher-emission, polluting wood burning stoves and boilers.
- Reduce fossil fuel consumption in the transportation sector, through Transportation Demand Management (TDM) and the electric vehicle promotion strategies outlined further in the NVDA Transportation & Land Use Plan.
- Provide assistance to municipalities when requested to enhance town plans to be consistent with Act 174 standards for the purpose of enabling municipalities the ability to gain substantial deference in the Certificate of Public Good Section 248 process. This assistance will include working with municipalities and businesses to identify natural, cultural, historic, or scenic resources to be protected from all development types, identify preferred locations for renewable energy generation facilities, and encourage "leading by example" with respect to energy efficiency for buildings and transportation and the deployment of renewable energy.
- Empower the NEK Energy Network to engage with residents and municipalities about opportunities to reduce energy burden and switch to affordable renewable energy sources. Additionally, continue to collaborate and partner with organizations (including municipalities, educational institutions, businesses, and non-profits) to help meet the State's energy and climate goals.
- Support a wide variety of renewable energy generation types, including, but not limited to, sustainable uses of biomass for heating, passive solar building design, biodigesters for electricity

generation, photovoltaic solar, agrivoltaics, small-scale wind turbines, and optimizing the energy potential for existing hydro-electric dams.

- Work with the distribution utilities on long-range infrastructure capacity planning.
- Support in-place upgrades of existing facilities, including existing renewable energy generation, storage, transmission lines, distribution lines and substations as needed to reliably serve municipalities and the region.
- Support changes in federal, state, and local policies to achieve the state of Vermont’s goals related to the Comprehensive Energy Plan, Climate Action Plan, and Environmental Justice law.
- Encourage the legislature to adopt policies and increase incentives and rebates that reduce energy burden.

Objective:

Promote climate-ready and resilient buildings and communities.

ACTIONS:

- Promote Vermont’s residential and commercial building energy standards (RBES/CBES) for new construction and existing buildings, including additions, alterations, renovations, and repairs.
 - Host and facilitate building science/standards training and education opportunities for local officials, zoning administrators, and relevant workforce development groups. Encourage communities with zoning to require Certificates of Occupancy. Encourage the local adoption of “stretch energy codes.”
 - Review local zoning bylaws and offer technical assistance to development review boards when evaluating the energy, climate, and health implications of site plans for proposed developments.
 - Work with housing and energy efficiency organizations to promote and improve the regional supply of affordable, high efficiency manufactured housing, such as Zero Energy Modular homes.
- Continue collaborations with key partners, such as Vermont Department of Health, state and regional emergency management, regional hospitals and community groups; identify buildings and facilities that serve critical community functions, including as emergency heating and cooling sites.
- Pilot Community-led Resilience Hubs in the NEK to advance climate and energy resilience, emergency management, and social equity while providing expanded opportunities for communities to be successful before, during, and after disruptions. ([2022 EAN Action Team Proposal](#))

Objective:

Support the development of new, community-scale renewable energy in the region to meet the Vermont Comprehensive Energy Plan’s goal of using 90% renewable energy by 2050, in a manner that is affordable, equitable, and respects the natural environment and its inhabitants.

ACTIONS:

- Support the development and siting of renewable energy, storage, transmission, and distribution resources on state and regionally preferred (and potential) locations, as identified by NVDA Act 174 Energy Maps (available online at [NVDA.net](#)).

- Investigate public benefits provided to communities either directly from renewable energy developers or as a condition of a Certificate of Public Good. Assess if the current system is equitable to all municipalities impacted by a renewable generation facility, or if the current system can be improved to provide greater equity to all community members impacted by a renewable energy generation facility.
- Support the economic viability of farms through appropriate renewable energy development as a complementary use that keeps farms in agricultural production while preserving agricultural soils and working lands.
- Promote the use of and increase the amount of on-farm power and community energy generation and the use of renewable energy for farming and food production (such as anaerobic digesters, solar, wind, biomass, and biodiesel) in accordance with local and regional planning priorities.
 - Encourage [agrivoltaics](#) that co-locates solar energy generation with active farming.
 - Encourage and support agricultural production of biofuels and oilseed crops and explore ways to broaden access to processing infrastructure.

GOAL – Decrease Transportation Energy Burden Costs & Fossil Fuel Pollution

Objective:

Promote a shift away from single-occupancy vehicle (SOV) trips and reduce fossil-fuel Vehicle Miles Traveled (VMT) in the NEK:

ACTIONS:

- Follow the [2023 Vermont Transportation Equity Framework](#) to help decision makers plan for and prioritize projects, ensure accurate representation in decision making, and enhance the equitable delivery of services. Continually assess NEK transportation access and barriers.
- Expand walking and biking infrastructure to support active, multi-modal transportation and to provide interconnection with the region’s transit system by:
 - Implementing the strategies and priorities identified in the [Vermont Health Equity Planning Toolkit](#) that are relevant to the NEK.
 - Working with municipalities to update municipal road standards (for maintenance and new construction) to reflect [Complete Streets](#) principles.
 - Reviewing state transportation projects to ensure that Complete Streets are implemented.
 - Ensuring that site plans include adequate bike and pedestrian infrastructure and safety measures, through participation in the Act 250 hearing process.
 - Assisting municipalities with scoping of future bike and pedestrian facilities to improve safety, accessibility, efficiency, and continuity of the system. Municipalities could use the outcomes of the scoping studies to apply for various VTrans implementation grants.
 - Promote the use of the region’s infrastructure such as the Lamoille Valley Rail Trail (LVRT) and support the efforts of local groups maintaining them and providing enhancing amenities.
- Promote Transportation Demand Management (TDM) and Ridesharing programs:
 - Promote and support the [Go!Vermont](#) program that links travelers to a variety of transportation resources and mobility options.
 - Support the continued development and expansion of Park-and-Ride facilities.

- Support employer programs to encourage telecommuting, carpooling, vanpooling, walking, and biking for employee commute trips.
- Continue to advocate for better telecommunications infrastructure so employees can work remotely.
- Encourage increased use of public transit by:
 - Increasing investment in Rural Community Transit (RCT) services in the NEK
 - Working in cooperation with RCT and VTrans to identify opportunities for transit improvement/expansion. Integrate park-and-ride facilities with transit routes.
 - Maximizing ridership for public school buses and minimizing use of private vehicles for student transport.
- Adequately fund the maintenance and preservation of our existing transportation assets including roads, bridges, rail, transit, walking/biking, park-and-ride facilities, and transportation demand management (TDM) programs.
 - Promote and support rail infrastructure as a cost-effective transportation resource.

Objective:

Shift away from gas/diesel vehicles to electric or other non-fossil fuel transportation options.

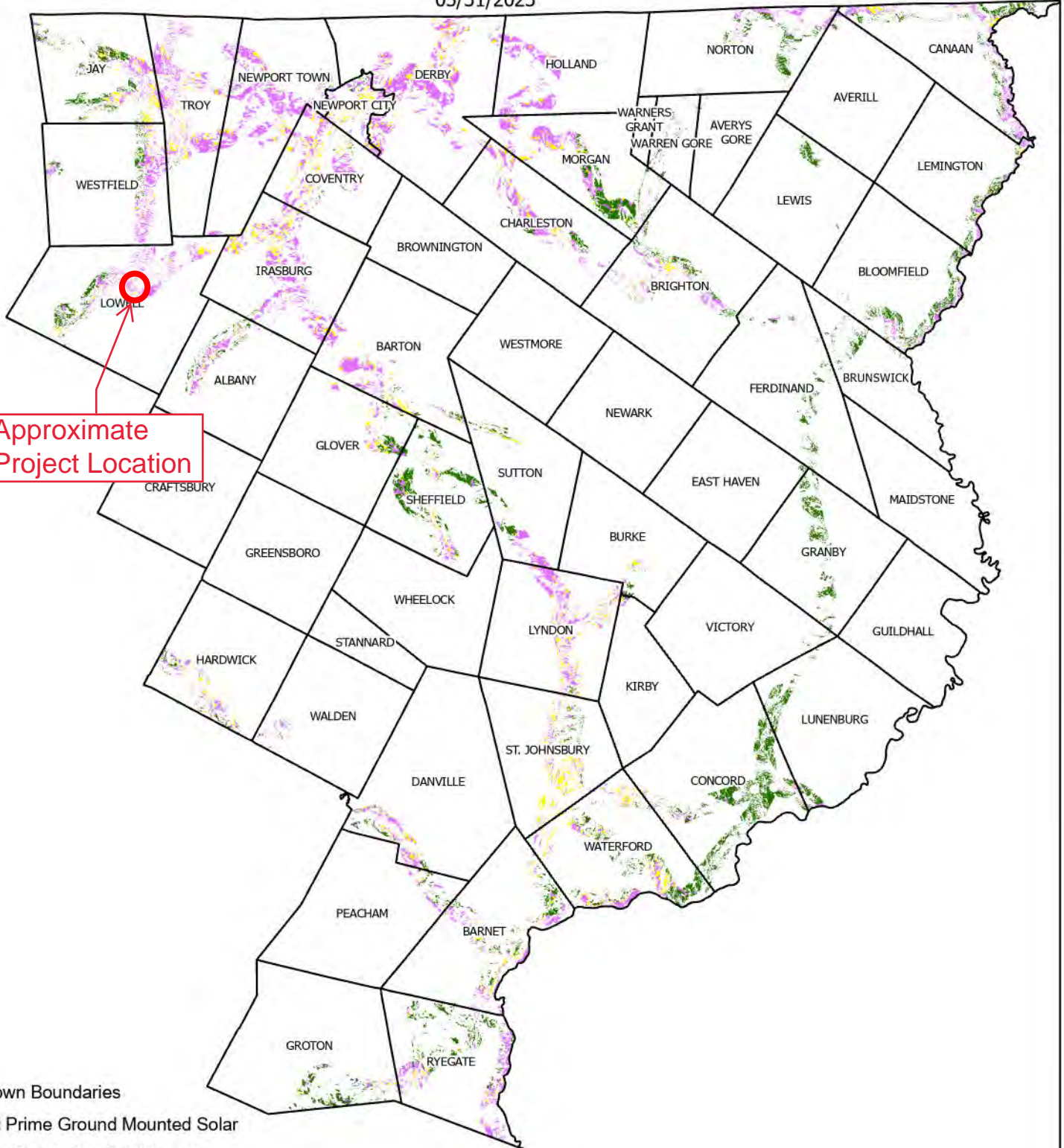
ACTIONS:

