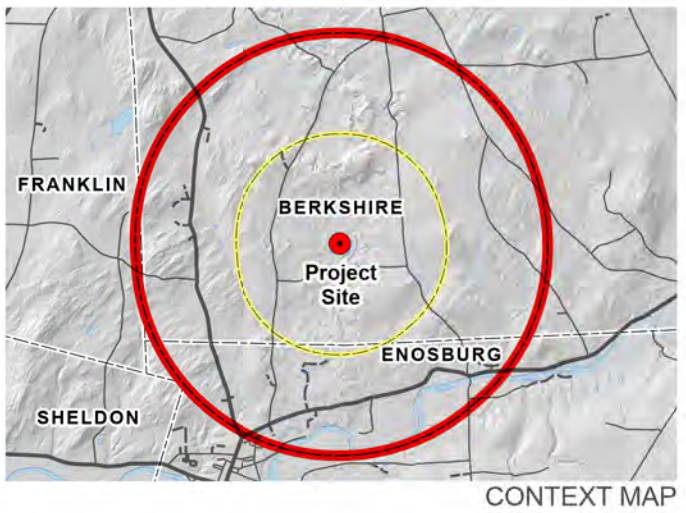




ER Reservoir Road Solar, LLC

Appendix A

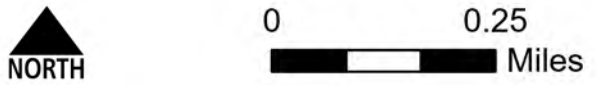
MAP 1: AERIAL CONTEXT MAP

December 2024

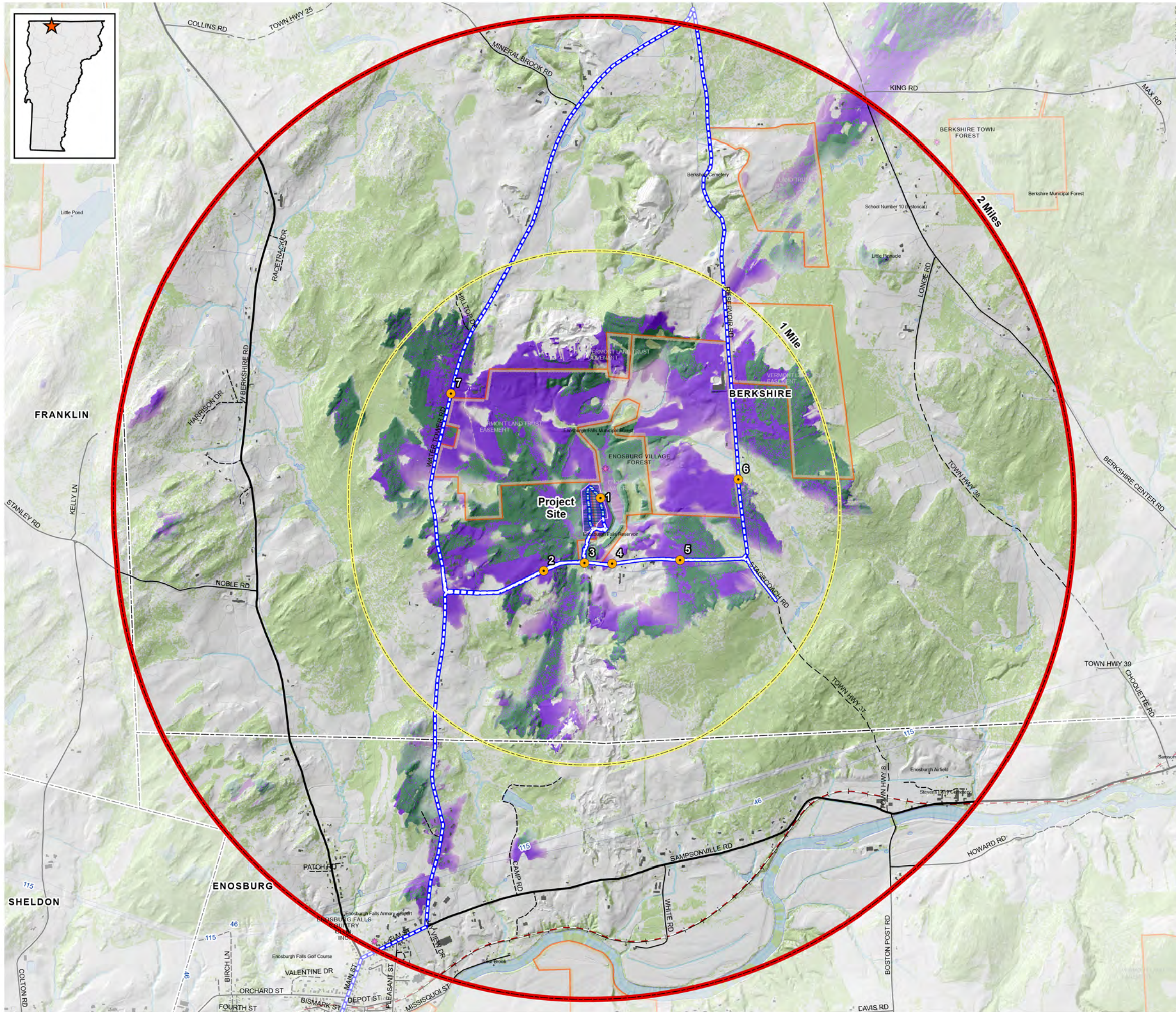
LEGEND

- Viewpoint Location
- Landmarks
- Recreation Sites
- Inventory Route
- 1-Mile Radius
- Town Boundary
- Vermont Protected Lands
- Hydrology
- Proposed Solar Array Layout

Exh. RRS-MB-2
Appendix A
Map 1



Service Layer Credits: EGC_services/
MAP_VCGI_ALLIMAGERYCLR_WM_NOCACHE_v1: VCGI



SITE MAP

ER Reservoir Road Solar, LLC

Appendix A

MAP 2: TERRAIN VIEWSHED MAP

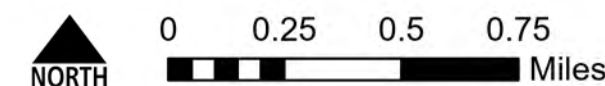
[2-Mile Study Area]

December 2024

LEGEND

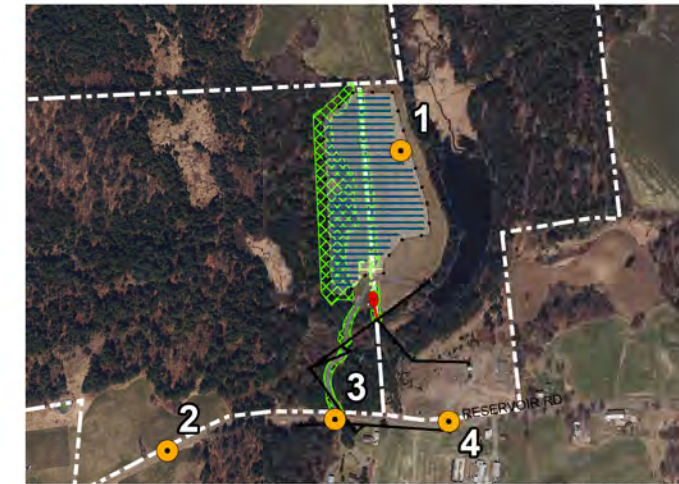
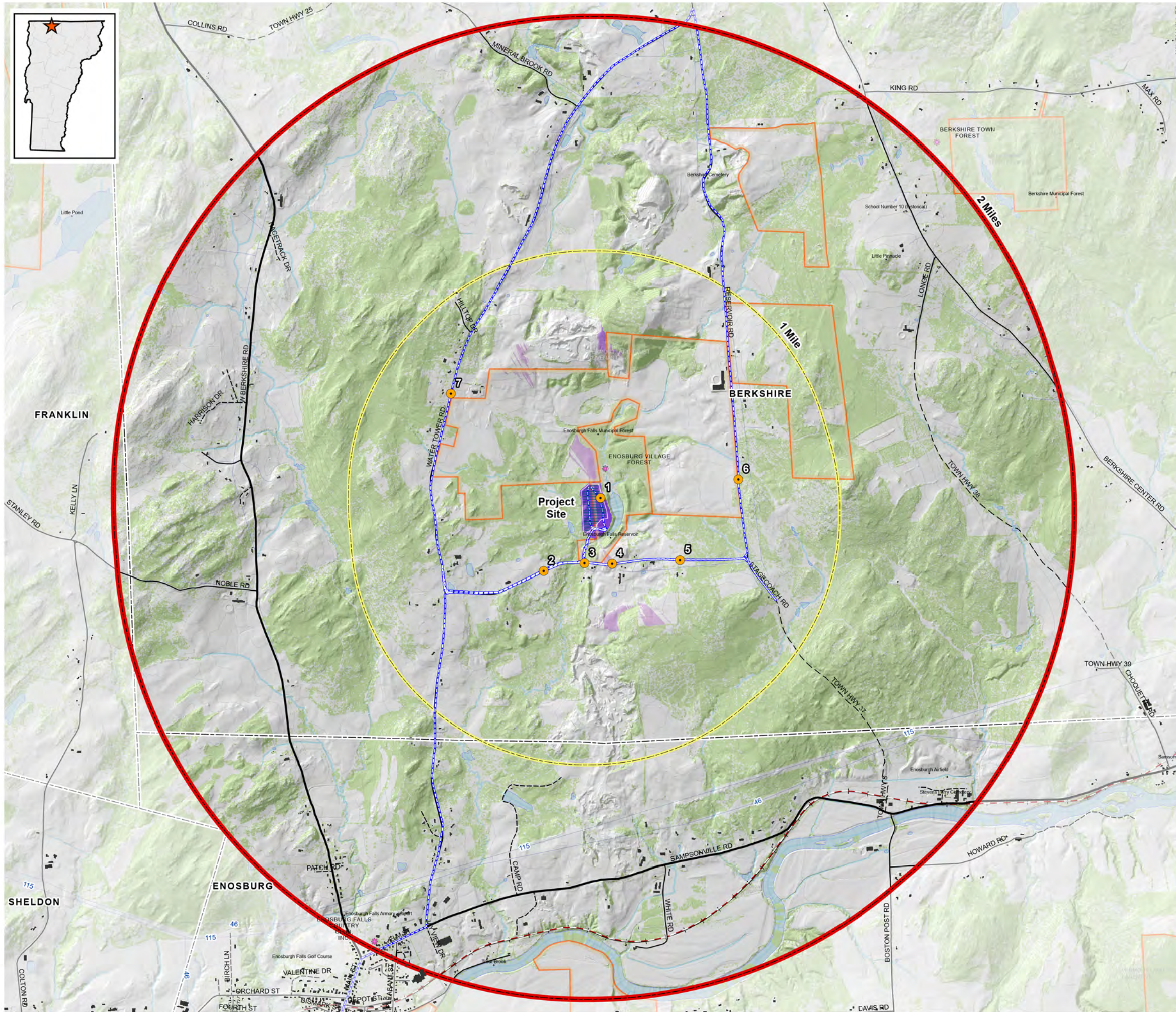
- Viewpoint Location
- Landmarks
- Recreation Sites
- Inventory Route
- Utility Lines
- 20' Contours
- Vermont Trails
- Railroads
- 1-Mile Radius
- 2-Mile Study Area
- Town Boundary
- Hydrology
- Vermont Protected Lands
- Proposed Solar Array Layout
- Potential Visibility within Non-Forested Areas
 - Low
 - High
- Potential Visibility within Forested Areas
 - Low
 - High

Exh. RRS-MB-2
Appendix A
Map 2



GIS viewshed mapping is a preliminary means of visual analysis. While beneficial for preliminary orientation and investigation, because of data assumptions and omissions, viewshed maps are not a definitive indication of visibility. Potential visibility needs to be confirmed through field investigation and other visualization techniques.

Elevation data derived from LiDAR data and/or the National Elevation Dataset.



SITE MAP

ER Reservoir Road Solar, LLC

Appendix A

MAP 3: VEGETATED VIEWSHED MAP

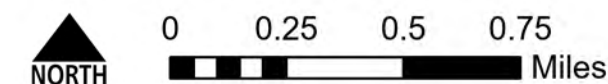
[2-Mile Study Area]

December 2024

LEGEND

- Viewpoint Location
- Landmarks
- Recreation Sites
- Inventory Route
- Utility Lines
- 20' Contours
- Vermont Trails
- Railroads
- 1-Mile Radius
- 2-Mile Study Area
- Town Boundary
- Hydrology
- Vermont Protected Lands
- Proposed Solar Array Layout
- Potential Visibility within Non-Forested Areas
- Low High

Exh. RRS-MB-2
Appendix A
Map 3



GIS viewshed mapping is a preliminary means of visual analysis. While beneficial for preliminary orientation and investigation, because of data assumptions and omissions, viewshed maps are not a definitive indication of visibility. Potential visibility needs to be confirmed through field investigation and other visualization techniques.

Elevation and obstruction data derived from LIDAR data, aerial imagery, the National Elevation Dataset and the National Land Cover Database.



Viewpoint 1a: Approximately 180° panoramic view from within the Project site, towards the center right of the proposed array area, panning from west (left) to east (right). The orange rectangle represents the image below, which is captured with a 50mm equivalent lens.



Viewpoint 1a: View looking northwest from the Project site towards the adjacent field. (50mm equivalent)



Viewpoint 1b: Approximately 180° panoramic view from the Project site (continuation of the previous panoramic view for full 360°), panning from east (left) to west (right). The orange rectangle represents the image below, which is captured with a 50mm equivalent lens.