- Encourage development of electric vehicle supply equipment (EVSE), like Level 2 and 3 charging stations, in our regional downtowns, village centers, and opportunity zones, as well as along key interstate and state highway corridors in the NEK.
- Support and encourage municipalities and businesses to install EV charging stations at convenient and desirable locations, such as in front of restaurants, stores, tourist and recreational destinations, and community sites like Town Halls and libraries, where users would want to park for several hours. Explore and pursue incentives to defray the cost of installation and administration so that users pay only for electricity.
- Support and expand access to liquid biofuels for use in commercial vehicles and heavy equipment, as well as electrification.
- Support and expand the use of electric powered buses and vans among the public and private transportation providers serving the region, including school districts ([EPA Clean School Bus Program](#)).
- Work with cycling advocacy groups such as Local Motion by hosting safe on-road cycling workshops and raise awareness about the viability of micro-mobility (such as electric bikes and scooters).
- Provide training to local zoning and development review boards to consider infrastructure for alternative transportation in their review of site plans.
- Provide technical and grant writing assistance to municipalities who plan for multi-modal transportation and better connectivity with alternative transportation modes.



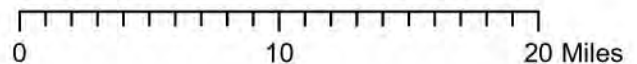
NVDA Energy Map Preferred Ground-Mounted Solar Energy Sites

05/31/2023



Approximate
Project Location

- Town Boundaries
- Preferred Prime Ground Mounted Solar
 - No Constraint - 8,509 acres
 - Possible Constraint, Other - 34,534 acres
 - Possible Constraint - Forest Blocks/Connectivity - 20,695 acres



Warning- This Data is for planning purposes only and does not replace a survey and/or engineering study. Because this map is developed from various scale sources, there may be some discrepancies between data layers.

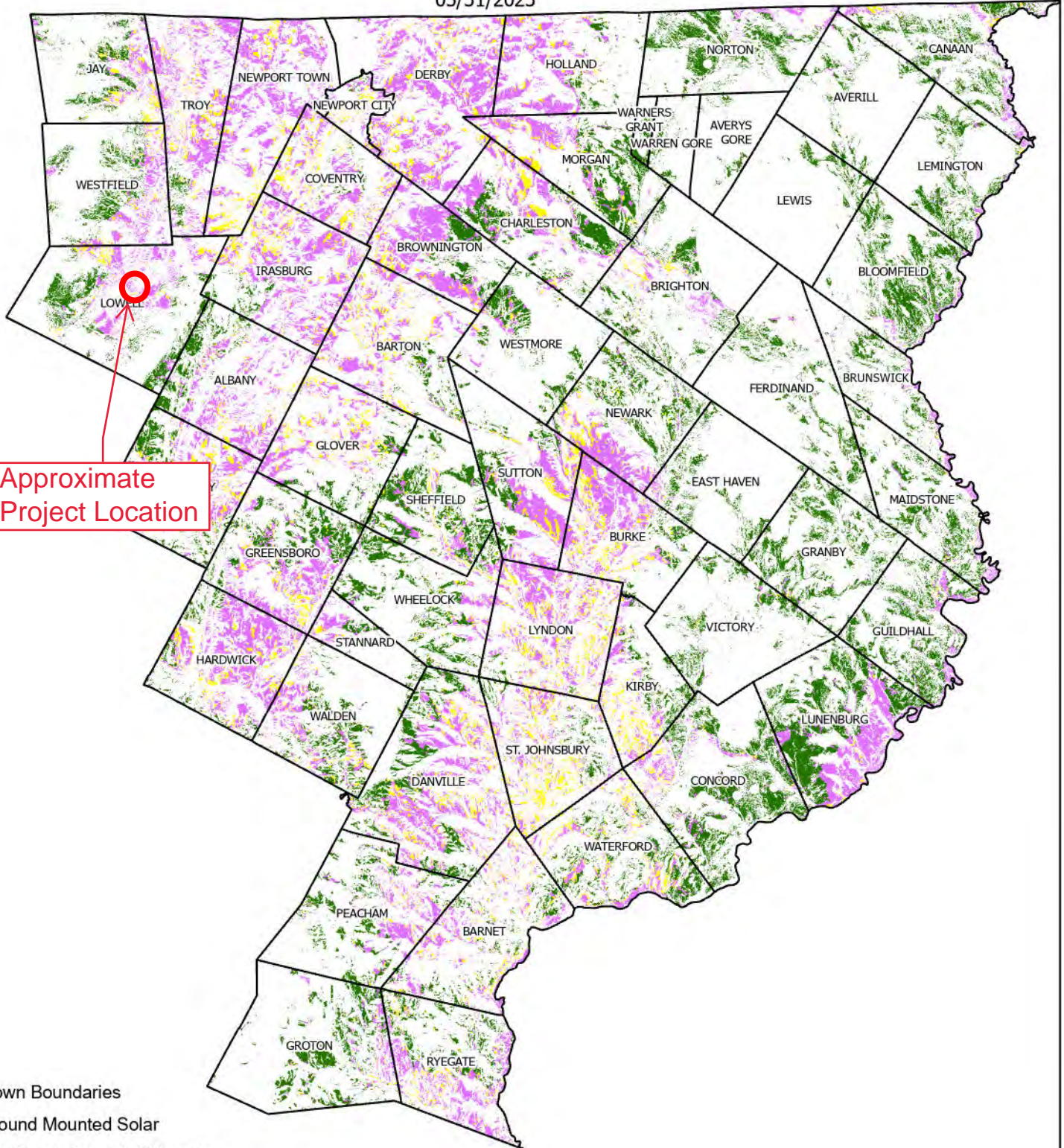




NVDA Energy Map

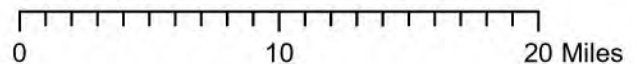
Prime Ground-Mounted Solar Energy Areas

05/31/2023



Approximate Project Location

- Town Boundaries
- Prime Ground Mounted Solar
- No Constraint - 33,378 acres
- Possible Constraint, Other - 141,483 acres
- Possible Constraint - Forest Blocks/Connectivity - 131,172 acres



Warning- This Data is for planning purposes only and does not replace a survey and/or engineering study. Because this map is developed from various scale sources, there may be some discrepancies between data layers.



Lowell Town Plan 2022

Adoption Date: August 2023



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Community Profile

Lowell is a Town in the Northeast Kingdom of Vermont and is part of Orleans County which is made up of 18 Towns and one City – Newport. Sitting at an elevation of 996 ft. with a total land area of 56 square miles, Lowell has unrivaled scenic views in the heart of the Green Mountains.

Lowell is surrounded by seven neighboring towns reaching the borders of: Westfield, Irasburg, Eden, Troy, Newport, Albany & Montgomery.

A large percentage of Lowell's land is forested mixed with rural residential and a small portion being considered "the Village" which is located where Route 58 and Route 100 intersect. This location is commonly referred to as "The Four Corners".

The Town of Lowell has mountains and hills on three sides. All except for the northern part of town is quite rough and mountainous. The northern pan of town is fairly level. The Missisquoi River rises in town, originating in a small pond nearly on the line between Lowell and Eden, and enters Westfield near its southeast corner. It flows northward into Canada and then turns westward and cuts its way through the mountain a few miles north of the border, enters Vermont again and continues west into Lake Champlain. It is an important river and its valley is an important unit in the economic status of the state. Years ago in the center of the Town of Lowell at the grist mill the Missisquoi River passed through a hole in the solid rock at the foot of a fall in the river of 10 feet. The top of the rock bridge was three feet wide.

Where originally there were 37,000 acres set to the town, now there are just over 33,729 acres. Upon the southern border arc Mt. Norris, M t. Hadley and Mt. Belvidere. In the eastern pan of the town is a mountain which affords only two places for a road, one is the old Hazen Road and the other is the Irasburg route. Serpentine Hill in the northern pan of the town, is also an abrupt elevation. The whole eastern and central pan of the town are very rough and mountainous. The northern pan of the township is a fertile, sandy plain, watered by branches of the Missisquoi River, forming the most available farming land in the township. The numerous springs and streams that unite to form the Missisquoi are waters of an exceptionally pure quality and are populated with beautiful specimens of speckled trout. Large quantities of hard and softwood timber were standing in the forest, while excellent mill privileges were afforded, so Lowell was an exceedingly busy lumbering town.

VERMONT

Total Area: 9,609 square miles

Highest Elevation: Mt. Mansfield, 4,395.3 ft.

Lowest Elevation: Lake Champlain shoreline, 95 ft.

Major Mountains: Killington, 4,229 ft., Mt. Ellen, 4,083 ft., Camel's Hump, 4,083 ft., Mt. Abraham, 4,017 ft.

Major Rivers: Missisquoi River, Lamoille River, Winooski River, White River, Otter Creek, West River, Batten Kill, and the Connecticut River which runs along Vermont's Eastern boundary with New Hampshire

During the spring of 2000 the Lowell Planning Commission conducted a public opinion survey and held a public information meeting to determine the needs and desires of Lowell's residents with regard to the Town's future.

The Planning Commission, in conjunction with the Town Clerk's Office, will hold another survey allowing the residents to voice their opinions on planning for our community. It will focus on their concerns, what development they would like to see happen in the future and asking for ideas on how to protect the Town but also advance and grow it to its full potential.

The Planning Commission will take all opinions into account when updating the next Town Plan to ensure all residents have a say in the future of Lowell.

Based on past objectives, Town feedback and the Planning Commission analyzing the data presented in this plan the following objectives are being set in place as the future goal of this Town to achieve.

Vision Statement

It is the primary and fundamental intention of Lowell to remain a rural, agricultural town that encourages farming and a town that encourages individual businesses and entrepreneurship of a scale that can integrate harmoniously into its residential areas.

Goals & Objectives

The primary goal of this Town Plan is to provide for Lowell's residents: to further their opportunities to maintain an adequate and satisfying livelihood, to foster harmony among neighbors and to protect and maintain the rural lifestyle we all enjoy. It is to these ends the following objectives are set out.

- Ensure all residents have their property rights both respected and protected.
- The growth of Lowell should occur in such a way as to enable residents to continue to live in town without undue tax burdens.
- Allow for commercial and industrial development that fit within the Town's primary objective.
- Create a safer intersection at Routes 58 and 100.
- Ensure the Zoning Administrator is well informed and equipped with the necessary resources to make determinations that adhere to state regulations for building in flood zones.
- Have flood maps available to the people of the town along with guidelines and suggestions for protecting themselves in a flood situation.
- Work with the Select Board and Road Commissioner to see better maintenance of ditches and culverts to prevent flooding during storms and seasonal melting.

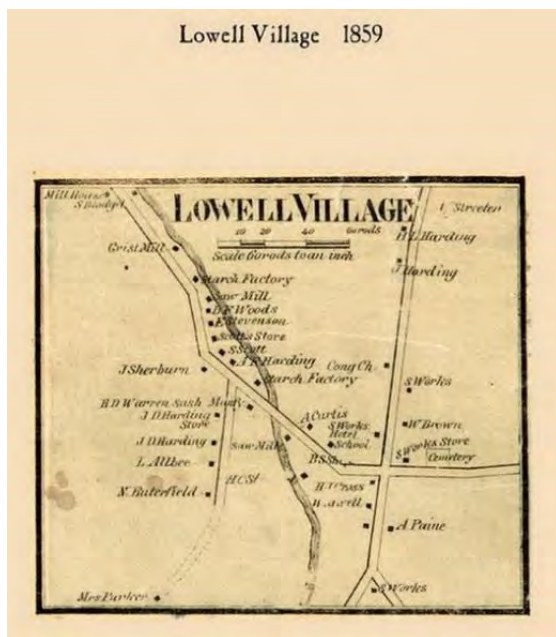


- Maintain the Town's beautiful rural character as much as possible – eliminating junk yards and unsightly areas.
- Participate in the *National Flood Insurance Program – Community Rating System* through FEMA to raise awareness on flood prevention while qualifying the town residents to take advantage of home insurance discounts.
- Provide a public carpooling lot for residents commuting to work in other towns.
- See that the Town Residents have access to reliable high-speed internet.
- Keeping communication open between Town officials, residents, neighboring towns and the Zoning Board to ensure there is a constant awareness of what the residents' needs are while projecting future development to accommodate growth.
- Encourage open farmland for agricultural purposes and find new ways to support career farmers and hobby farmers to ensure they can continue their appreciated endeavor.
- Maintain roads like Bayley-Hazen Military Road between Lowell and Albany, that are no longer maintained for vehicular use, for recreational uses.
- Encourage the development of more town owned and operated parks and other recreational uses and maintain the ones the Town already has.
- Encourage the maintenance of the roads in Lowell in such a manner as to allow for safe passage and to prevent traffic congestion.

Yesterday

The History of Lowell

The Town was granted March 5, 1787, and chartered by Governor Thomas Chittenden to John Kelley, Esq., of New York, from whom it was named Kelleyvale. The name was changed to Lowell, Nov. 1, 1831.



The Town is located 44° 47' North Latitude (36 miles north from Montpelier and 10 miles southwest from Irasburg).

The first settlement was commenced by Major Caldwell from Barre, Massachusetts in 1803 He moved his family here in April, 1806. In 1807 John Harding came to town, drawing with the assistance of four others his family and goods on three hand sleds. He settled on what became the Philip Geoffroy farm, it is believed.

The first Town Meeting was on March 12, 1812 A petition signed by nine of the inhabitants of Lowell was tendered to Meda Hitchcock requesting him to warn the people of a meeting for the purpose of organizing the town. The meeting was held March 31, 1812, at the home of Asabel Curtis.

The Warren Road (now known as Route #100) was the first County Road. It was built in 1828 running northeast through town from Burlington to Derby, passing through Lowell, north and south through Eden, and was the only mail route. Soon after the mountain road to Irasburg was built, but not traveled much in winter as it was too rough and steep.

On Nov. 3, 1927 a heavy downpour of rain occurred, which citizens will not forget. The Missisquoi River rose so the "flat" resembled a lake. Great gullies were made in roads and many bridges were washed away, including the two at the entrances of the village, and numerous ones on

the back roads. The sawmill went down in the torrent of angry water and was never rebuilt. The dam at the sawmill site was destroyed at this time. There had been a dam in the village by the bridge and another by the old grist mill. These furnished power for the mills.

In the fall of 1938 a severe "hurricane" storm paid a visit to Lowell. Roofs were blown off, buildings and trees were uprooted, and the surroundings were a sorry sight indeed when the storm finally spent itself.

On May 6, 1939 the R.E.A. line was energized, bringing electricity to Lowell, the results of a vision that has made our present standard of living possible.

Asbestos was discovered in Lowell in 1824, but little was done to mine it at first. It takes about 15 tons of rock to make a ton of asbestos fiber. This fiber was used in different building materials such as shingles, siding, roofing and many other industrial uses. The mine commenced operations in the early 1900's.