Viewpoint 1b: View looking roughly southwest from the Project site towards the existing access drive. (50mm equivalent)



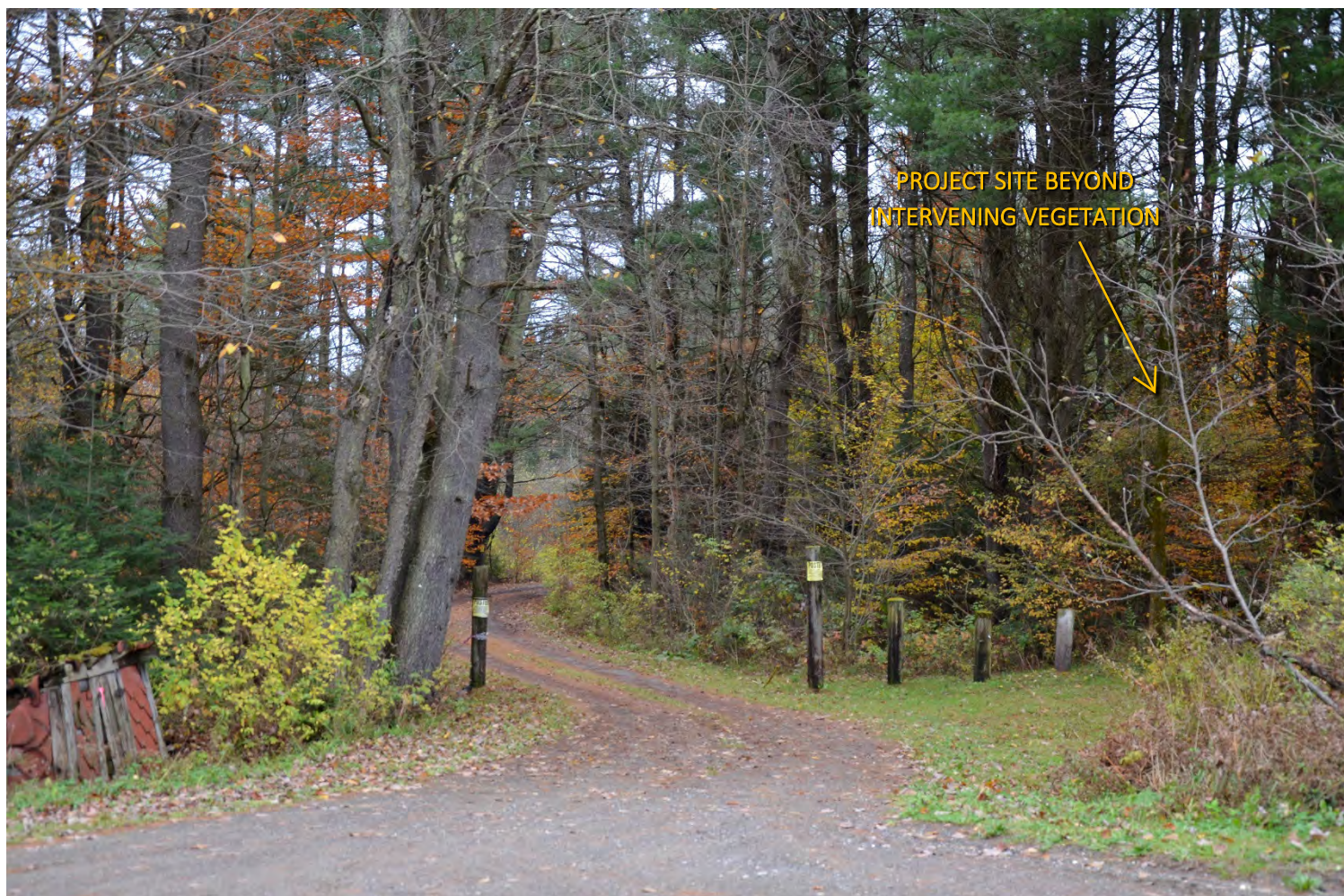
Viewpoint 2: Approximately 180° panoramic view from Reservoir Road southwest of the Project Site, panning from west (left) to east (right). The orange rectangle represents the image below, which is captured with a 50mm equivalent lens.



Viewpoint 2: View from Reservoir Road looking northeast towards the Project site. (50mm equivalent)



Viewpoint 3: Approximately 180° panoramic view from Reservoir Road south of the Project Site, panning from west (left) to east (right). The orange rectangle represents the image below, which is captured with a 50mm equivalent lens.



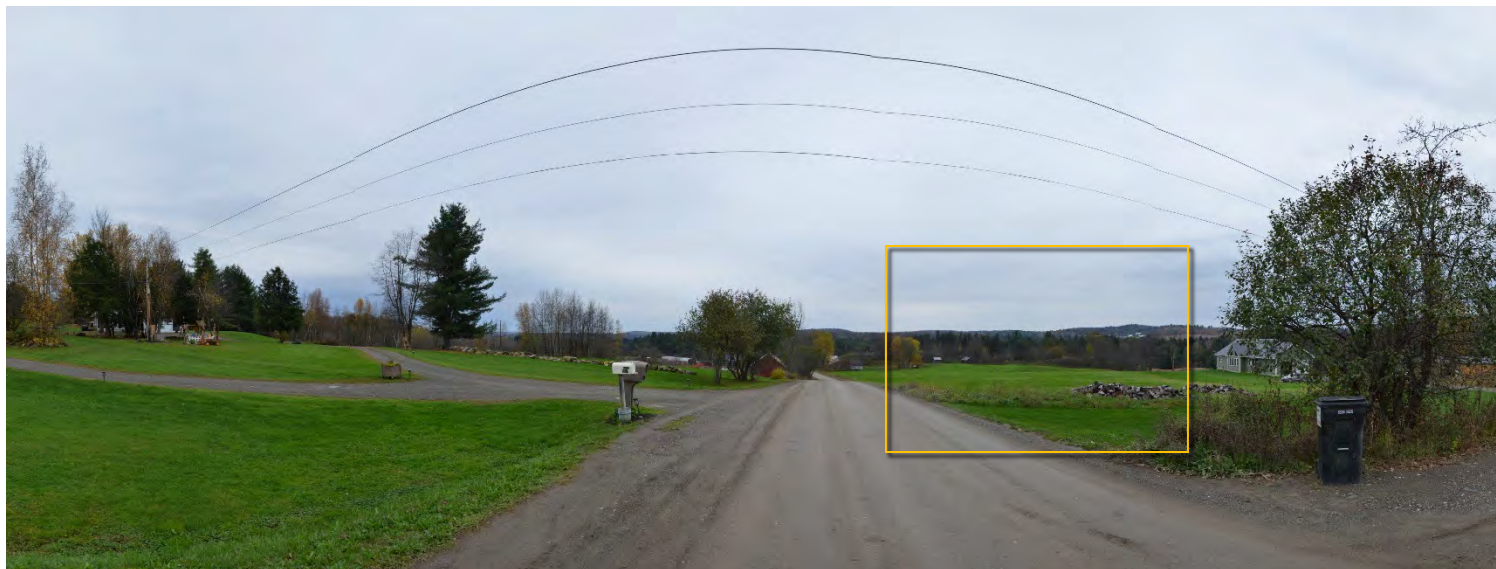
Viewpoint 3: View from Reservoir Road looking north towards the Project site and the existing access road. Vegetation clearing adjacent to the road will be cleared to facilitate road improvements. (50mm equivalent)



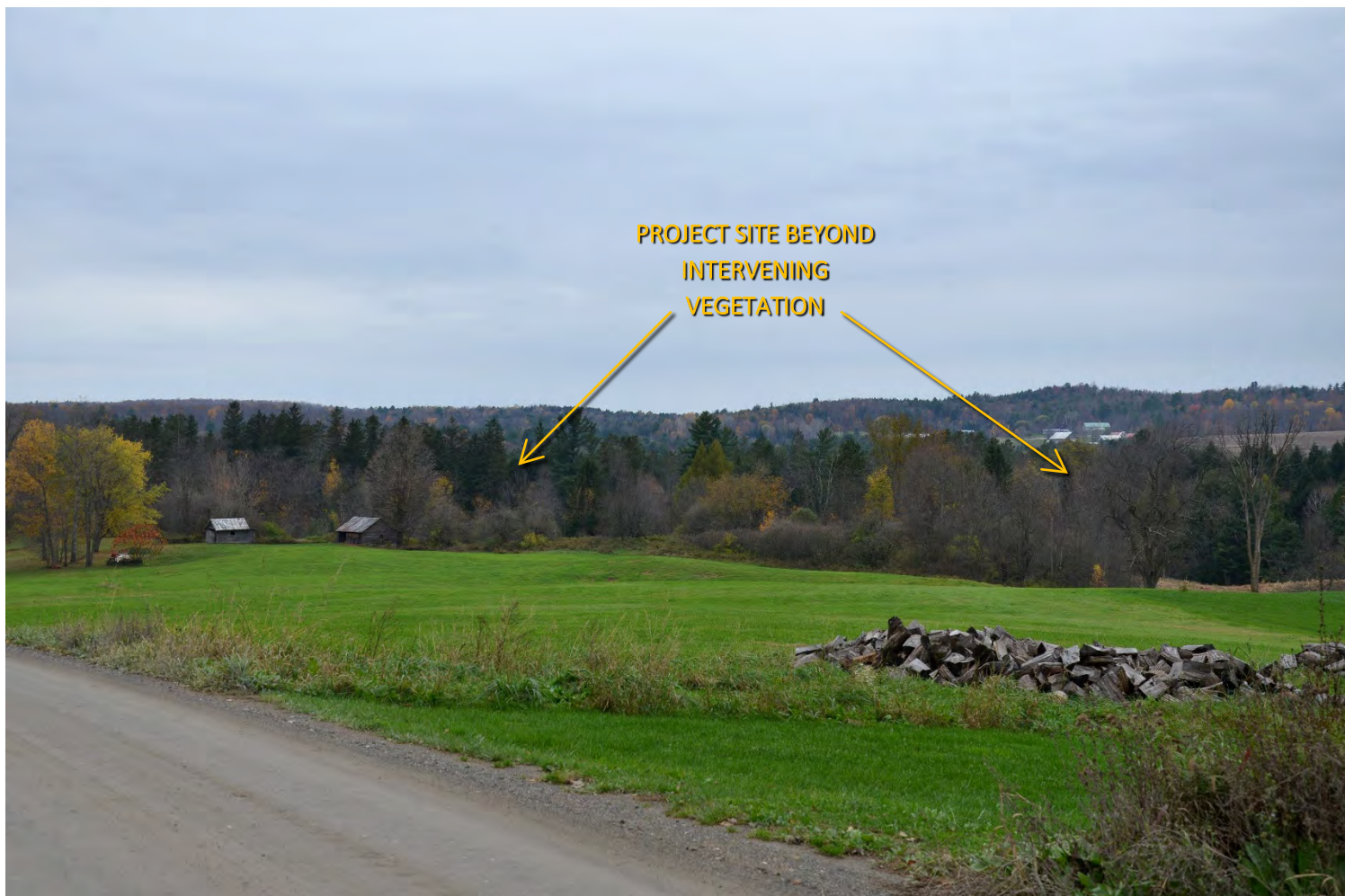
Viewpoint 4: Approximately 180° panoramic view from Reservoir Road southeast of the Project Site, panning from west (left) to east (right). The orange rectangle represents the image below, which is captured with a 50mm equivalent lens.



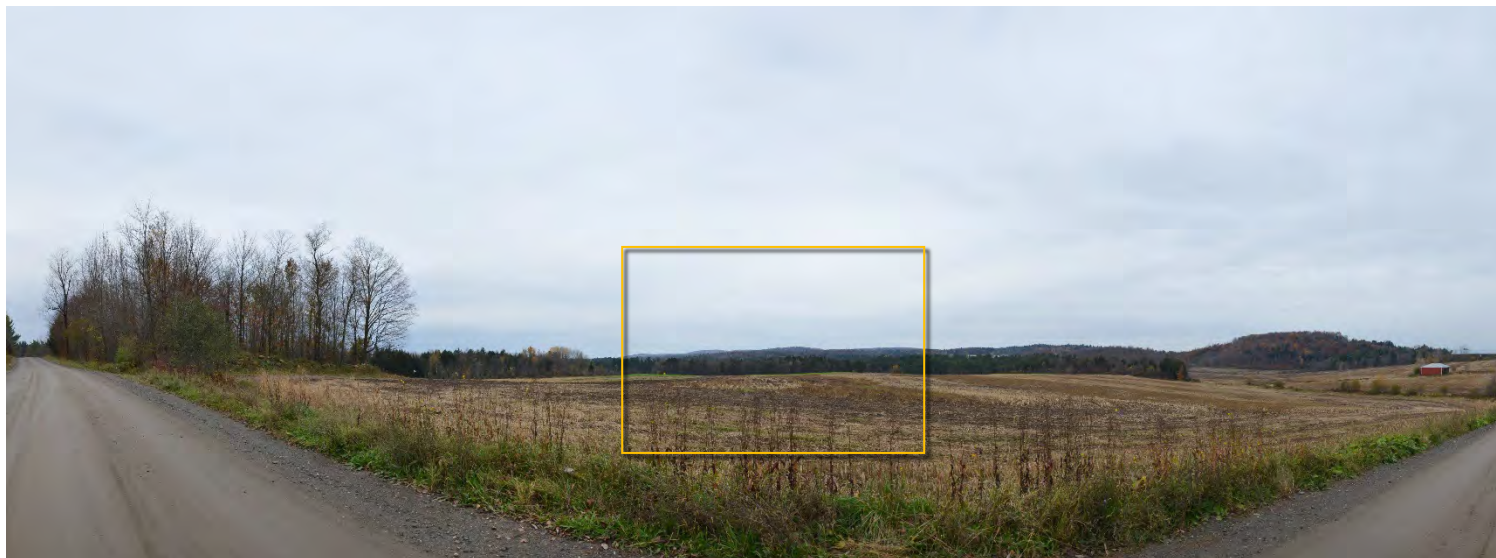
Viewpoint 4: View from Reservoir Road looking northwest towards the Project site. (50mm equivalent)



Viewpoint 5: Approximately 180° panoramic view from Reservoir Road southeast of the Project site, panning from south (left) to north (right). The orange rectangle represents the image below, which is captured with a 50mm equivalent lens.



Viewpoint 5: View from Reservoir Road looking northwest towards the Project site. (50mm equivalent)



Viewpoint 6: Approximately 180° panoramic view from Reservoir Road east of the Project site, panning from south (left) to north (right). The orange rectangle represents the image below, which is captured with a 50mm equivalent lens.



Viewpoint 6: View from Reservoir Road looking west towards the Project site. (50mm equivalent)

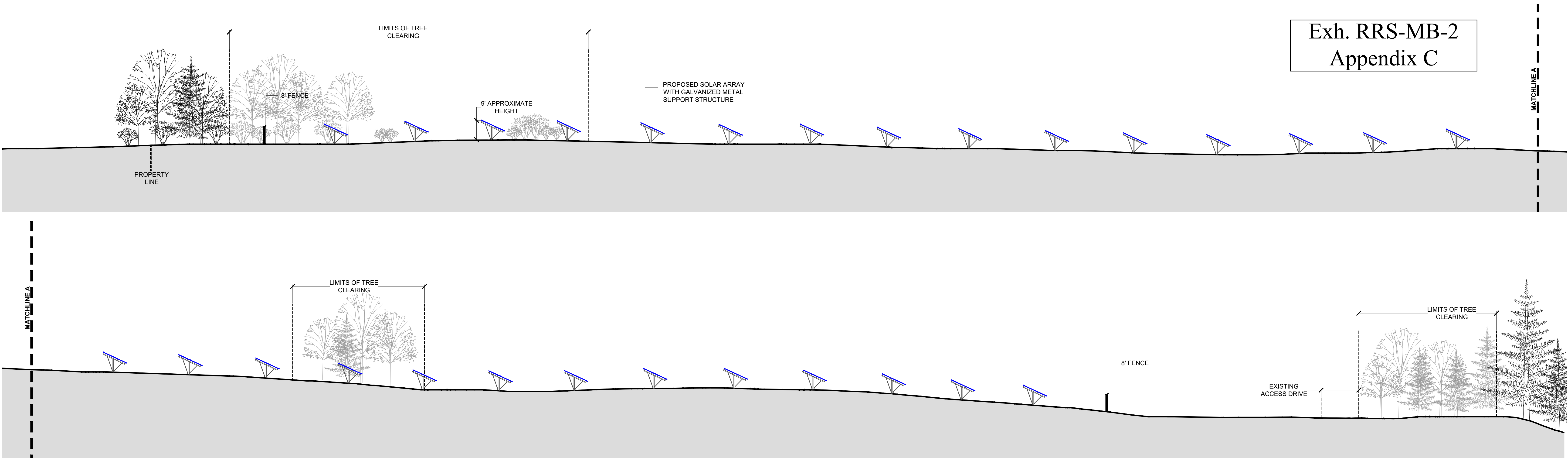


Viewpoint 7: Approximately 180° panoramic view from Water Tower Road northwest of the Project site, panning from northeast (left) to southwest (right). The orange rectangle represents the image below, which is captured with a 50mm equivalent lens.