Eventually when the mine was utilized to its full potential Lowell supplied 96 % of all asbestos produced in this country, which was but a small percent of the asbestos actually used in the country years ago. The mine was a huge open face mine or quarry with no underground operation. Around the clock operation required a working force of 240 to 300 men at its peak in the 1960's and 1970's. After years of successful operation of the mines the health hazards of asbestos became a concern and use of asbestos declined. To save their jobs the workers bought the mine in 1975 but then sold it to H. A. Manosh in 1978. The fact that the mine was producing chrysotile asbestos instead of the more dangerous types did not save the mine's market and it closed its doors in 1993. The mine still sits in the Town of Lowell abandoned and discussion has been had as to how or what can be done to ensure asbestos is not airborne harming the residents of the town. The Planning Commission will continue to work with the Department of Health to ensure no one is harmed by the abandoned mine pits.

References

The History of Lowell by Helen Gelo of Lowell, Vermont and published by the Lowell Historical Society in 1976 for the Lowell Bicentennial celebration,

A History of Vermont written and compiled by Bethany Dunbar with Sam Thurston and published by the Lowell Historical Society

Cemeteries

There are three cemeteries in Lowell:

1. Mountain View Cemetery: VT Route 58 E, Lowell, VT 05847.

The cemetery is managed by the Lowell Cemetery Association, incorporated in 1915.

The cemetery entrance is just east of Vermont Route 100 at the "Four Corners" crossing. The cemetery has been in continuous use since shortly after the town was incorporated in 1812. The earliest identified burial is 1817. The approximate number of interred is 1100 and 20% of the designated land area is available for future use.

2. St. Ignatius Cemetery: 1953 VT Route 100, Lowell, VT 05847

The cemetery has a board of 6 commissioners plus the priest to oversee the care and upkeep, improvements, and pricing. The diocese of Burlington owns and controls the finances of it.

Started in the early 1900's with first recorded burial in 1906. It is approximately 5 1/4 acres in size. The number buried is nearly 900 and around 35% of the designated land area is available for future use.

Land Use

The estimated Lowell population for 2020 is 879 and the average people per square mile is a mere 16. When comparing Orleans County or the State of Vermont we can clearly see that Lowell is well below the average and that our population is geographically sparse in comparison.

	Population 2020	Area – square miles	People per square mile
Lowell	887	56	16
Orleans County	27,393	698	39
Vermont	643,077	9620	66.8

Open Spaces Reserved for Conservation Purposes

One of the former Lowell Town Plans, adopted on December 12, 1989, contains wording to authorize a Conservation Mountain district to limit development in those areas of Town least suited for development. Such a district was established in the current Lowell Zoning Bylaw, adopted in 2009, and the objective for this district designates those areas over 2,000 feet in elevation as being in the Conservation Mountain district. These areas are generally forested, are inaccessible and have moderately steep to very steep slopes. It should be noted that those areas in Lowell that are above 1,500 feet also possess many of the same characteristics as those areas above 2,000 feet in elevation. These areas can be found along the Town's eastern, southern, and western boundaries.

Projected Housing Needs

The reader should note that the Town of Lowell is not and will not be in the business of providing housing for the residents of Lowell. The purpose of the housing element is only to help the Town understand the existing housing situation and the Town's future needs.

Like many of the towns in Orleans County, Lowell had seen growth in the number of buyers of second homes. Up until the current economic downturn the region was attractive to many looking for a getaway spot. Housing was relatively affordable, and the scenic beauty of the area was appealing to many. This demand decreased in the years immediately following the Great Recession, but the grand list data indicates that growth in seasonal homes appears to have picked up. The pandemic has also affected real estate sales, but it is too early to tell what the long-term impacts will be. The Planning Commission hopes that in the future the Town will still be seen as a desirable vacation area for prospective buyers.

With a very slight increase in population for the 2020 Census, and possibly modest population growth by 2030, we very comfortably foresee the housing market growing with the population at a manageable rate. We cannot see there being a housing crisis or urgent demand that the area cannot supply.

The Town must be aware at all times of the economic situation and if there are large corporations coming into Town supplying jobs enticing quantities of new families to migrate to the area. This situation is rare but can provide a housing demand that the Town is not capable of supplying.

Village Character

The Planning Commission is proud of the Town's historic village and wants to encourage the revival of some original aesthetics it once possessed. The Planning Commission aims to maintain the integrity of all public areas of the town to these standards to encourage residents to follow, bringing the town's core to its original charm.

Plans for the Village:

- Give the town a more community-like and attractive appearance to reflect what the area really is, has been, and could be in the future. This can be done by adding parks, benches, secure places young children can play with their parents, improved sidewalks, elderly housing and easy off-street parking that would encourage business.



The Planning Commission will look at the community survey to see what the Town Residents feel are priorities in the Village and what they would like to see improved upon. The Town can then discuss and approve a budget for the additions and changes.

Future Land Use

Permit Allocation

The Town of Lowell Adopted its Zoning By-Laws May 25, 2009 and amended them most recently in 2018. A copy can be obtained from the Town Clerk's office or from the Zoning Board. These policies explain the current criteria and requirements for anyone wishing to build in Lowell.

The Planning Commission will be updating and revising these in the near future to ensure they are current with today's trends and coincide with the new Town Plan objectives.

The current procedure is for residents to fill out a building permit with all required information, have the appointed Zoning Administrator sign and approve the request, pay the indicated fee and then it is filed with the Town Clerk's office. In the last few years there have been very few resident requests that have brought forth debate, extended discussion or caused any concern to the Town. Therefore, the Planning Commission agrees that the current procedure for building permits works well for the Town and there is no need to change the arrangement at this time.

Should there be any challenge to the system in the future the Planning Commission will then review the process.

Permitting activity is fairly consistent over the decades. Permits were issued for various reasons, but mainly for small out buildings, sheds and garages being added on. There were also approval requests for housing additions, placements of trailers and sub-division of land into smaller parcels.

In the year 2000 – 34 Building Permits were submitted to the Town by residents. In 2010 there were 33 permits issued showing no great change in the 10 year period. In 2020, 34 permits were issued, and 31 permits were issued in 2021. The breakout of permitting activity over the past two years permitting is as follows:

2020	2021
Residential – 6	Residential – 10
Additions – 5	Additions – 5
Outbuildings – 6	Outbuildings – 11
Camps – 5	Camps – 1
Municipal – 1	Subdivisions – 2
Subdivisions -9	Miscellaneous - 1
Miscellaneous - 2	

The Planning Commission currently feels that any property that meets the specified requirements is eligible for building. We will not dictate to property owners and undermine their rights if they meet requirements for the town and adhere to all state and federal bylaws. The only way in which the Board will intervene is if the resident’s plans infringe on the rights of other residents or the Town; if the proposal does not meet State or Federal criteria, if it violates flood zone regulations, or if the proposed use is not lawful. The Board will step in and make suggestions and do everything they can to help the progress without bringing it to a halt.

Agriculture

There is an active dairy farm in Lowell. Most of the land used for agricultural purposes is located adjacent to Route 58 and Route 100 with few scattered among the side roads.

Vermontdairy.com which is a site sponsored by the Vermont Agency of Agriculture states that in 2013 there were 993 active dairy farms in Vermont. The Agricultural Census of 2017 reported 841 dairy farms, Orleans County being home to 109 of those.

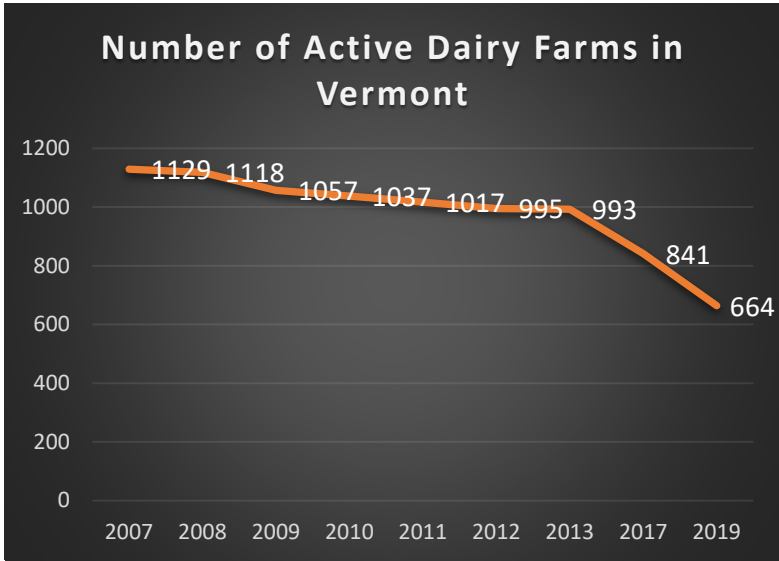


However, there has been a substantial decrease in dairy farms since the last Agricultural Census. The Vermont Farm to Plate Food System Plan (2020) reports that statewide, there were 664 dairy farms in 2019, with 470 conventional and 188 organic. The plan also indicates that Orleans County, one of the most dairy intensive counties in the state, has seen a 19% decrease in the number of dairy farms since 2009. You will see the totals in this graph. The slow decline is blamed on rising costs, economic downfall,

market changes, price fluctuations, along with the increased costs that go with new state and federal production standards.

Between 2007 and 2019 we see a decline from 1129 farms down to 664 which is a 41% difference over a 12 year time period. In the 2009 Town Plan it was stated that Lowell had 10 active dairy farms. In comparison to the current total of 1 we have seen a tremendous 90% decline in the industry.

The declining Farming population is caused in two areas: First this is common for much of Vermont and New England, farms have consolidated and become larger or specialized in “value added farming”. The larger family farms have concentrated where there is infrastructure, large open drainable fields. And the other is there are fewer people interested in a 7 day a



week lifestyle and fewer people brought up in Agriculture and attracted to this type of work long term.

With the aging population, and technology advances leading youth into different career paths we feel there will be no real recovery for the farming industry. The future of farming in Lowell will be strictly a few remaining family farms staying in production and the rest will be for hobby/leisure and not on a full production size scale.

Although Lowell will not turn its back on its farmers and will

continue to do everything it can to support and encourage the industry, it will not attempt to promote this area as huge growth potential for the town. The Town will need to focus on other areas moving into the future.

The area of growth for agriculture in Vermont is the production of Maple Syrup often referred to as "Sugaring". There are currently thousands of taps producing sap in Lowell.

The Vermont Maple Sugar Makers Association shows that there are 55 companies registered in Orleans County alone that produce Maple Syrup for resale, four of which are in Lowell. This does not include the families producing for private use or the non-registered maple farms.

This is a growing industry that both small families and large farms are able to participate in. Lowell will do everything it can to ensure it protects the Sugaring Houses and helps support growth of the industry.

Forestry in Vermont

There are few solid facts about the forestry industry relating specifically to Lowell largely because the lands are privately owned and the statistics are not reported and recorded with the Census Bureau. We can, however, look at the forestry industry in all of Vermont. These facts were obtained from the Vermont Division of Forestry – vtfpr.org.

Vermont forests cover about 4.5 million acres and take up 74% of the land in the state -- about 76% of the land mass when water is removed from total area. (USDA 2019) This is a level that has stayed steady since 1980. Nearly all of this land can produce commercial timber.

There is little "public" land in the State of Vermont. The Green Mountain National Forest together with any small municipal owned lands only account for 21% of the forests in the state (10% state and municipal and 11% federal). The vast majority – 79% -- is individually owned.

Although the industry has declined slightly since its peak in 1990, a report prepared for the Dept. of Forests, Parks and Recreation and released in October 2021 finds that Vermont's vibrant forest economy directly employs over 9,100 people and has \$1.4 billion in sales. Total contributions from the sector support nearly 14,000 jobs, with labor income over \$500 million, and \$2.1 billion in sales. Vermont's forest and wood products industries account for about 12% of Vermont's direct manufacturing jobs and about 5.7% of non-food manufacturing jobs.

In 2013 Vermont Legislature passed Act 24, allowing until January 2015 for a new Harvesting Guideline to be written and provided to residents to ensure healthy harvesting is being practiced and thus protecting our forests. The guidelines, which are voluntary for private landowners, are available on the Forests, Parks and Recreation website: <https://fpr.vermont.gov/forest/managing-your-woodlands/cut-with-confidence>

No. 24. An act relating to harvesting guidelines and procurement standards. (H.131)

It is hereby enacted by the General Assembly of the State of Vermont:

Sec. 1. 10 V.S.A. § 2750 is amended to read:

§ 2750. HARVESTING GUIDELINES AND PROCUREMENT STANDARDS

(a) The secretary of natural resources Commissioner of Forests, Parks and Recreation (the Commissioner) shall develop voluntary harvesting guidelines that may be used by private landowners to help ensure long-term forest health and sustainability. These guidelines shall address harvesting that is specifically for wood energy purposes, as well as other harvesting. The secretary Commissioner may also recommend monitoring regimes as part of these guidelines. In developing these guidelines, the Commissioner shall:

(1) Provide widespread public notice of the process to develop the guidelines.

(2) Provide opportunities for potentially affected individuals, business organizations, and members of the public to submit recommendations on the specific content of the guidelines prior to their development and to comment on a draft of the guidelines once the draft is developed.

The Town of Lowell will ensure it is made available to its residents. The Planning Commission will actively work to ensure that the forests are protected and that the residents are continually aware of updated guidelines and regulations by the State of Vermont.

As for development in these areas: Any land area in Lowell that has steep slopes and/or shallow soils should have a very low intensity of development. This land is generally suitable only for forest purposes; some agricultural uses, and, at a very low-density, seasonal and year-round dwellings, which should be permitted only if the site can support a well and septic system and there is adequate public access to the site.

This plan recommends that all lands above 2,000 be designated as being in this district.

The minimum density for the Conservation Mountain district should be one family per ten (10) acres.

Benefits of Lowell's Forest Blocks and Connected Forests

The Town of Lowell recognizes the importance of unfragmented forest blocks and the connecting landscapes in maintaining the ecological processes that support the biological and economic health of the people of Lowell and its wildlife. Lowell's unfragmented forests provide many benefits to the people of Lowell. Our forests provide timber and jobs, help moderate tick-borne illness, prevent soil erosion and contribute to the quality of our waters and air. These forests provide places for recreation including hunting, fishing, and trapping, walking and hiking, skiing, snowshoeing, snowmobiling, ATV riding and enjoying our mountains, rivers, and our spectacular display of fall colors. Lowell's unfragmented forests also contribute to our Biological Diversity and provide secluded habitats for many of our more wary species of wildlife such as bear, bobcat, moose, and fisher.

The Town of Lowell encourages all landowners to assist in maintaining our unfragmented forests and the connections between them.

Definitions

Forest Blocks: Forest blocks are those unfragmented forest blocks (sometimes called “interior forest” that are over 500 acres in size. These forest blocks are without paved roads, permanent houses, agricultural, and other human development. Lowell’s forest blocks may also contain small ponds, streams and rivers, wetlands, and other features such as ledges, cliffs and orchards that also contribute to a forest block’s value to a wide variety of wildlife. These forest blocks consist of the Town’s highest priority interior forest and connectivity blocks (as mapped by the State of Vermont) as well as those containing Lowell’s serpentine landscape, a landscape that contains unusual natural communities and rare plants. Also included are smaller unfragmented forested areas that potentially serve as a landscape “stepping stones” that function as a linkage for wildlife between these larger forest blocks.

Connecting Blocks: Larger connecting blocks that function in maintaining an unfragmented forest in Lowell have been identified and are shown on the accompanying map. Forested blocks that are separated by paved roads but retain relatively wild conditions - largely free of concentrated human development, may also serve to facilitate the movement of wildlife across the landscape and between forest blocks. Forested stream crossings and areas with forest habitat and little human disturbances have also been mapped as potential wildlife connectors between forest blocks.

Note: Maps of priority habitat blocks and connecting blocks appear at the end of this plan in an 11x17” color format.

Wetlands



Wetlands are of crucial importance to the surface water regime. These areas store large quantities of water during periods of high runoff and gradually release water during low flow periods. Therefore, the wetland regulates stream discharge both during low flow and peak flow. Loss of this storage capacity will not only adversely affect stream behavior but will also increase floods and reduce stream flow during crucial low flow periods. Wetlands are also important for the maintenance of water quality. The biological activity of a wetland area enables the

absorption and assimilation of nutrients and thus purifies to some extent the water which is discharged.



and fishing. For those who enjoy indoor activities, Derby and Newport City can provide various forms of entertainment. While the Missisquoi Bowling Alley is a local place for some indoor fun.

Located at the Lowell Graded School is the school playground, Gelo Park and the Lowell Community Trails. These areas include ball fields, a basketball court, traditional playground equipment, trails behind the ball fields with picnic tables for walking and biking, providing opportunities for both children and adults alike.

For hiking, biking, snowshoeing, and Nordic skiing: The Long Trail passes through the western part of Town and the Town's roads provide ample opportunities for both road and mountain biking. In addition to the Long Trail, approximately 8.6 miles of the Catamount Trail also pass through Lowell. Some of the Catamount Trail follows the Bailey Hazen Military Road between Albany and Lowell. This trail, like the Long Trail, also runs the length of the State, but it is designed for snowshoeing and Nordic skiing. Summer use of the Catamount Trail is generally not permitted. Lowell's wilderness areas and many streams and rivers should also provide ample opportunities for hunting and fishing.

The Vermont Association of Snow Travelers (VAST) maintains trails in Lowell. One of these trails coincides with the Catamount Trail on the Bailey Hazen Military Road between Albany and Lowell.