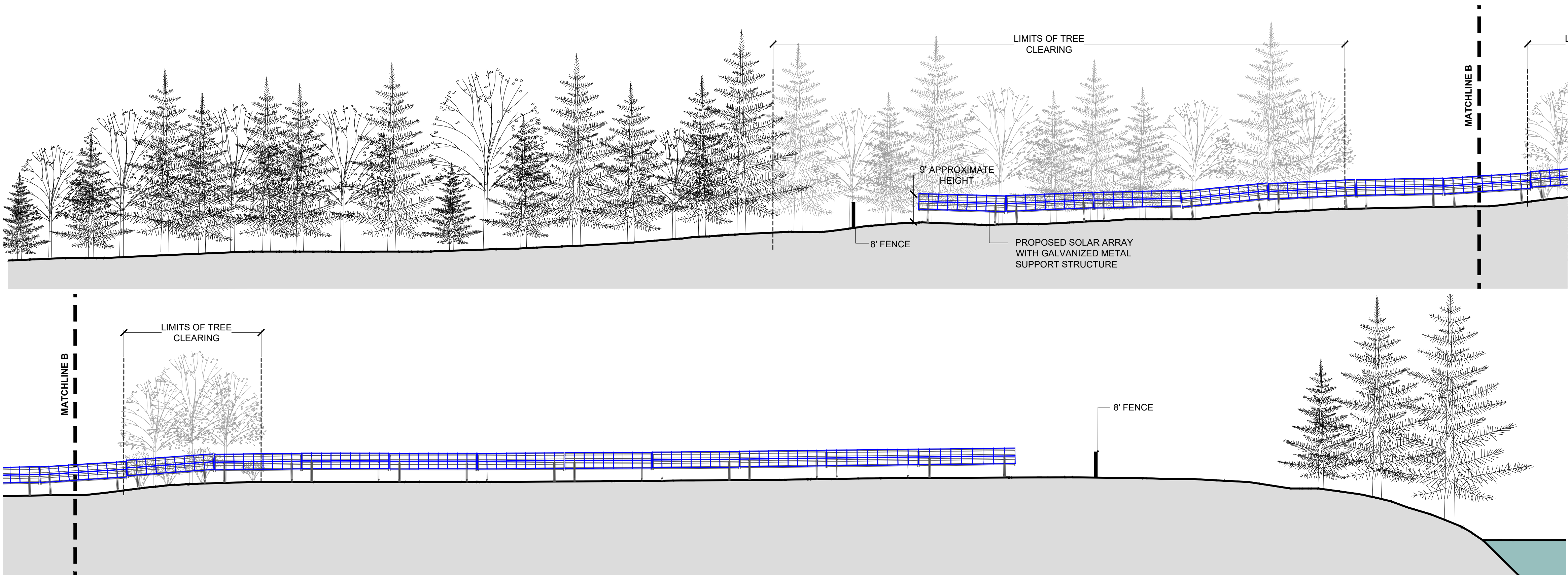


Viewpoint 7: View from Water Tower Road looking southeast towards the Project site. (50mm equivalent)

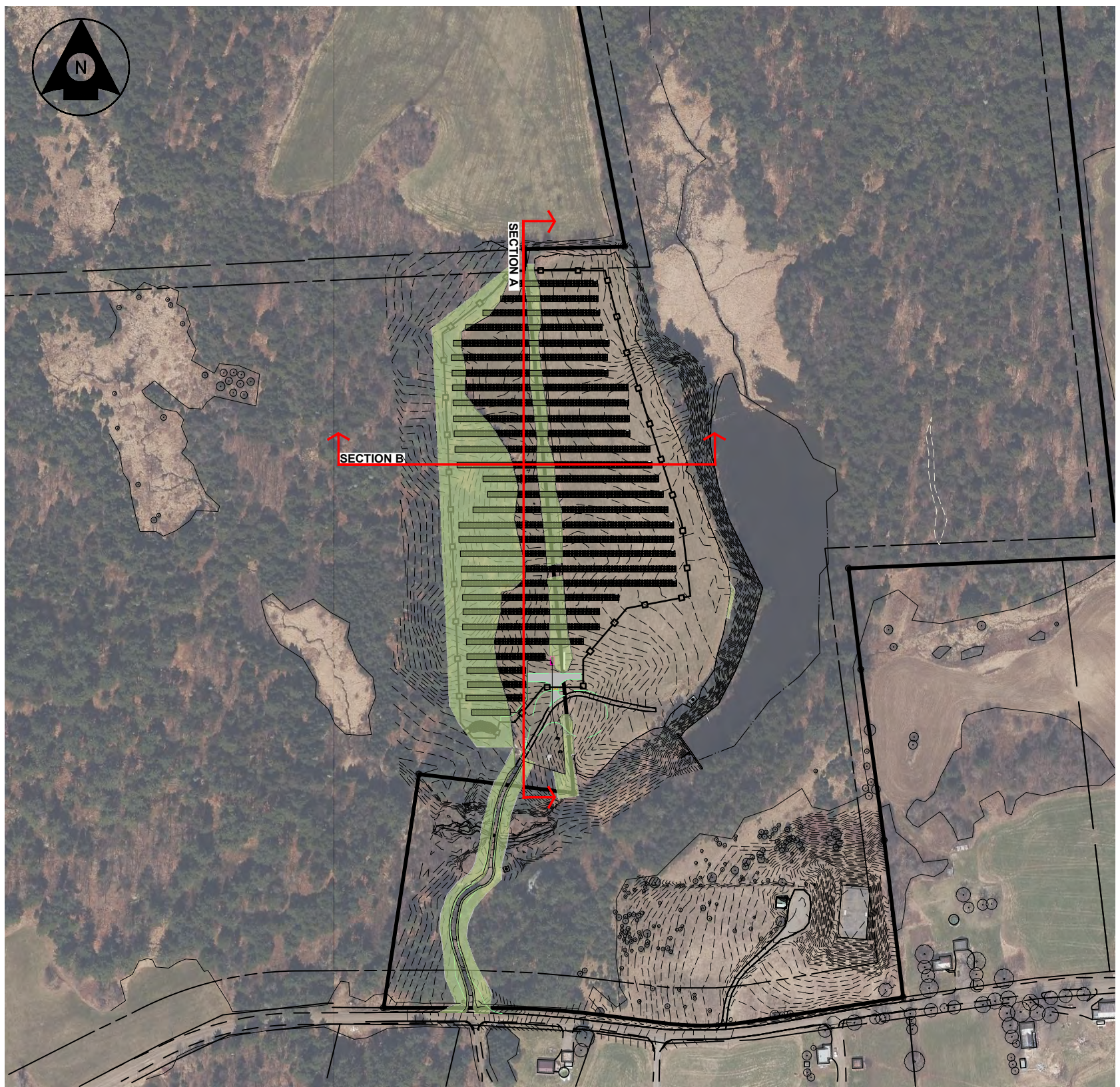
Exh. RRS-MB-2
Appendix C



1 SECTION A: LOOKING EAST
SCALE 1" = 20'

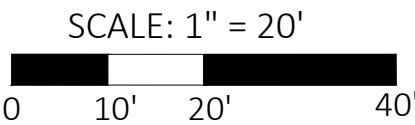


2 SECTION B: LOOKING NORTH
SCALE 1" = 20'



CONTEXT MAP

REVISIONS	DATE	REVISIONS	DATE





NORTHWEST REGIONAL PLAN

2023 - 2031

Adopted by the Board of Regional Commissioners: July 26, 2023

Effective: August 30, 2023

Amended by the Board of Regional Commissioners: September 24, 2024

Photo: David Juaire

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ENERGY

GOALS

1. Ensure all residents have equitable access to the benefits and an equitable share of the burdens of the energy transition.
2. Use demand-side management to handle the expected doubling of electric energy demand in the Northwest region by 2050.
3. Reduce annual regional fossil fuel needs and fuel costs for heating structures and foster the transition from nonrenewable fuel sources to renewable fuel sources.
4. Hold vehicle miles traveled per capita to 2011 levels through reducing the share of single-occupancy vehicle (SOV) commute trips, doubling the share of pedestrian and bicycle commute trips, increasing public transit ridership, and focusing regional development in or near existing growth centers and villages.
5. Significantly increase region-based passenger rail trips and double rail freight tonnage in the region by 2050.
6. Increase the share of renewable energy in transportation by increasing the use of renewable and less carbon-intensive fuels.
7. Increase the renewable energy generation capacity in the Northwest region with new solar, wind, and hydro generation capacity by 2050.

REGIONAL ASSETS AND OPPORTUNITIES

In 2017, NRPC completed the Northwest Regional Energy Plan, a pilot project funded by the Vermont Department of Public Service. The intent of the project was to complete in-depth energy planning at the regional level while achieving state and regional energy goals (Figure 2)—most notably, the goal to have renewable energy sources meet 90% of the state’s total energy needs by 2050 (known as the 90 x 50 goal). The energy element of this regional plan consists of this energy section and the full Northwest Regional Energy Plan, included by reference and available at www.nrpcvt.com. While the energy chapter is a high-level overview of NRPC’s energy goals and policies, the energy plan takes a comprehensive and detailed look at the region’s energy context. The regional energy plan meets the standards required for an enhanced energy plan and therefore gives NRPC increased deference in Act 248 proceedings. The requirements for enhanced energy plans can be found in Appendix I of the regional energy plan. The outline of the full regional energy plan can be seen in Table 6.

Since the development of NRPC’s regional energy plan, there have been several statewide planning efforts that will inform NRPC’s future energy planning. In 2020, the legislature passed the Global Warming Solutions Act,

Guiding Policy Statements

NRPC readopts these overall statements of policy to affirm its commitment to meeting state and regional energy goals and to satisfy the determination standards established by the Vermont Department of Public Service:

1. Support conservation efforts and the efficient use of energy across all sectors.
2. Reduce in-region transportation energy demand, reduce single-occupancy vehicle use, and transition to renewable and lower-emission energy sources for transportation.
3. Increase the use of energy conservation practices in site planning and development and support patterns and densities of concentrated development that result in the conservation of energy.
4. Review the development and siting of renewable energy resources in the Northwest region that are in conformance with the goals, strategies, standards, and maps contained in this plan.

Additional goals, policies, and implementation steps will guide the Northwest region in achieving energy conservation and renewable energy generation targets. These have been specifically identified for the following categories: electricity conservation, thermal efficiency, and transportation. Goals and policies in other areas of the regional plan related to local food production and consumption, land-use patterns, natural resource protection, utilities, and other areas also support implementation of the energy goals. Implementation steps can be found in the introduction of this plan and the Northwest Regional Energy Plan in Appendix II.

GOALS AND POLICIES



GOAL

Ensure all residents have equitable access to the benefits and an equitable share of the burdens of the energy transition.

- a. Use the Vermont Climate Council's Guiding Principles for a Just Transition (Appendix J of the regional energy plan) to proactively work toward equity in our energy and climate work.
- b. Promote and support incentive programs for low-income and rural residents and other frontline communities to ensure equitable access to the economic benefits of energy-efficient technologies.
- c. Ensure environmental justice as defined by the EPA when determining regional conformance of energy generation projects.
- d. Promote widespread access to education on energy transition opportunities and advocate for equitable access to such opportunities.
- e. Encourage policy makers to consider equity issues outside of Vermont when making decisions about our energy future.



GOAL

Use demand-side management to handle the expected doubling of electric energy demand in the Northwest region by 2050.

- a. Encourage public utilities to move all customers to smart rates (i.e., charging higher rates during peak demand times), with mitigation of any differential effects of smart rates on low-income customers.
- b. Encourage the legislature and/or public utilities to create programs that promote the use of energy storage systems for individuals and system-wide. Using electric storage systems may reduce peak demand and provide emergency backup power.
- c. Support public utilities' efforts to increase customers' knowledge of their energy use. This may happen

walking, use of public transportation, and other forms of transportation that are an alternative to the single-occupancy vehicle. Municipal efforts may include capital budgeting, streetscape plans, revitalization plans, or adoption of an “official map” (as outlined in 24 V.S.A. Chapter 117, to identify future municipal utility and facility improvements, such as road or recreational path rights-of-way, parkland, utility rights-of-way, and other public improvements) by the municipality.

- f. Support changes to public transportation funding in the state that alters how public transit routes are funded. Support efforts for state funding of public transportation routes that serve stops on federal and state highways (in a similar manner to the existing highway funding system) and require municipal funding primarily for public transportation routes that serve local roads.
- g. Work with regional employers to identify and encourage programs to reduce single-occupancy vehicle commuting by employees. Share best practices and encourage recognition of successful programs.
- h. Support increased funding for expansion of public transit into Grand Isle County and the region’s rural areas.

5 GOAL

Increase region-based passenger rail trips and rail freight tonnage in the region by 2050.

- a. Support the extension of Vermonter service to Montreal.
- b. Support increased rail freight service to the region.
- c. Expand intermodal connection opportunities for passengers and freight.

6 GOAL

Increase the share of renewable energy in transportation by increasing the use of renewable and less carbon-intensive fuels.

- a. Require all commercial, industrial, and multifamily developments subject to Act 250 to provide electric vehicle (EV) parking spots and at least one electric vehicle charger with associated infrastructure.
- b. Continue to support Vermont Agency of Commerce and Community Development (ACCD) grant opportunities for municipalities to install EV charging stations, infrastructure, and supply in designated areas.
- c. Support financial incentives for municipalities that develop direct current (DC) fast EV charging stations.
- d. Support the development and creation of biofuels production and distribution infrastructure in the region.
- e. Support the efforts of municipal fleet operators to replace inefficient vehicles with more efficient vehicles, including heavy-duty vehicles that operate on biofuels.

7 GOAL

Increase the renewable energy generation capacity in the Northwest region with new solar, wind, and hydro generation capacity by 2050.

- a. Support the development of individual home and community-based renewable energy projects in the region through the following programs: Vermont Small Scale Renewable Energy Incentive Program, Vermont Clean Energy Development Fund, and tax and regulatory incentives, including net-metering.
- b. Support changes to net-metering rules and other regulatory tools to provide financial incentives in order to encourage siting of renewable generation facilities on the built environment (such as parking

structures and rooftops) and other disturbed lands (such as former landfills, brownfields, or gravel pits). Support changes to net-metering rules that disincentivize development on land identified in this plan as a location with known and possible constraints. Encourage multiple uses in conjunction with the development of renewable generation facilities, such as grazing of livestock, recreation, or parking. Support efforts to make net-metering more accessible to low-income residents.

- c. Continue to support the Standard Offer Program to foster deployment of diverse and cost-effective renewable energy resources, and support the evaluation of this program to determine if the program should be extended or changed.
- d. Support efforts by local utilities and private individuals to maintain and upgrade existing renewable electric generation facilities and necessary distribution and transmission infrastructure in the Northwest region and the state.
- e. Support the development of additional methane digesters on farms in the Northwest region, especially those that utilize manure from multiple farms and/or food waste.
- f. Support the creation of incentives for locating new renewable energy generation facilities within a half-mile of three-phase distribution line or electric transmission line infrastructure. Ensure new transmission lines and three-phase power lines associated with renewable energy projects do not create forest fragmentation or have an undue adverse impact on necessary wildlife habitats, ecological systems, and water and/or air quality.
- g. Development and siting of energy generation facilities shall be in conformance with the goals, strategies, standards, mapping, and other information contained in the entire regional plan. Standards of review for known and possible constraints (see Appendix B of the regional energy plan) will be used in evaluation of conformance.
- h. Wind facilities with a tower height in excess of 100 feet (excluding blades) shall not be considered to be in conformance with this plan.

NATURAL AND CULTURAL RESOURCES

GOALS

- 1. Protect significant natural resources, including air, wetlands, wildlife, lakes, ponds, woodlands, earth resources, open spaces, groundwater resources and wildlife habitat.**
- 2. Protect and conserve historically significant buildings and locations, archaeological resources, and important scenic and aesthetic resources, starting with those identified in local and regional plans.**
- 3. Maintain and wherever possible improve the quality of lakes, ponds, rivers, streams and groundwater.**

ASSETS AND VALUES

The region is a reflection of its people and its land. With a traditionally agrarian, working landscape framed by the Green Mountains and Lake Champlain, Franklin and Grand Isle Counties are still heavily dependent on the natural resource base. With a built environment largely defined by compact villages surrounded by open countryside, the region retains much of its rural character.

The region is home to an abundance of archaeological, historic, and cultural resources. The archaeological resources provide clear evidence of the region's extensive and longstanding indigenous habitation, while many of the historic resources are tangible reminders of the communities built following the arrival of Europeans in North America. Cultural value is attached to events and physical items from prehistory through to the present day.

Archaeological resources include the villages, hunting camps, trade networks and burial grounds associated with indigenous people. Significant indigenous archaeological resources are known to be located in the vicinity of Route 78 in Swanton and Monument Road in Highgate. The location of many other such sites in the region remain private to protect their integrity. The Vermont Division for Historic Preservation maintains a listing of the 522 known archaeological sites within the region, of which 410 have detailed data. This figure likely represents a small fraction of significant sites in the region given that indigenous peoples lived in many places and intensive investigation of site locations has not been undertaken. The Abenaki of Missisquoi continue to maintain a deep connection to the area in many ways, including via their tribal headquarters in Swanton.

Similarly, several historic settlements, sites and structures in the region (most reflecting post-colonial settlement) have been identified and entered into the State Register of Historic Places. In addition, over 75 properties within the region are included in the National Register of Historic Places. These include historic

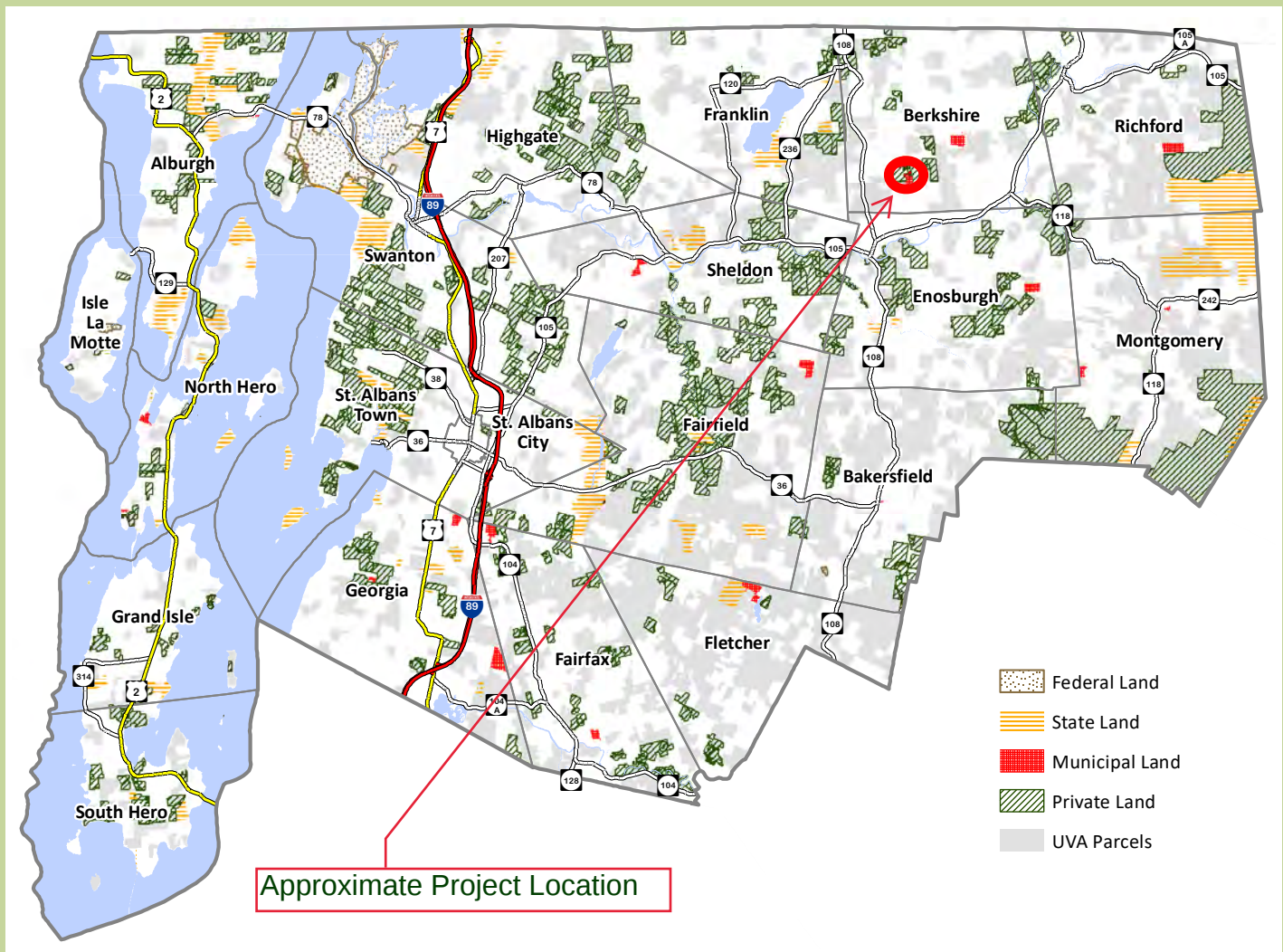
Forest Resources: The region's forests play an important role as a natural, cultural and economic asset to the local communities. Indeed, several communities in the region maintain town forests. These and other forests throughout the region are used for recreational and educational purposes and activities.

Northwestern Vermont is part of the Northern Forest, an area stretching across northern New York and New England and encompassing 26 million acres of forestland. The upland area of northwestern Vermont contains the largest tracks of contiguous woodland in the Northern Forest. This area is characterized by steeply sloping mature softwood and hardwood forests as well as streams that flow into the Missisquoi and Lamoille Rivers. The region's uplands strongly correlate with the preferred habitat for Vermont's black bear population, and these areas are generally the most undeveloped lands in Franklin County.

Forest products are a vital component of the local economy. According to the United States Department of Agriculture (USDA), Vermont produced 48.1% of the nation's maple syrup in 2014, with Franklin County a leading production area in the state. Timber is also an essential industry in the region, and more than 10,000 MBF (million board feet) and 7,614 cords of pulpwood were produced by Franklin County in 2010.

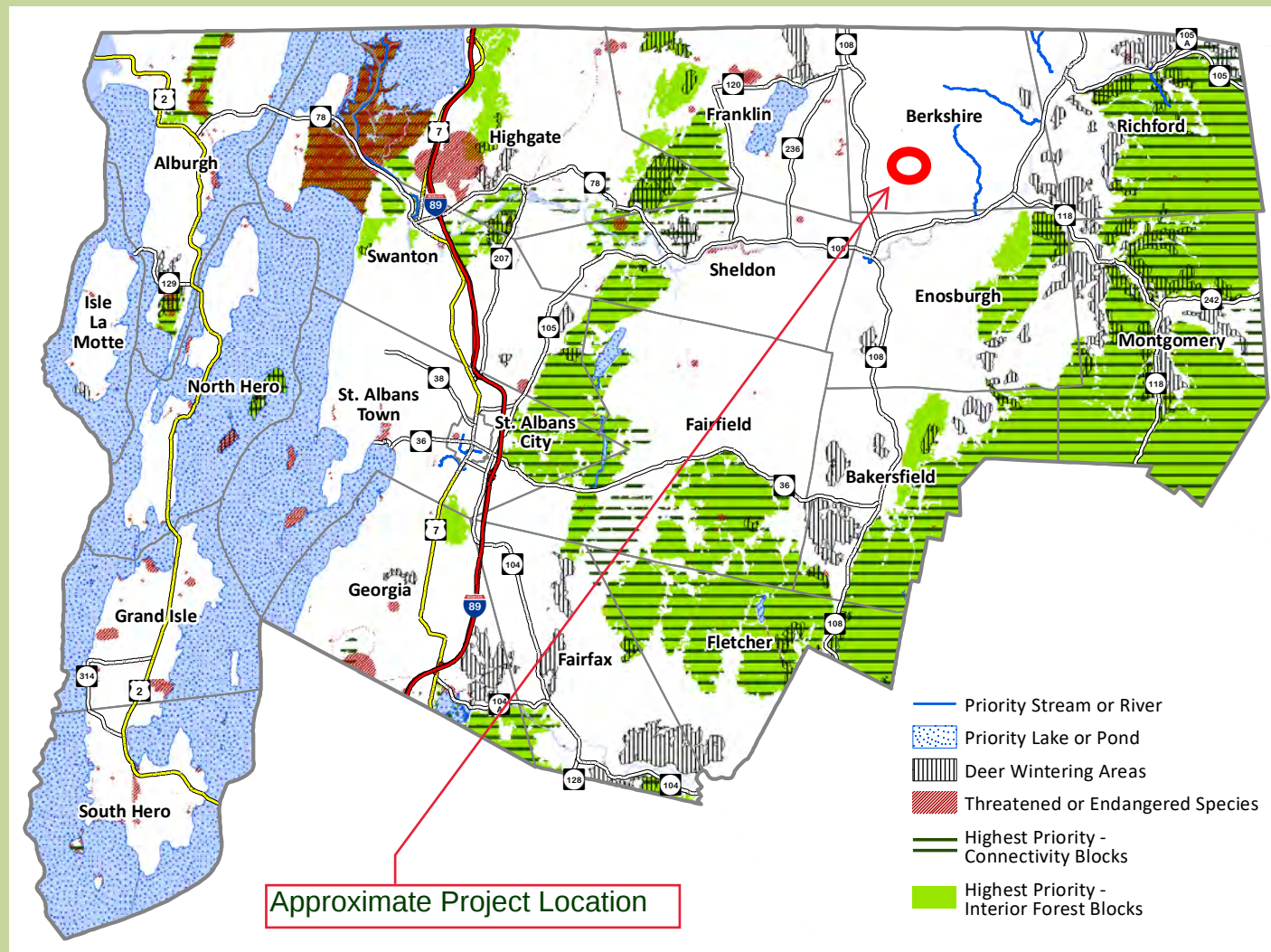
Fifty percent of the land in the region is enrolled in Vermont's Current Use or Use Value Appraisal (UVA) Program, which means the land is being actively managed for agriculture or forestry (Map 10). The amount of

MAP 10: Conserved Land



SOURCE: Vermont Open Geodata Portal and Use Value Appraisal (UVA) Program

MAP 11: Wildlife Habitat



SOURCE: Vermont Open Geodata Portal

Invasive species can be harmful to native wildlife and their habitats by “out competing” native species and displacing them. According to DEC, significant aquatic invasives found in Franklin and Grand Isle Counties include plants such as purple loosestrife, water chestnut, or Eurasian milfoil, and animals like zebra mussels, spiny water flea and white perch. Significant terrestrial invasive species include plants like garlic mustard, buckthorn and Japanese knotweed that can poison soils, cause streambank erosion, and crowd out native plants. Forest pest insects of concern include the Asian long-horned beetle, emerald ash borer, and hemlock wooly adelgid.

Numerous locations in the region support populations of designated rare, threatened or endangered plants and animals. The species identified have very particular habitat requirements, or they are at the edge of their natural range, are vulnerable to collection or disturbance, or have difficulty reproducing. The majority of identified sites are located in Grand Isle County and in western Franklin County. Many are found on the lesser islands of Grand Isle County and its shoreland areas.

Although not endangered, black bears are at risk. Black bears prefer mountainous and forested landscapes on the wooded slopes of the Green Mountains. Thus, a significant amount of regional bear habitat exists in eastern Franklin County. Because of its large home range, the black bear is vulnerable to habitat loss through the fragmentation of large forested areas into smaller units and isolated “forest islands.”

Deer wintering areas, or “deer yards,” provide critical habitat for white tail deer and other species of vertebrates. These areas of hemlock, spruce, fir, cedar and pine species provide shelter from deep snows and permit easier winter travel for deer, compared to deciduous forests. Deer yards also benefit 169 of Vermont’s 386 vertebrate species (excluding fish). Of these, five species are threatened or endangered, and four are of special concern due to their limited population size. Numerous deer wintering areas have been identified throughout Franklin and Grand Isle Counties, the most extensive of which are located in the heavily forested areas of eastern Franklin County.