In the area surrounding Lowell there are ample recreational opportunities. Jay Peak is located about 15 miles away and offers both alpine and Nordic skiing in the winter and hiking, mountain biking, golf, tennis and basketball in the summer. Burke Mountain is a little further away and offers both alpine and Nordic skiing. Kingdom trails is located near Burke Mountain and offers hiking and mountain biking. Many of these same activities are also available south of Lowell in the Stowe area. For those who prefer the water, there are many lakes in the area that offer swimming, boating, and fishing. In addition to those opportunities listed here there are numerous other recreational activities to do in the area.

Recreational Planning

The Planning Commission does not see the need currently to recommend any kind of an organized recreation program. However, because Lowell's recreational opportunities are dependent on the quality of Lowell's environment, it is necessary to protect and maintain Lowell's wonderful natural resources including the trails and streams, from development damage.

Recycling

The Town of Lowell provides free recycling to residents with a local drop off point at the Town Garage. The recycling is open to residents every Saturday from 8am to noon.

While the current system of dealing with solid waste and recyclables has been working well for the Town, Act 148 banned recyclables from the waste stream in 2015 and food scraps in 2020. The Town maintains a Waste and Recycling Website, and an up-to-date Solid Waste Management Implementation Plan. <http://www.townoflowell.org/recycling---solid-waste.html>

Energy

Electric Infrastructure and Services

Power is supplied to the Town by the Vermont Electric Co-op. With the installation of the new wind towers, Green Mountain Power maintains a transmission station on Rte. 100 in and all of the transmission lines and distribution are facilitated through the VEC.

VEC's distribution system line lengths have not changed significantly from the 45 miles reported in 2009, however all the distribution assets along Rte. 100 in Lowell were rebuilt with the KCW project. These upgrades have greatly improved reliability.

The Lowell substation was upgraded from 2,500 kilo-volt amperes to 7,500 kilo-volt amperes when the VEC rebuilt the station in 2011/12. The station is now fed from the VEC 46 kilo-volt transmission system in the north which is connected to the VELCO 115 kilo-volt system. The old connection to the south is now used as a redundant source. Having dual sources from the north and one from the south has greatly improved operating flexibility and reliability.

The 46 kilo-volt transmission line between Jay and Lowell was rebuilt in 2011/12 as part of the KCW project. It has a capacity of 75 megawatts which serves Lowell as well as serves as the connection for the KCW wind farm to the VELCO bulk transmission system in Jay. This transmission line which is all to the north of the Lowell substation is jointly owned by GMP and VEC, with VEC being the operating authority and charged with maintenance.

Approximately four miles of new 46 kilo-volt line was built from the south of the Lowell substation to connect to the wind farm. This line is rated at 75 megawatts as well and is only used to transport the wind farm output. This line is solely owned by GMP which they operate and maintain.

Telecommunications Facilities

Cell phone and internet facilities are still less than what they should be. Lowell, along with all the Northeast Kingdom, is determined to improve the system, and we do expect improvement over the next few years. The Lowell Fire Department has been working with cell phone providers to create income and provide service for the town on their property.

The Town of Lowell has limited DSL availability. It is the goal of the Zoning Board to rectify this and promote the extension of more dependable DSL lines for the residents.

Many residents rely on satellite internet providers and this source can be more costly and less reliable.

The Northeast Kingdom Communication Union District is commonly referred to as "NEK Community Broadband." It was formed in March of 2020, and now includes 32 towns, including Lowell. Every town has one primary representative on the Governing Board who was appointed by the select board. The organization's purpose is to ensure that every e911 address in the Kingdom can access robust reliable internet service speeds. This is a long-term process which will take years to fully realize. Funding will come through state and federal grants, subsidized loans,

and the fees from internet subscribers for services provided. Financial resources will not include taxes from member towns. In fact, NEK Community Broadband is legally prohibited from using tax dollars directly, and this prohibition includes debts.

Conservation and Local Generation

Lowell has a small center surrounded by extensive rural settlement and open space. According to the latest American Community Survey 5-Year Estimates, about 82% of the community's housing stock consists of detached single-family homes. Many of its residents travel out of town for work, shopping, and other necessities. This pattern of development is linked to considerable energy use to meet transportation and heating needs.

Nevertheless, the Planning Commission strongly advocates the conservation of energy. Energy conservation should be part of daily life, at home, school, and the workplace. The use of energy efficient appliances, lighting, and building materials is highly recommended. It is also recommended that residences and businesses avail themselves of the energy efficient services and programs currently offered by energy suppliers, especially Vermont Electric Cooperative. The Planning Commission recommends that all residents develop good conservation practices and take advantage of the many promotional energy conservation programs available in the community.

"Energy burden," is measured as a household's total energy spending as a percentage of income. A 2019 report from Efficiency Vermont estimates the average statewide energy burden to be about 10%, but in the Northeast Kingdom, the rate trends much higher. The greatest determinant of energy burden is income, not fuel cost, so even though many residents are able to reduce their costs by burning wood, they still struggle to make ends meet. Those who are energy burdened are less likely to pursue conservation measures, such as weatherization or fuel switching. Even if those measures save money in the long run, they can't afford it.

HEAT Squad, a recent arrival to the Northeast Kingdom, makes affordable whole energy audits available to all households and assists with procurement and oversight to homeowners seeking contractors for their efficiency projects. Reduced audit costs are generally available for households with incomes up to 125% of the area median income, and HEAT Squad representatives can coordinate rebates through Efficiency Vermont and other resources for their clients. A similar **free** program for qualifying low-income homeowners is available through Northeast Employment and Training Organization. Grants and low-interest financing options are also available through USDA. Homeowners are not always aware of these resources. A local energy committee or an energy coordinator could help connect energy burdened individuals with the services they need.

In 2010-2011 the Town of Lowell began discussing the proposal for the installation of wind turbines for renewable energy production. This was a project piloted by Green Mountain Power and the turbines would be erected on the mountain ridgeline between Albany and Lowell.

There was much debate over the project but in the end the Town's people voted in favor and the project was approved.





Working together with Vermont Electric Coop, Green Mountain Power has built 21 wind turbines along the ridgeline of the Lowell Mountain Range. This location offers both a reliable source of wind, and the infrastructure necessary to bring the project online.

The project began generating electricity at the end of 2012.

The wind turbines at Kingdom Community Wind are 3 MW VESTAS V112, some of the newest technology on the market. When fully operational, the plant is expected to produce approximately 186,000 MWH

annually or the equivalent of enough electricity to power more than 24,000 homes each year. However, production is frequently curtailed because of grid constraint. In simple terms, our region produces more power than it uses, so power is exported out of the region. When the transmission line carries too much power, the line overheats, threatening grid stability. To keep the line from overheating, the largest power generators, the regional grid operator (ISO New England) requires generators (usually those with a capacity of 5 MW or greater, to curtail (reduce) their electrical output to ensure reliable operation of the transmission system.

Every kilowatt hour of electricity will be used by Green Mountain Power and Vermont Electric Cooperative customers.

The land leased for the project has been an active logging operation for decades. Of the thousands of acres that comprise Lowell Mountain a total of 135 acres was used for the wind plant. Direct impact to bear habitat totaled 20 acres, impact to wetlands totaled half an acre, and for high level wetlands the impact was one-tenth of an acre. To mitigate these impacts and the habitat fragmentation caused by the road, GMP procured conservation easements on over 2,800 acres. The conserved area includes over 1,100 acres on Lowell Mountain, and over 1,600 acres in Eden connecting important wildlife corridors between Green River Reservoir and the Lowell wildlife habitat area.

The Town has a total installed grid-connected solar capacity of 272 kW. For those who are unable to install solar panels on their own property, Vermont Electric Coop operates a community solar program that allows customers to sponsor a panel in return for a fixed monthly credit on their bill. Additional solar development in the area is limited, largely due to the massive amount of energy the Northeast Kingdom already generates.

Power Generating Plants

While the Town of Lowell has little or no influence over the operation of the privately owned hydroelectric generating plants in Lowell, the Zoning Board does encourage the continued operation and maintenance of these sites as they are seen as a benefit to the Town of Lowell.

Public Safety and Emergency Response

Volunteer Fire Department

The Lowell Fire Station is located at 2534 VT RTE 100, Lowell, VT 05847. This is just north of the four corners intersection leading to the Village where Route 58 crosses Route 100.

The Lowell Fire Department is run by volunteers of which there are currently 21 members that train monthly.

(1) **Class 1** town highways are those town highways which form the extension of a state highway route and which carry a state highway route number. The agency shall determine which highways are to be class 1 highways.