For habitat serving large mammal populations, the area along the Green Mountains on the eastern boundary of the region is critical. The Cold Hollow to Canada initiative is a partnership of community members in Franklin and Lamoille Counties. Its mission is to work together toward the common goal of land stewardship and wildlife habitat conservation across property and municipal boundaries through education, outreach and conservation of land and water resources. On a larger scale, several state and federal organizations have mapped large contiguous habitat blocks in the Green Mountains and vital corridors that connect them; these connectors are important for enabling the movement of large mammals (Map 11).

Scenic Resources: The region’s scenic resources are plentiful and include both natural and human-influenced elements. Undeveloped ridgelines are among the region’s highly valued natural scenic resources, serving both as vantage points (the areas we enjoy views from) and as terminal views (and create the scene we are enjoying through our observation). Because impacts on scenic resources are assessed as part of the Act 250 development review process, communities in the Region may wish to incorporate a scenic resource assessment as part of their planning processes.



Moose in a Highgate Wetland
PHOTO CREDIT: Bill Ashton

GOALS AND POLICIES

1 GOAL

Protect significant natural resources, including air, wetlands, wildlife, lakes, ponds, woodlands, earth resources, open spaces, groundwater resources and wildlife habitat.

- a. Support efforts to reduce air pollutants generated in the region from the residential, commercial, industrial and transportation sectors.
- b. Ensure that development will not present an undue risk of degrading the region’s air quality.
- c. Plan, construct and manage mineral and earth resource extraction and processing facilities to ensure that negative impacts are limited and rehabilitation is certain. Minimize noise and adverse impacts on existing or planned uses within the vicinity of the project, fish and wildlife habitat, water quality, prime agricultural soils and scenic resources. Ensure projects do not interfere with the function and safety of all modes within the transportation system.
- d. Ensure that development in floodplain or river corridor areas does not impede the flow of flood waters or endanger public health, safety and welfare.
- e. Locate and configure land development to avoid the fragmentation of and adverse impacts to natural areas, forest blocks, critical wildlife habitat and connectivity areas identified in the regional plan or local plans by the Vermont Agency of Natural Resources, or through site investigation.
- f. Ensure that outdoor lighting is designed to minimize the amount of light leaving development sites, overly bright areas or hot spots, and the amount of light pollution illuminating the night sky.
- g. Assist in efforts to combat the spread of invasive species.

2 GOAL

Protect and conserve historically significant buildings and locations, archaeological resources, and important scenic and aesthetic resources identified in local and regional plans.

- a. Ensure that new land development minimizes impact on archaeological sites.
- b. Ensure that land development along prominent ridgelines and hilltops is designed to fit within the landscape and avoid undue adverse visual impacts.
- c. Encourage communication facilities to limit their impact on scenic resources by reducing their size or location so that exterior lighting is not required, by seeking opportunities for co-location, and by choosing sites, shapes and colors of structures that reduce visual impact.
- d. Encourage energy generation and distribution facilities to minimize their visual impact on ridgelines, slopes and open areas.
- e. Ensure that historically significant buildings and locations are conserved and/or made available for adaptive reuse whenever feasible considering their cost and condition.

3 GOAL

Maintain and wherever possible improve the quality of lakes, ponds, rivers, streams and groundwater.

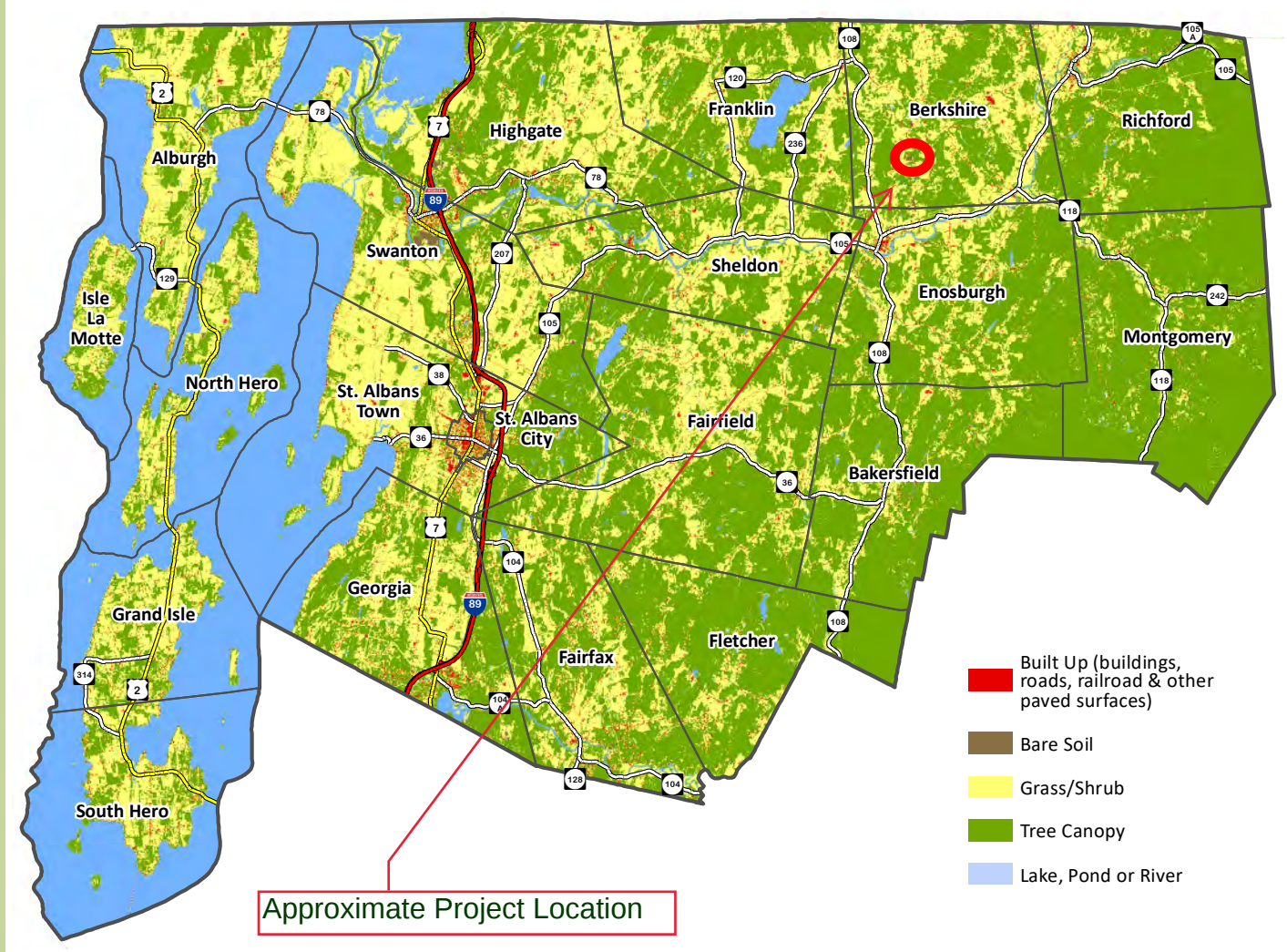
- a. Forbid the use of persistent harmful and toxic pollutants in groundwater recharge areas or in areas where they could enter surface or sub-surface waters.
- b. Ensure that development mitigates the anticipated effects on water quality through Low Impact Development techniques, such as limiting the amount of impervious surface on a site and incorporating adequate amounts of vegetation, trees and shrubs to aid in stormwater treatment.
- c. Improve surface water quality and protect it from point and non-point nutrient loading.
- d. Maintain and expand vegetative buffers along surface waters of sufficient width as a tool for improving water quality and protecting habitat.
- e. Support efforts to remove as much of the Missisquoi and Carry Bay causeways as possible given permitting and funding constraints.

LAND USE

GOALS

1. The region is characterized by compact villages and growth centers separated by rural countryside and the working landscape.
2. Maintain healthy and diverse forest and conservation areas as well as a strong working landscape of agriculture and forestry.
3. Target future economic growth primarily in the region's existing and planned growth areas.

MAP 12: Current Land Use



SOURCE: Vermont Open Geodata Portal

With sufficient planning, cumulative commercial and residential development can avoid creating problematic conditions over time, such as traffic congestion, lack of or insufficient infrastructure and services, lack of or poorly designed parking, pedestrian inaccessibility and sprawl. The beginning of these growth-related issues can be seen in some areas of the region. While recognizing the opportunities that residential and commercial expansion brings to the region in terms of economic growth, it is critical to strike a balance between embracing growth and managing it to preserve rural character and traditional settlement patterns. It is also crucial to ensure that municipal and regional infrastructure, facilities, utilities and services are adequate and functional. An important role of the NRPC is to work with local municipalities in developing plans and local regulations to effectively manage growth. Specific tools and resources are discussed in the next section.

PLANNING FOR GROWTH AND DEVELOPMENT

Most communities in Franklin and Grand Isle Counties have updated their plans and local regulations to keep pace with changing development pressures. However, ensuring local capacity to manage land use planning and development review continues to be a challenge. Faced with growth and development pressures, the workload and responsibilities of local governments will only expand in the coming years. Assistance and educational opportunities from the NRPC, the state, the Vermont League of Cities and Towns, and other organizations will help make land use planning and development review more manageable now and in the future. It will also be important to take advantage of opportunities to share resources among municipalities.

To guide land use planning and development in this state, the Vermont Planning and Development Act outlines 13 planning goals and 9 smart growth principles. The smart growth principles are the core of the growth center designation program passed into law in 2006 and discussed later in this plan. If followed, these principles will prevent sprawl by focusing development in compact, pedestrian-friendly village, town, city or growth centers. The 13 state planning goals from 24 V.S.A. §4302 establish a policy framework for land use planning in Vermont. All municipalities are encouraged to adopt local plans that further these goals. The act enables communities to utilize numerous regulatory and non-regulatory tools to implement these goals, including but not limited to zoning bylaws and subdivision regulations.

Regional Planning Area Mapping Criteria

Agricultural Resource Planning Area

- Farmed prime soils > 20 acres
- Farmed non-prime soils > 20 acres
- Negligible acreage of unfarmed prime soils

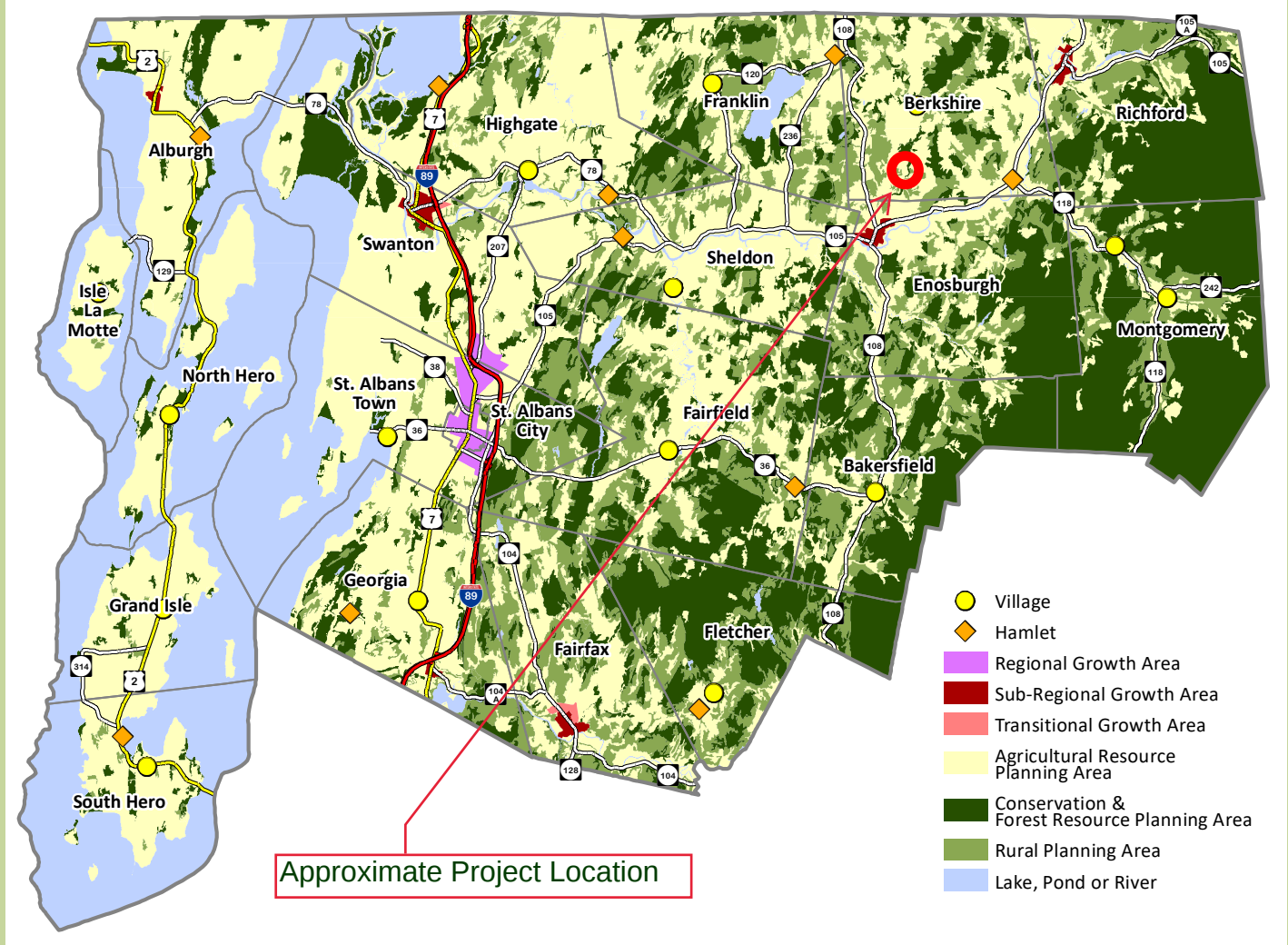
Forest and Conservation Planning Area

- Wetlands > 5 acres
- 100-year floodplain
- Uplands (> 1,000' elevation)
- Public lands
- Shore land (< 500' from waterline)
- Everything from "moderate to severe" on suitability map

PROPOSED LAND USE

The NRPC has divided the region into several proposed land use planning areas to encourage the conservation of valued resources and a development pattern that will maintain the character and quality of life that is important to this region. These planning areas are illustrated in Map 14 and include Agricultural Resource Planning Areas, Forest and Conservation Planning Areas, Rural Land Planning Areas, Growth Planning Areas and Sub-Regional Growth Planning Areas. In addition, the NRPC has identified villages, hamlets and transitional growth planning areas. It is important to note that planning areas designated in this plan are regional planning tools, not regulatory zoning districts. When reviewing land uses for conformance with this plan, emphasis will be placed not on whether the use is located entirely within or just outside a particular area, but on the impact the land use will have on underlying resources and how the use will affect the intent and function of the particular land use planning area.

MAP 14: Proposed Land Use



SOURCE: Vermont Agency of Natural Resources and NRPC Collected Data

Land Use Planning Areas

Agricultural Resource Planning Areas: Agricultural Resource Planning Areas represent the best farmland in the region and shall be given the highest level of support for their continued use as active agricultural lands. Nearly 39% of the region is included in this category, reflecting the significant acreage of prime agricultural soils, the large number of farms in the Northwest and the importance of agriculture in the region's economy. Strategies that support the long-term protection of these lands from conversion to non-agricultural use are supported by NRPC. Where development does occur, it shall be located to minimize impact to primary agricultural soils. Recognizing the importance of farming to the region's character and economy, and also recognizing that existing farms may occupy some good farming lands that would otherwise be categorized as Forest and Conservation Planning Area, Agricultural Resource Planning Areas were given precedence over the Forest and Conservation designation. For example, if a particular area has characteristics of both an Agricultural Resource Planning Area and a Forest and Conservation Planning Area, the area would be characterized as the former.

Forest and Conservation Planning Areas: Forest and Conservation Planning Areas, which constitute 25% of the region, include a variety of land types that are well suited for tree growth and habitat and generally not suitable for development. Land in this category usually should not be developed in order to protect the forest resource value of the lands. Development that does occur shall be limited due to natural resource constraints,

Transitional Growth Areas: Given the rate of growth in the region, some areas are certain to experience—due to geographic location or local planning—increased rates of local growth. To ensure well-planned and well-financed infrastructure and foster smart growth principles, it is of utmost importance for municipalities to plan for development in advance, rather than planning around established development after the fact. The NRPC will help municipalities with planning for these areas. Transitional growth areas have been identified north of the Fairfax sub-regional growth area and east of the Swanton sub-regional growth area.

Industrial Areas: The NRPC supports industrial parks, districts and areas that encourage economic expansion and high-wage businesses to locate in the region without adversely affecting neighboring land uses. Industrial parks and districts should be carefully planned to ensure access and connectivity. This can be achieved through public transportation service and walkability - both within the district in addition to making connections from the district to adjacent pedestrian and bicycle infrastructure. Thoughtful site planning can both ensure that off-site impacts, such as noise, are mitigated through buffers, landscaping and other design considerations while at the same time ensuring good quality of life and integration with the local community.

GOALS AND POLICIES

1

GOAL

Ensure the region continues to be characterized by compact villages and growth centers separated by rural countryside and the working landscape.

- a. Support infill and redevelopment of designated growth centers or existing strip development areas over new commercial strip development.
- b. Locate intensive residential development primarily in areas within or related to state or regionally designated growth areas and support redevelopment and infill opportunities.
- c. Ensure that residential development outside of growth centers, downtowns, villages and hamlets is clustered or otherwise designed to work with the landscape in terms of energy efficiency, protection of ecologically sensitive areas and conservation of farmland and agricultural soils.
- d. Ensure that public investments—including public facilities and the construction or expansion of infrastructure—will promote expansion in growth areas designated in this plan and will not encourage the development and/or fragmentation of farmlands or other resource areas.
- e. Ensure that the scale, siting, design and management of new development respect the existing landscape and the character of the area's built environment.

2

GOAL

Maintain healthy and diverse forest and conservation areas as well as a strong working landscape, including agriculture and forestry.

- a. Ensure that development respects the physical limitations of the site and avoids negative impacts on the natural and cultural features of the landscape.
- b. Ensure that development in rural, forestry and conservation areas will not diminish the viability of agricultural or woodland operations, or fragment high-priority forest and connectivity blocks and other large contiguous tracts of woodland or wildlife habitat/ corridors.
- c. Limit the loss of prime and primary agricultural soils and active farmland to the greatest degree possible, and mitigate it whenever the loss cannot be prevented.
- d. Maintain all right-to-farm protections for agricultural operations that have acceptable agricultural practices.
- e. Ensure that development in designated conservation areas on the proposed land use map will be small scale and will not diminish the environmental value of the lands. Only allow development farther than

- 1,000' from road centerlines in conservation areas if it advances conservation goals.
- f. Encourage the development of local businesses that add value to agricultural and forest products grown in Vermont and site them in locations that minimize conflicts with neighboring land uses.
- g. Support agricultural, forest and conservation land protection strategies including but not limited to transfer of development rights, purchase of development rights, fee-simple purchase of agricultural lands and use of value tax assessment; these protection strategies can allow for compatible uses that support other key policy goals.
- h. Support initiatives that assist agricultural businesses with adapting to the impacts of climate change.



GOAL

Target future economic growth primarily in the region's existing and planned growth areas.

- a. Locate industrial development first in existing industrial areas. Ensure that industrial growth outside of existing industrial areas is located near or within growth areas designated in the municipal and regional plan, on property with sufficient infrastructure.
- b. Ensure that mixed-use development occurs at significantly higher densities and on a larger scale in planned growth areas than in the surrounding region.
- c. Scale retail and commercial developments to primarily serve the market of the regional, sub-regional or local growth center.

NORTHWEST REGIONAL ENERGY PLAN

2024 – 2032

Adopted by the Board of Regional Commissioners: September 25, 2024

Effective: September 25, 2024



Northwest
Regional Planning
Commission

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I. EXECUTIVE SUMMARY

The Northwest Regional Energy Plan began as a pilot project funded by the Vermont Department of Public Service in 2017. The intent of the project was to complete in-depth energy planning at the regional level while achieving state and regional energy goals—most notably, the goal to have renewable energy sources meet 90% of the state’s total energy needs by 2050 (CAP Mitigation Scenario). This in-depth regional energy planning is needed to address three key issues: energy security, environmental protection, and economic needs and opportunities.

Specific goals to be achieved by this plan include the following:

- Collaboration with Vermont Energy Investment Corporation (VEIC) to create a regional energy model that identifies targets for energy conservation and renewable energy generation
- Creation of specific strategies to help the region achieve state energy goals
- Creation of regional maps prioritizing locations for the development of future renewable generation facilities in the region

The region’s energy supply and consumption are analyzed in Section IV to establish baseline energy use. The use of space heating energy, transportation energy, and electricity in the region is specifically examined.

The energy element of NRPC’s regional plan consists of the energy chapter of the Northwest Regional Plan and this Northwest Regional Energy Plan. While the energy chapter is a high-level overview of NRPC’s energy goals and policies, the energy plan takes a comprehensive and detailed look at the region’s energy context. This regional energy plan meets the standards required for an enhanced energy plan and therefore gives NRPC increased deference in Act 248 proceedings. The requirements for enhanced energy plans can be found in Appendix I. Since the development of NRPC’s regional energy plan, there have been several statewide planning efforts that will inform NRPC’s future energy planning. In 2020, the Legislature passed the Global Warming Solutions Act, which sets specific required emissions targets for the state. The Climate Action Plan (CAP), written in 2021 by Vermont’s Climate Council, sets out pathways to achieve these emission targets, as well as addressing how to ensure an equitable transition and climate resilience. In 2022, the state updated its Comprehensive Energy Plan (CEP). The CEP included an increased focus on ensuring an equitable climate change transition and three updated sector goals for thermal, transportation and electric sectors.

NRPC’s updated Energy Plan, adopted in 2024, further addresses these new statewide planning efforts and new regional considerations including a focus on an equitable energy transition for all residents.

The NRPC worked with VEIC to create targets for energy conservation and renewable energy generation that align with state energy goals while taking into account regional factors. The energy saved via conservation and improved efficiency is targeted to equal approximately 3.5 trillion BTUs by 2050. Conservation and improved efficiency are planned through a variety of means including increased use of efficient materials during construction and weatherization of existing structures, installation of efficient technologies, and electrification of previously fossil fuel powered technologies. Most prominently, improved efficiency is targeted through the use of electric vehicles for transportation and electric heat pumps for space heating. The resulting increase in regional electricity demand means that electricity generation in the region will also need to increase.

Goals, strategies, and implementation steps are established in Section VI to guide the Northwest region to achieve the energy conservation and renewable energy generation targets created in Section V. Goals, strategies, and implementation steps have been specifically identified for the following categories: electricity conservation, thermal efficiency, and transportation. Electricity conservation, thermal efficiency and transportation are the types of energy conservation that the Northwest Region focuses upon in this section. Achievement of the goals set by NRPC will require the cooperation of regional partners, businesses, and the

efforts of individual citizens.

A substantial part of the Northwest Region's effort to set renewable electricity generations goals involves the creation of regional energy generation maps as shown in Appendix C. The regional energy generation maps are meant to guide the development of new solar, wind, hydro, and biomass energy generation facilities in the Northwest region. The NRPC Regional Energy and Climate Committee was actively involved in this effort. The maps inform and help guide the siting of new renewable energy generation facilities in the region. The maps provide a macro-scale look at different factors that impact the siting of renewable generation facilities including generation potential. The objective of the NRPC Regional Energy Committee was to allow for sufficient renewable electricity generation in the region while avoiding undue adverse impacts upon known and possible constraints (these resources are specifically identified in Appendix B).

Section VII assesses the feasibility of meeting regional goals and outlines challenges to implementation. Regional energy generation goals are attainable while still allowing for the protection of known and possible constraints. The identified conservation goals and strategies may be more difficult for the NRPC to implement given that implementation is heavily reliant on the choices and financial means of individual consumers in the region. The thermal efficiency goals and strategies are similar. While NRPC, cannot accomplish the goals and implement the strategies in the plan alone, it can aid the efforts of other organizations to increase conservation and thermal efficiency in the region as well as increase volunteer capacity, outreach, and community engagement.

Achieving transportation-related energy goals is more straightforward. One of NRPC's core functions is coordinating transportation planning for the region and this makes NRPC well suited to achieving goals and implementing strategies for transportation. Progress on transportation-related implementation actions will be prioritized.

There are several challenges to successful plan implementation, and overcoming these challenges to implementation will likely mean bearing both economic and environmental costs. The equity issues related to who will bear those costs is of continuing concern to NRPC, and are addressed in depth in Section III.

Appendix A contains the full results of NRPC's collaboration with VEIC to set regional targets for energy conservation and renewable generation. Appendix B contains a list of the known and possible constraints identified by the NRPC Regional Energy Committee that were used to create the regional energy generation maps. Appendix C contains the regional generation maps to be used in regulatory proceedings (Section 248). Appendix D summarizes the planning approach and process used to create this plan. Appendix E contains a list of acronyms and phrases used throughout the plan. Appendix F is a summary of existing renewable generation facilities in the Northwest Region (by municipality). Appendix G includes a summary of municipal energy analysis and targets.

II. INTRODUCTION

A. BACKGROUND AND VERMONT STATE ENERGY GOALS

In 2017, NRPC completed the Northwest Regional Energy Plan, a pilot project funded via the Vermont Department of Public Service. The intent of the project was to complete in-depth energy planning at the regional level while achieving state and regional energy goals- most notably, the goal to have renewable energy sources meet 90% of the state's total energy needs by 2050 (commonly referred to as 90 x 50). The energy element of this regional plan consists of the energy chapter of the Northwest Regional Plan and this Northwest Regional Energy Plan. While the energy chapter is a high-level overview of NRPC's energy goals and policies, the energy plan takes a comprehensive and detailed look at the region's energy context. This regional energy plan meets the standards required for an enhanced energy plan and therefore gives NRPC increased deference in Act 248 proceedings. The requirements for enhanced energy plans can be found in Appendix I. Since the development of NRPC's regional energy plan, there have been several statewide planning efforts that will inform NRPC's future energy planning. In 2020, the Legislature passed the Global Warming Solutions Act, which sets specific required emissions targets for the state. The Climate Action Plan (CAP), written in 2021 by



FIGURE 2.1 STATE ENERGY AND GREENHOUSE GAS EMISSION GOALS

Global Warming Solutions Act: Requirements for Reducing Greenhouse Gases



Not less than 26% from 2005 greenhouse gas emissions by January 1, 2025, pursuant to the State's membership in the United States Climate Alliance and commitment to implement policies to achieve the objectives of the 2016 Paris Agreement



Not less than 40% from 1990 greenhouse gas emissions by January 1, 2030, pursuant to the State's 2016 Comprehensive Energy Plan



Not less than 80% from 1990 greenhouse gas emissions by January 1, 2050, pursuant to the State's 2016 Comprehensive Energy Plan

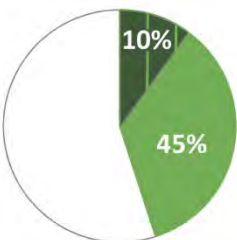
Increasing Renewable Energy



Meet 90% of Vermont's overall energy needs from renewable sources by 2050

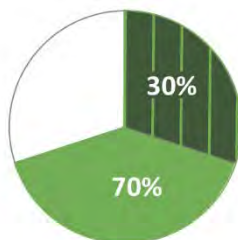
Additional Goals Regarding Renewable Energy

Transportation Sector



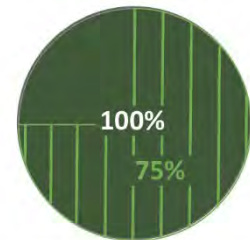
Meet 10% of energy needs from renewable energy by 2025, and 45% by 2040

Thermal Sector



Meet 30% of energy needs from renewable energy by 2025, and 70% by 2042

Electric Sector



Meet 100% of energy needs from carbon-free resources by 2032, with at least 75% from renewable energy

Vermont's Climate Council, sets out pathways to achieve these emission targets, as well as addressing how to ensure an equitable transition and ensuring climate resilience. In 2022, the state updated its Comprehensive Energy Plan (CEP). The CEP included an increased focus on ensuring an equitable climate change transition and three updated sector goals for thermal, transportation and electric sectors.

NRPC's updated Energy Plan, adopted in 2023, further addresses these new statewide planning efforts and new regional considerations including a focus on equity and a just energy transition for all residents.

The State of Vermont has adopted several ambitious energy goals. The Vermont Comprehensive Energy Plan, developed by the Department of Public Service, calls for the state to meet 90% of its total energy needs through renewable energy sources by 2050 (90 x 50 scenario). State statute also contains several goals pertaining to greenhouse gas emissions, energy generation, and energy efficiency (Figure 2.1).

Additional energy goals have also been set for Vermont's public utilities for renewable energy generation, distributed generation, and fossil fuel use through Act 56 (the Vermont Renewable Energy Standard).¹ It is important that these goals be kept in mind while reading and using this document. The goals and strategies in this plan will provide a path to achieving regional and state energy goals.

B. PURPOSE OF THE PLAN

The NRPC has identified regional goals and strategies for energy conservation and renewable energy generation that will support the attainment of Vermont's energy goals. NRPC has also identified specific implementation strategies appropriate to the region to accomplish these goals. Goals and strategies for municipalities, organizations, and individuals have been included in order to encourage sustainable changes across the entire region in all facets of our community.