(2) **Class 2** town highways are those town highways selected as the most important highways in each town. As far as practicable they shall be selected with the purposes of securing trunk lines of improved highways from town to town and to places which by their nature have more than normal amount of traffic. The selectmen, with the approval of the agency, shall determine which highways are to be class 2 highways.

(3) **Class 3** town highways:

(A) Class 3 town highways are all traveled town highways other than class 1 or 2 highways. The selectmen, after a conference with a representative of the agency, shall determine which highways are class 3 town highways.

(B) The minimum standards for class 3 highways are a highway negotiable under normal conditions all seasons of the year by a standard manufactured pleasure car. This would include but not be limited to sufficient surface and base, adequate drainage, and sufficient width capable of providing winter maintenance, except that based on safety considerations for the traveling public and municipal employees, the Select Board shall, by rule adopted under 24 V.S.A. chapter 59, and after following the process for providing notice and hearing in section 709 of this title, have authority to determine whether a class 3 highway, or section of highway, should be plowed and made negotiable during the winter. However, a property owner aggrieved by a decision of the Select Board may appeal to the transportation board pursuant to subdivision 5(d)(9) of this title.

(C) A highway not meeting these standards may be reclassified as a provisional class 3 highway if within five years of the determination, it will meet all class 3 highway standards.

(4) **Class 4** town highways are all town highways that are not class 1, 2, or 3 town highways or unidentified corridors. The Select Board shall determine which highways are class 4 town highways.

(5) Trails shall not be considered highways and the town shall not be responsible for any maintenance including culverts and bridges.

Highways & Streets

Lowell, as a rural community, depends entirely on its highway system and private vehicles for transportation purposes. Thus, the highway system is of the utmost importance. Within the Town of Lowell there are two State highways. Route 100 is a north/south highway providing access to Newport City to the north; Morrisville, Stowe, and Interstate 89 to the South. Route 58 is the east/west highway and it provides access to Barton and Interstate 91 to the east; Montgomery and other points to the west. Route 58 to the west of Route 100, however, is a town road with a gravel surface. This portion of Route 58 passes through Hazen's Notch and is closed during the winter months.

Route 100, classified as a rural minor arterial, passes through the Missisquoi River valley and is generally in good repair, it has paved shoulders that are two feet wide, and has relatively few problems. The problems that do exist include an unsafe segment between mile markers 5.6 and 5.9, poor pedestrian access to the Lowell Graded School, and a dangerous intersection with Route 58. To the north of the Village is a segment of Route 100 (between mile markers 5.6 and 5.9) with an "S" curve that makes it difficult for northbound drivers to see the farm and cattle crossing to the north (this farm is not currently in operation and therefore not a hazard at this time).

Route 58 to the east of Route 100, which is classified as a major collector, passes over the ridge that forms the northern end of the Lowell Mountains and therefore provides many scenic vistas to the west and north. This highway needs to be repaved, but it has not yet been included in the

Upgrades that will improve safety for all users should also be considered. Suggested projects include the posting, by the Town and/or State, of reduced speed limits along Route 100 in the vicinity of the Village; additional guardrails along the back roads where needed; and as mentioned maintaining a safer intersection at Route's 58 & 100. These improvements are absolutely necessary to make Lowell's roads safer.

Act 64, Vermont's Clean Water Act, now requires municipalities to develop and implement a customized, multi-year plan to stabilize their road drainage system, bring road drainage systems up to basic maintenance standards, and implement additional corrective measures to reduce erosion. The plan is based on a comprehensive inventory of the road network that identifies priority road segments that are connected to surface waters through ditches, culverts or other drainage structures. Towns must prioritize road segments and develop remediation plans and implementation schedules (capital budgets). Towns can apply for funding through the Better Back Roads Program for both the inventory and remediation process. There is technical assistance through the County Conservation District, VTrans Maintenance District, Vermont Local Roads and NVDA, the latter of which has assisted with a road erosion inventory. According to most recent data, Lowell has 408 road segments that either fail to meet standards or lack sufficient data. Many if not all roads have been brought to standard as of 2022. Yet all segments must be brought into compliance by the end of 2036.

Parking Facilities

Due to Lowell's rural nature and limited number of businesses, Lowell does not need any public parking facilities to serve the Town's businesses. However, the fact that more than half of the Town's residents commute to work in other towns, the Planning Commission does recommend the creation of a small public parking lot for the benefit of those who carpool. Such a parking lot should also include one or more bicycle racks. The Town could consider buying some undeveloped property in the Village area to develop this idea.

Transit Routes

Residents of the Town of Lowell, as well as non-residents, who own land in Lowell, are most dependent on Routes 58 and 100, as these two routes are Lowell's main connection with the rest of the world. Therefore, the Planning Commission would like to stress to the Vermont Agency of Transportation how important it is that these roads are well maintained and/or improved when appropriate. In particular, we would like to see the State repave that portion of Route 58 between Lowell and Irasburg.

Terminals

At the present time, the nearest bus routes (Rural Community Transit) are in the Newport City – Derby and St. Johnsbury – Lyndon areas. These routes do not serve Lowell. Service going outside the State of Vermont is also available in White River Junction.

Scenic Roads

Some of the scenic features of Lowell to celebrate are:

- Route 58 corridor
- Hazen's Notch Road
- Bayley Hazen Road
- Route 100
- Long trail- Belvidere Mountain

Route 58 is perhaps the most scenic road in Lowell. This highway passes over some of the higher elevations in Lowell and offers some spectacular views. That section of Route 58 between Irasburg and Route 100 crosses an elevation of almost 1,700 feet above sea level.

However, these areas also provide a higher risk for flood zones and more information can be found on that in the Flood section of this Town Plan.

Wildlife and Fisheries



Wildlife is an important resource for any community. The presence of wildlife is an indication of a healthy, sustainable environment. A diverse and large wildlife population will be a good basis for recreation, in the form of hunting and trapping. Lowell has an extraordinary range of habitats, characterized by many elevation differences, and thus hosting a diverse collection of wildlife and bird populations.

Wildlife is generally considered to be animals which are not domesticated. Wildlife is mobile and uses different areas for living, eating and sleeping; because of their mobility wildlife is difficult to inventory.

The following are some of the wildlife species found in Lowell:

- Moose, deer, Bear, fox, raccoons, skunks, turkey, waterfowl, fisher cat and bobcats.

Common species of fish found in Vermont are:

- Lake and brook trout, bass, pike, pickerel, perch and landlocked salmon.

Moose are seen most prevalently during the months of May and October. Signs are posted to warn motorists along Route 58 and Route 100 where moose are commonly known to cross the road.

It is very important for a community to protect its natural inhabitants and their habitat. There is no urgency in Lowell for extra measures to be taken to control or protect the wildlife population, but the Planning Commission will keep attune to the environmental concerns and ensure no building or development becomes a severe detriment to any one wildlife species.

Problems related to wildlife:

- Lack of access for hunters from excessive posting,
- Lack of all stream side buffers, resulting in a fragmented habitat
- Little money in the trapping business,
- Misfiring by hunters; firing on horses or dogs and the destruction of fences.