In 2017, NRPC collaborated with Vermont Energy Investment Corporation (VEIC) to create a regional energy model to identify targets for energy conservation and renewable energy generation. VEIC created a statewide model as well as regional models for the regional planning commissions (RPCs). In 2022, this modeling was updated by Stockholm Environment Institute (SEI) under contract by the Department of Public Service and the Agency of Natural Resources. This modeling, known as the Low Emissions Analysis Platform (LEAP), provides one possible scenario of accomplishing the state's goal of meeting 90% of total energy demand through renewable energy resources by 2050 and analyze the potential energy demand within the region. They also look at regional energy generation needs. Specific information about the models and their results can be found in Section V. The modeling work provides a framework for two other tasks completed by NRPC:

- Creation of specific strategies to help the region achieve state energy goals
- Creation of regional maps prioritizing locations for the development of future renewable generation facilities in the region

Regional strategies are outlined in Section VI. The regional energy maps as well as information regarding the process by which the maps were developed are located in Section VI, Appendix B, and Appendix C.

While reading this document, it is also important to keep in mind what the Regional Energy Plan will not do. Much like the Vermont Comprehensive Energy Plan, the Regional Energy Plan does not intend to directly address every specific energy-related issue within the region, and it does not discuss or provide recommendations regarding specific renewable energy generation projects that have been proposed in the region. Although it provides a prospective vision of the mix of renewables that may be developed in the

¹ Act 56: Vermont Renewable Energy Standard (<http://legislature.vermont.gov/bill/status/2016/h.40>)

region to attain state goals, the Regional Energy Plan does not specify the mix of renewable energy generation facilities that will actually be built or contracted by utilities serving the Northwest region. In addition, the plan does not provide specific information about the costs of implementing the plan or the costs of failing to implement the plan.

The energy landscape in Vermont has rapidly changed over the past 10 years. This has been driven by climate change, policy changes, materials cost reductions, and quickly evolving technologies. The NRPC anticipates that methods of generating, distributing, and conserving energy will continue to evolve over the next 30 to 40 years. This plan should be revisited and revised—perhaps more frequently than other regional plans adopted by NRPC—to account for changes in federal and state policy as well as regulatory frameworks, and for changes in environmental conditions due to climate change.

NRPC will continue to incorporate the strategies identified in this plan into the Northwest Regional Plan during future updates.

C. KEY CONSIDERATIONS

While it is important to understand the energy goals established by the legislature, it is more important to understand the reasons why the goals were established. The “why” behind this plan can be explained by looking at three different motivations that are important both regionally and statewide: energy security, environmental protection, and economic needs and opportunities. As climate change continues to change our world, NRPC hopes to prepare its communities, businesses, residents, and infrastructure for the transition.

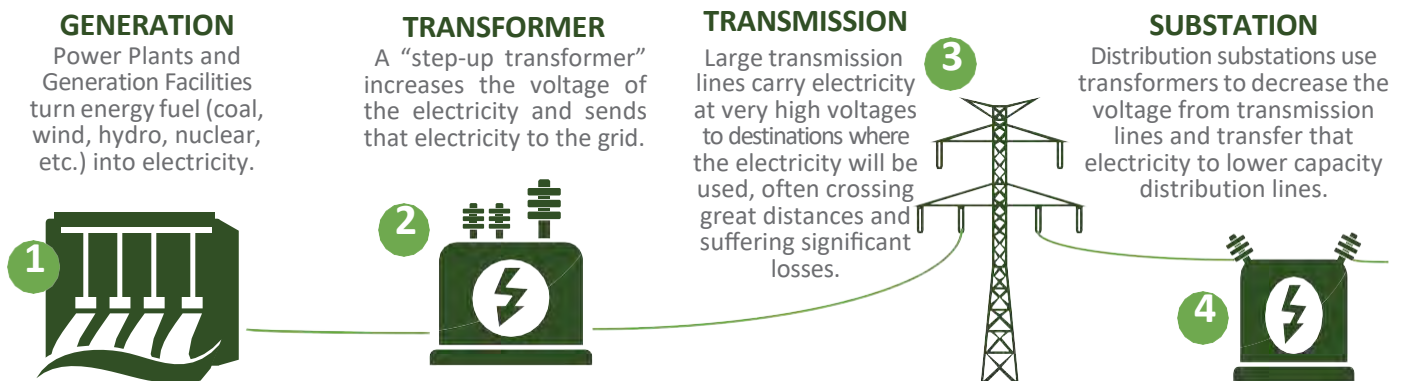
ENERGY SECURITY

Vermont and the Northwest region are reliant upon other states and countries for a large portion of their energy needs. To address this issue, a state statute (10 V.S.A. 580(a)) has set a goal that by 2025, 25% of the energy consumed within the state will also be produced in the state by renewable generation.

Transportation energy is a clear example of the potential threats to both state and regional energy security. Vermont imports all of the gasoline and diesel fuels that are required to operate passenger and heavy vehicles in the state. While there are varying opinions about “peak oil,” there is no debate that fossil fuels are a finite resource. The continuing reliance on a finite resource combined with the volatility of the fossil fuel market will result in increasing transportation costs with potentially far-reaching implications.

FIGURE 2.2 UNDERSTANDING THE GRID

The major components in the US electrical generation and distribution grid are enumerated and described in the diagram below (continued on the following page)



V. TARGETS FOR ENERGY CONSERVATION, ENERGY USE, AND ELECTRICITY GENERATION

While Section IV focuses on cataloguing the Northwest region's current energy demand and generation capacity, Section V creates targets for regional energy conservation, use and generation. The targets will guide the region toward achieving the state's and region's energy goals.

Achieving these energy goals will be challenging. Intensive conservation methods will need to be employed throughout the region in all sectors. Increased electrification of transportation and space heating will also be needed (combined with the subsequent decrease in fossil fuel use). But perhaps most importantly, total energy demand in the region will need to decrease despite population growth. The specifics of regional conservation and generation targets are covered in detail in Subsection B. Subsection A provides context for how regional targets were developed. Appendix H contains a comprehensive list of regional energy targets.

A. LEAP MODEL AND METHODOLOGY

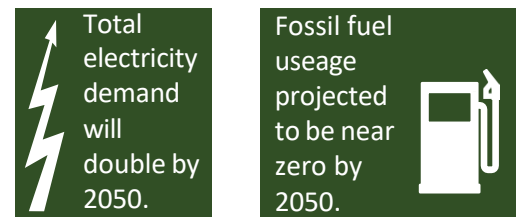
Energy targets were created by the Department of Public Service using the LEAP (Long-range Energy Alternatives Planning) software to create a model of the demand for and supply of total energy usage in Vermont and the region. LEAP software is a system that allows users to create complex models of future energy use. The LEAP model does not identify specific costs that would be incurred in the future. Instead, it compares 2050 costs among various scenarios, in order to achieve the least-cost alternative to meet legislative goals. The LEAP model also includes impacts that do not result in out-of-pocket costs, such as impacts of pollution. Because of the model's complexity, it is difficult to explain comprehensively. The following scenarios provide some background on the methodology and the inputs used to create both statewide and regional models in LEAP. Appendix A presents the full model results for the region and the state as well as a more thorough explanation of the model assumptions and methodology.

Targets for generation were developed by the Northwest Regional Planning Commission in partnership with the Department of Public Service.

ONE MODEL - TWO SCENARIOS

The model created in LEAP actually contains two scenarios. The first scenario—the reference scenario—models what we will achieve based on current trends. The second scenario is designed to achieve the goal of meeting Vermont's greenhouse gas reduction obligations under the Global Warming Solutions Act (GWSA). This scenario, called the "CAP Mitigation" scenario, is adapted from the Vermont Total Energy Study (TES) Total Renewable Energy and Efficiency Standard (TREES) Local scenarios.³ More information regarding the TES can be found on the Department of Public Service website.⁴

FIGURE 5.1 PROJECTED ENERGY DEMAND AND FOSSIL FUEL USAGE



To meet the GWSA goals, total energy use will need to decline despite a growing population and economy. Electricity use will increase with the intensified use of heat pumps as primary heating sources and the use of electric vehicles. Because those choices are powered by electricity, and electricity is three to four times more efficient compared to fossil fuels, overall energy use will decrease both regionally and statewide.

³Required by Act 170 of 2012 and by Act 89 of 2013, the intent of the TES according to the VT Public Service Dept. was "to identify the most promising policy and technology pathways to employ in order to reach Vermont's energy and greenhouse gas goals."

The difference in total energy demand between the reference scenario and the CAP Mitigation scenario is a key point. This difference represents the amount of total energy demand that will need to be eliminated to reach the state's and region's energy goals by 2050. The many challenges that could inhibit regional efforts to reach conservation and generation targets are covered in detail in Section VI.

LEAP INPUTS AND ASSUMPTIONS

This LEAP model was developed for the state Comprehensive Energy Plan and disaggregated for each regional planning commission accounting for share in population, housing units, industries, commercial floorspace, number of vehicles and presence of natural gas pipelines. More information on the LEAP modeling inputs and assumptions can be found in Appendix D of the 2022 Vermont Comprehensive Energy Plan. This disaggregated "share" represents only one of the many paths the Northwest region may take to attain its energy goals and does not necessarily set a mandatory target for the region to achieve.

FIGURE 5.2 THERMAL DIRECTIONAL GOALS



Significantly decrease use of fossil fuels.



Significantly increase number of regional residential cold climate heat pumps and heat pump hot water heaters.

increasing the percentage of renewable energy in the electricity supply will require interstate coordination to ensure reliability. There exists continued debate as to exact 2050 goals, but fossil fuels are unlikely to form a major part of the electric energy supply by 2050.

REGIONAL GENERATION TARGETS

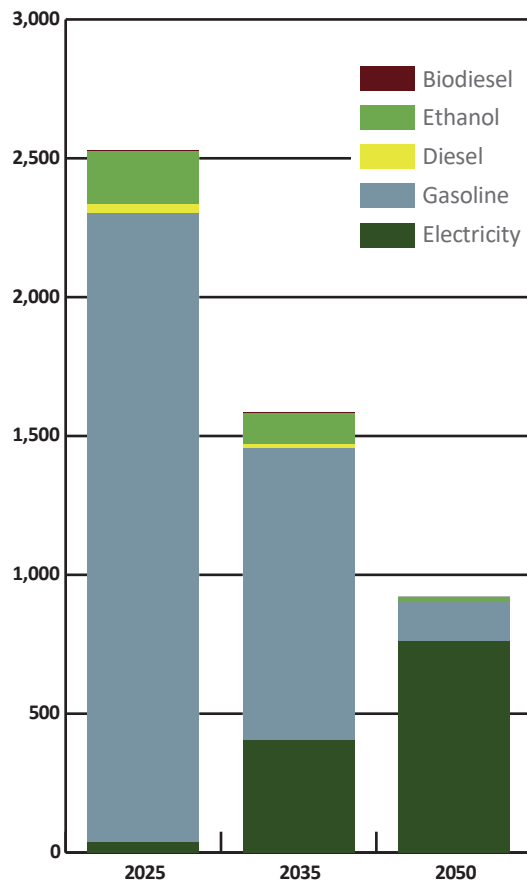
Based on the 2050 energy goals and the Vermont Comprehensive

Energy Plan, the Department of Public Service worked with regional planning commissions in Vermont to develop targets for new renewable generation. The generation targets are based on the estimated needs to cover the 50% of the region's energy use in 2050. It is expected that the other 50% of energy would be generated out-of-state.

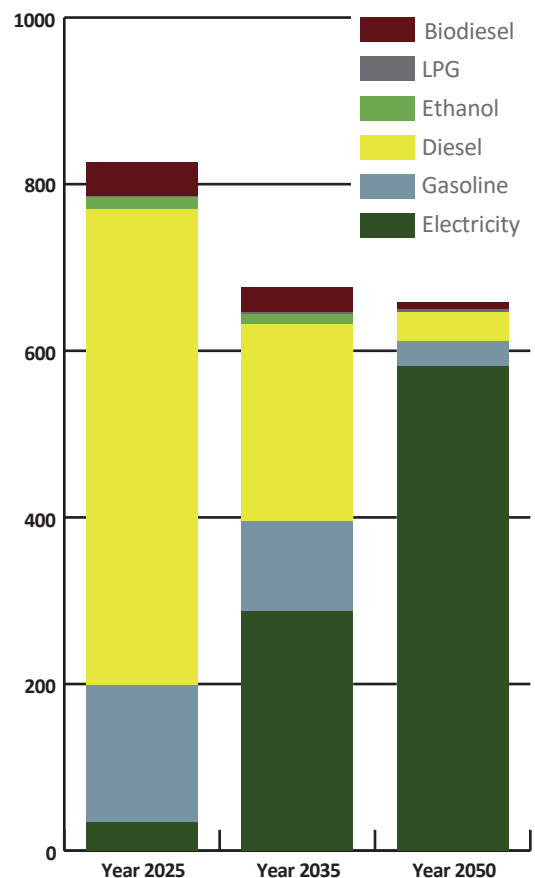
Figure 5.15 displays the regional targets for new renewable generation. The targets envision a high solar mix of renewable generation in the region. These targets display a linear progression to the 2050 generation targets. The generation targets call for only the addition of renewable energy generation sources in the region.

It is important to stress that the generation targets in Figure 5.15 represent only one possible way to derive 90% of total energy from renewable sources by 2050. The intent of the targets is to provide a sense of scale

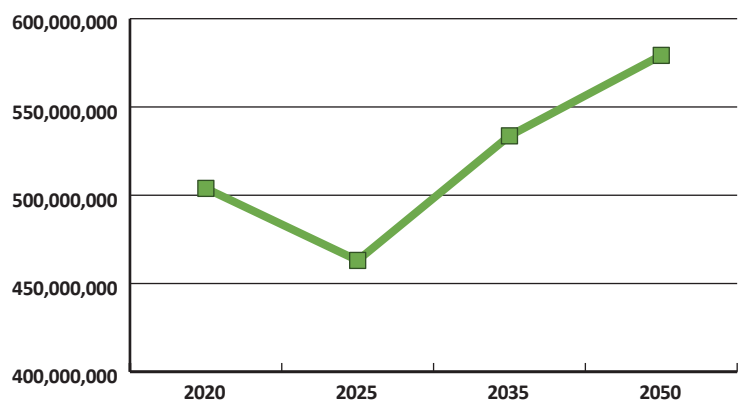
**FIGURE 5.12 CAP SCENARIO:
ENERGY USE FOR PASSENGER
CAR & LIGHT DUTY TRUCKS**



**FIGURE 5.13 CAP SCENARIO:
ENERGY USE FOR MEDIUM
& HEAVY-DUTY TRUCKS**



**FIGURE 5.14 TOTAL ELECTRICAL ENERGY USE:
CHANGE FROM 2020 TO 2050**



and a basis for discussion regarding the need for future electric generation, and about the siting of electric generation, in the region. Other electricity generation combinations may be possible. To guide the continuing conversation about the generation “mix,” a regional MWh target has also been provided for each target year.

FIGURE 5.15 RENEWABLE GENERATION TARGETS

	2025	2035	2050
Solar	15.0	65.0	140.1
Wind	0.2	0.9	1.9
Hydro	0.4	1.9	4.0
Biodigesters	0.2	1.0	2.1
MWH Total (in MWH)	23,396	101,384	218,365

Source: NRPC Targets based on Department of Public Service Renewable Generation Scenarios Tool

HYDRO GENERATION

The 2050 hydro generation target of 4 MW was developed based on two assumptions. First, based on the 2008 state study of possible additional capacity in existing dam sites, the region could add 750 kW of hydro. The remainder of the 3.25 MW could come from a number of small run-of-the-river systems. Run-of-the-river systems are flexible lower impact systems that generate electricity, small sites can have an average of 100 kW in generation. New traditional hydro sites were not included in the estimate.

BIODIGESTER GENERATION

Biodigesters take waste product from farms or food production and use anaerobic digestion to turn this waste into byproducts into methane gas and other byproducts that can generate electricity. Based on current technology, biodigesters are best financially suited for farms of 500 or more cows, of which there are currently 19 in the region. Assuming an average 150 kW project and that not every farm will have a biodigester, the total assumption is 2.1 MW.

WIND GENERATION

Based upon the analysis in Section V, the Northwest Region generally does not have suitable locations for the construction of “industrial” or “commercial” wind facilities within the region and therefore finds this scale of development does not conform to this plan. The NRPC remains committed to achieving new wind generation by 2050, but only through the construction of appropriately scaled wind generation facilities. For the purposes of this plan, NRPC will consider any wind facility with a tower height (excluding blades) in excess of 100 feet tall to be considered an “industrial” or “commercial” wind facility. Based on these constraints, the NRPC has set a wind generation target of 2 MW to be achieved through small-scale wind.

If a municipality through its local planning process identifies a preferred location(s) for an “industrial” or “commercial” wind facility within their boundaries, NRPC may consider amending this plan to account for this local preference. Coordination and consensus among neighboring municipalities will be a critical component of any process to amend the regional plan in this regard. Additionally, NRPC shall only consider such an amendment if the location, or locations, identified by the municipality do not include “known constraints” and mitigate impacts to “possible constraints” as identified in this plan.

SOLAR GENERATION

The remainder of the regional energy generation is expected to come from solar, an additional 140.1 MW, which equates to around 980 acres of solar [Once we have an updated prime solar acreage we will add it here—expected to be about 4% of prime solar land].

REGIONAL MUNICIPAL ELECTRICITY GENERATION

Department of Public Service standards for enhanced energy plans require that regional planning commissions develop targets for each municipality in the region. The NRPC is developing solar, hydro and biodigester targets

for municipalities. Wind targets have not been provided to municipalities and are instead considered a regional target. This is because of the limited amount of area in the region that is appropriate for wind generation per mapping completed by the NRPC (see Section VI) and because of the NRPC's position regarding the construction of "industrial" and "commercial" wind facilities in the region as noted above.

RENEWABLE ENERGY CREDITS (REC)

The generation targets do not take into consideration renewable energy credits (RECs). RECs are legally created when a renewable energy generation facility is constructed. RECs can then either be "retired" by their owner or sold within the New England regional market. There is a contentious discussion in Vermont about the current REC system and whether or not the current system should continue to be used. This is due, at least in part, to changes that are currently occurring in regards to the disposition of RECs, particularly for net-metering projects. This discussion is outside the scope of this plan.

For the purposes of this plan, all new renewable generation in the region shall be considered to be progress toward the regional generation targets. Regardless of whether RECs are sold or retired, this plan encourages the development and production of renewable energy in the region.

FIGURE 5.16 CAPACITY FACTOR - NOT ALL GENERATION IS EQUAL

This section provides targets for new renewable generation from solar, wind, and hydro sources. However, there may be a preference for one kind of renewable energy generation vs. another type of renewable generation within the region. It is possible (but not simple) to "swap" one generation type for another (for example, the region could decrease the amount of solar in favor of more wind).

It is important to recognize the different types of renewable energy are not equal, and each have a different "capacity factor" (actual output over time). For example, a solar generation system with a capacity of 100 MW, in practice won't produce energy at that level all the time because the sun is not available for 24 hours a day, 365 days a year. Solar in Vermont is generally considered to have a capacity factor of 14%. Wind generation in VT, on the other hand, has a capacity factor of roughly 35%, because winds are more consistent source of energy than the sun. This means that if a region or community was determined to reduce the number of wind generation needed to reach targeted by the LEAP model, significantly more solar would be needed to make up the lost capacity.

Capacity factors also exist for hydro (40%) and biomass generation facilities (47%).

VI. STRATEGIES TO ACHIEVE REGIONAL TARGETS

The results of the LEAP model provide one scenario of future energy use in the Northwest region that ensures that state and regional energy goals are met. However, the LEAP model only provides targets for energy conservation and generation. It does not provide details about how the region may attain the targets set by the model.

This section addresses how the LEAP targets will be attained by examining specific goals, strategies, and implementation steps that the region may use to progress toward the CAP Mitigation Scenario and a more sustainable future.

This section, and the plan as a whole, is guided by the following statements of policy. The NRPC adopts these statements of policy to affirm its commitment to meeting state and regional energy goals and to satisfy the determination standards established by the Vermont Department of Public Service:

STATEMENTS OF POLICY

- NRPC supports conservation efforts and the efficient use of energy across all sectors.
- NRPC supports the reduction of in-region transportation energy demand, reduction of single-occupancy vehicle use, and the transition to renewable and lower-emission energy sources for transportation.
- NRPC supports patterns and densities of concentrated development that result in the conservation of energy.
- NRPC supports the development and siting of renewable energy resources in the Northwest region that are in conformance with the goals, strategies, and standards outlined in this plan.

The strategies are separated into those related to conservation and generation. The conservation strategies look specifically at the topics of electricity conservation, weatherization, and transportation, while the generation strategies explore how and where generation may be developed in the region.

Only strategies and implementation steps that can be completed by the NRPC are included in this plan. Many other strategies and implementation steps could help the region attain its energy goals, but these strategies cannot be achieved by the NRPC and require the action of state agencies, municipalities, public utilities, and individuals. The goals, strategies, and implementation steps outlined in this section are meant to evolve over time to reflect continuing changes in the Northwest region and changes to state and federal policy.

A. CONSERVATION

ELECTRICITY CONSERVATION

Additional electric generation and conservation are both required to ensure that the region can attain the targets set in the LEAP model and in state statutes. The following goals focus on electricity conservation. Policymakers must find ways to further electricity conservation efforts while also increasing the overall use of electricity compared to other energy sources (especially for space heating and transportation). The failure of conservation efforts could severely hinder the region's ability to achieve the CAP Mitigation Scenario.

FIGURE 6.1

RECAP: LEAP ELECTRICITY CONSERVATION TARGETS

To meet the CAP Mitigation Scenario, LEAP establishes the following targets:

- Total regional electricity demand projected to increase by 100% by 2050.
- Regional electricity use for transportation projected to increase .05% in 2010 to 33% in 2050.
- Use of electric heat pumps projected to account for 52% of single family home energy thermal energy demand by 2050.

park-and-ride lots, and in designated downtowns and villages.

6 GOAL

Increase the number of municipal energy committees in the Northwest region.

STRATEGIES

1. Support the creation of municipal energy committees in the Northwest region, community volunteer groups that focus on increasing energy efficiency in their municipalities and sharing information on existing programs with residents.
2. Support municipal projects that align with the goals and strategies of this plan.
3. Support municipal energy committees with project and grant management for energy and climate resilience projects that are consistent with this plan.

IMPLEMENTATION

1. Advocate for the creation of municipal energy committees in the region, and provide municipalities with technical support when creating such committees.
2. Work with Energy Action Network to provide available data to municipal planning commissions and energy committees to aid municipal energy planning work.

7 GOAL

Increase local food production and consumption.

STRATEGIES

1. Support the efforts of the Healthy Roots Collaborative and other regional organizations focused on expanding the local food system.

IMPLEMENTATION

1. Implement the existing language in the Northwest Regional Plan that calls for limiting the loss of primary agricultural soils and active farmland. In addition, implement the existing language in the Northwest Regional Plan that calls for mitigating the impacts to primary agricultural soils and active farmland when these areas are to be developed, including the construction of renewable energy generation facilities.
2. Work with regional municipalities to institute local zoning changes that provide additional protections to productive agricultural land and primary agricultural soils.

B. GENERATION

As seen in the results of the LEAP model, achieving the state's energy goals will take more than improvements to energy efficiency and reductions in energy use. It will also require additional energy generation, particularly of electricity.

ELECTRICITY GENERATION

Electricity generation strategies focus on continued support of existing state programs that encourage renewable generation development such as net-metering programs and the Standard Offer Program. Strategies also focus on the creation of more accessible, internet-based information for electricity generation developers and for the general public regarding grid limitations and the Certificate of Public Good process. Implementation will primarily focus on the NRPC aiding municipal energy planning efforts, which includes working with

municipalities to identify preferred locations for future generation development in municipal plans. It also includes working with municipalities to identify and develop effective policies to protect significant cultural, historical, scenic, or natural resources. The development of these policies can address many of the concerns that communities and citizens in the region have expressed with regard to solar and wind generation facilities. The NRPC will work with municipalities to ensure that municipal plans receive an affirmative “determination” from the Northwest Regional Planning Commission.

The NRPC would like to further investigate the public benefits provided to municipalities either directly from renewable energy generation developers or as a condition of a Certificate of Public Good. The NRPC is interested in determining whether the current system creates equitable outcomes or if it can be improved to provide greater equity to all municipalities impacted by a renewable energy generation facility, even if the facility is only located in one municipality. This is particularly relevant when discussing “industrial” or “commercial” wind generation facilities.

The NRPC finds it to be essential that all decisions regarding new renewable energy generation facilities take into consideration concerns about health and safety. The noise, vibration, glare, or other impacts from generation facilities shall be mitigated by developers to ensure that such impacts do not have an undue adverse impact upon neighboring properties. This includes any impacts that pertain from electric or magnetic fields, or from construction activities associated with the facility.

It is hard to know exactly what the future makeup of Vermont’s electricity generation will be, but it is important to support a diverse, distributed, and robust set of generation facilities in the region. This will ensure resiliency, equity, and adaptability for the future.

GOAL

Increase the renewable energy generation capacity in the Northwest region through a mix of generation types including solar, wind, hydro, and biodigesters.

STRATEGIES

1. Support the development of individual home and community-based renewable energy projects in the region through the following programs: Vermont Small Scale Renewable Energy Incentive Program, Clean Energy Development Fund, and tax and regulatory incentives including net-metering.
2. Support changes to net-metering rules and other regulatory tools to provide financial incentives in order to encourage siting of renewable generation facilities on the built environment (such as parking structures and rooftops) and other disturbed lands (such as former landfills, brownfields, or gravel pits). Support changes to net-metering rules that disincentivize development on land identified in this plan as a location with known and possible constraints. Encourage multiple uses in conjunction with the development of renewable generation facilities, such as grazing of livestock, recreation, or parking.
3. Continue to support the Standard Offer Program (Figure 5.6) to foster deployment of diverse and cost-effective renewable energy resources, and support the continued evaluation of this program to determine if the program should be extended or changed.
4. Support the creation of “solar maps,” like the maps developed by Green Mountain Power, to make interconnection information available to the general public and accessible online. Local electric utilities could partner with the NRPC to create these maps.

5. Support efforts by local utilities and private individuals to maintain and upgrade existing renewable electric generation facilities in the Northwest region and the state.
6. Support the development of additional methane digesters on farms in the Northwest region, especially those that utilize manure from multiple farms and/or food waste.
7. Support the creation of incentives for locating new renewable energy generation facilities within a half-mile of three-phase distribution line or electric transmission line infrastructure. Ensure new transmission lines and three-phase power lines associated with renewable energy projects do not create forest fragmentation or have an undue adverse impact on necessary wildlife habitats, ecological systems, and water and/or air quality.
8. Investigate potential new technologies including geothermal facilities to produce electricity, and support local research into their application.

FIGURE 6.5 STANDARD OFFER PROGRAM

In 2009, the Vermont legislature created the Standard Offer Program, which is designed to encourage the development of renewable energy generation facilities by establishing prices for new renewable energy based on the cost of developing a project plus a reasonable rate of return. Through the program, renewable energy developers can receive a long-term, fixed-price contract for renewables facilities up to 2.2 MW in size. The original program cap was 50 MW, which was amended to 127.5 MW in Act 170 of the 2011–2012 legislative session. All facilities to be built through the program are required to receive a Certificate of Public Good from the Public Service Board.

IMPLEMENTATION

1. Maintain determination of enhanced energy plan compliance through the Public Service Department in order to ensure that the plan is given greater weight in the Certificate of Public Good process.
2. Provide assistance to municipalities to identify potential areas for development and siting of renewable energy generation facilities. Work with municipalities to identify areas, if any, that are unsuitable for siting renewable energy generation facilities or particular categories of renewable energy generation facilities. Ensure that municipalities include this information in their municipal plans and work to ensure that municipal plans are given an affirmative regional determination of enhanced energy plan compliance by the NRPC so that municipalities may receive “substantial deference” in the Certificate of Public Good process.
3. Work with municipalities to specifically identify significant cultural, historical, or scenic resources in their communities. Work with municipalities to protect these resources through the development of a statement of policies on the preservation of rare and irreplaceable natural areas and resources as well as scenic and historic features and resources, as required by 24 V.S.A. 4382, and include such policies in municipal plans.
4. Identify, catalog, and map potential brownfield sites and other previously disturbed sites in the region that may be appropriate for future solar generation facilities.
5. Investigate public benefits provided to municipalities either directly from renewable energy generation 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 municipalities impacted by a renewable energy generation facility.

ENERGY RESOURCE MAPS AND THE PUBLIC SERVICE BOARD

The Vermont Public Service Board has jurisdiction over all energy generation facilities that are a part of the public electrical grid. The board provides its approval to an energy generation facility by issuing a Certificate of Public Good to that facility. A proposed energy generation facility must meet the criteria found in 30 V.S.A. §248 in order to receive a Certificate of Public Good. The role of regional planning commissions in the Certificate of Public Good process is outlined in 30 V.S.A. §248(b)(1), commonly referred to as Section 248:

With respect to an in-state facility, will not unduly interfere with the orderly development of the region with due consideration having been given to the recommendations of the municipal and regional planning commissions, the recommendations of the municipal legislative bodies, and the land conservation measures contained in the plan of any affected municipality.

In addition, regions and municipalities may receive “substantial deference” instead of “due consideration” during a Certificate of Public Good proceeding if the region or municipality has received an affirmative determination of energy compliance. This potentially provides regional and municipal plans with greater weight before the Public Service Board.

In recent Certificate of Public Good proceedings, the