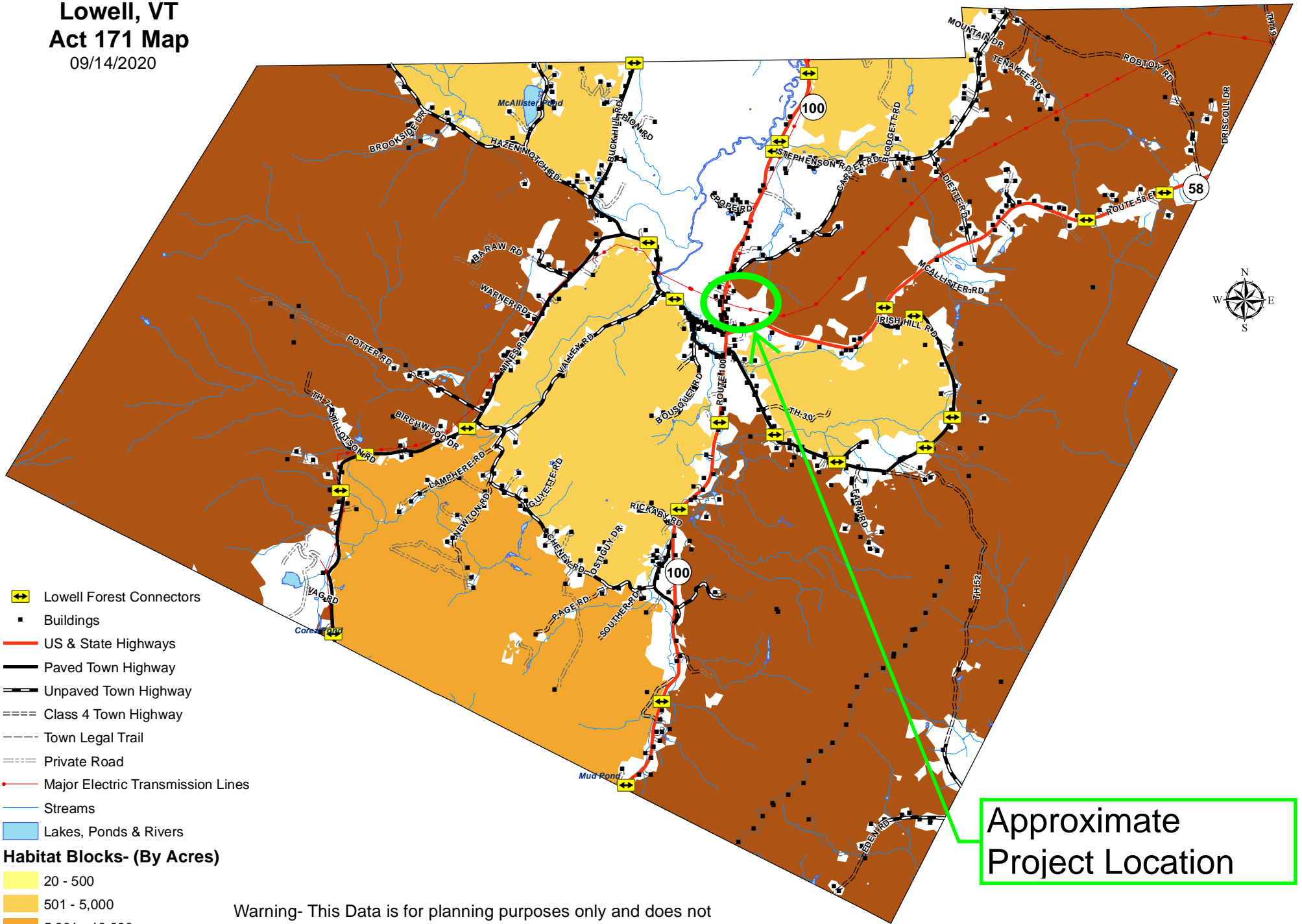
Hunting

Complete information about hunting are courtesy of the Vermont Fish and Wildlife Department can be viewed at www.vtfish@wildlife.com

Wildlife Management Areas

First established in 1919, Wildlife Management Areas (WMAs) help conserve fish, wildlife and their habitat, while providing people with opportunities for fish and wildlife-based recreation. The Vermont Fish & Wildlife Department currently owns 89 WMA's totaling 133,000 acres throughout Vermont. All WMAs are open to hunting, trapping, fishing, wildlife viewing and other wildlife-related outdoor activities. Management and administration of all WMAs is primarily funded through the sale of hunting and trapping licenses, and from the Federal Aid in Wildlife Restoration (Pittman-Robertson) Fund, in which excess taxes are paid on firearms, ammunition and archery equipment. The Vermont Fish and Wildlife Department uses this money for acquiring land for wildlife habitat, and for restoring and managing wildlife.

Lowell, VT
Act 171 Map
 09/14/2020



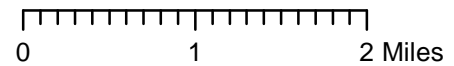
- Lowell Forest Connectors
- Buildings
- US & State Highways
- Paved Town Highway
- Unpaved Town Highway
- Class 4 Town Highway
- Town Legal Trail
- Private Road
- Major Electric Transmission Lines
- Streams
- Lakes, Ponds & Rivers

Habitat Blocks- (By Acres)

- 20 - 500
- 501 - 5,000
- 5,001 - 10,000
- 10,001 - 50,000
- 50,001 - 154,565

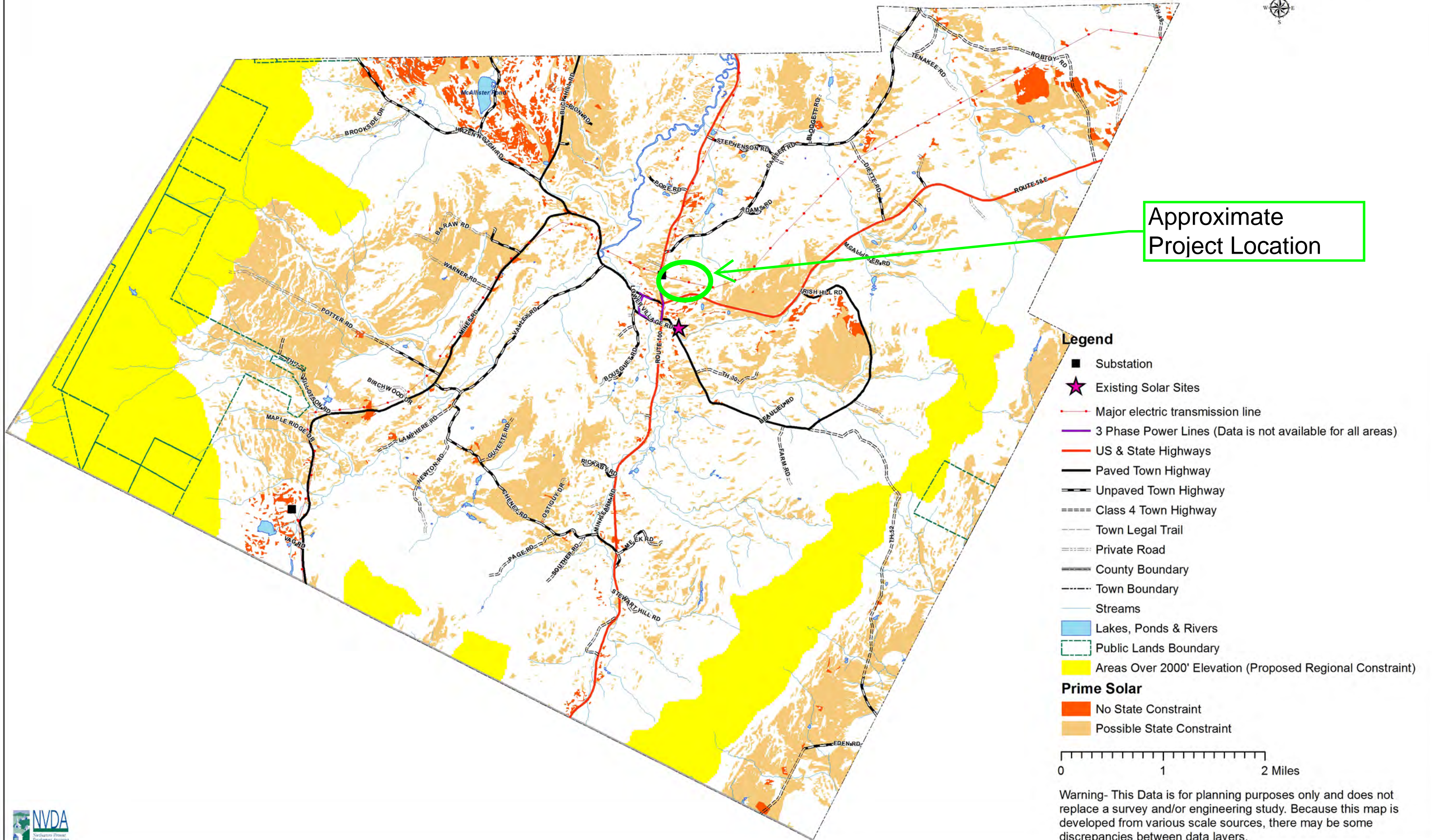
Warning- This Data is for planning purposes only and does not replace a survey and/or engineering study. Because this map is developed from various scale sources, there may be some discrepancies between data layers.

Approximate Project Location



Lowell, VT Solar Energy Potential Map

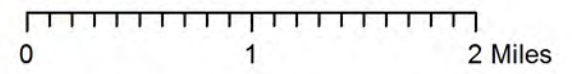
05/18/2017



Approximate
Project Location

Legend

- Substation
- ★ Existing Solar Sites
- Major electric transmission line
- 3 Phase Power Lines (Data is not available for all areas)
- US & State Highways
- Paved Town Highway
- Unpaved Town Highway
- Class 4 Town Highway
- Town Legal Trail
- Private Road
- County Boundary
- Town Boundary
- Streams
- Lakes, Ponds & Rivers
- Public Lands Boundary
- Areas Over 2000' Elevation (Proposed Regional Constraint)
- Prime Solar
 - No State Constraint
 - Possible State Constraint



Warning- This Data is for planning purposes only and does not replace a survey and/or engineering study. Because this map is developed from various scale sources, there may be some discrepancies between data layers.

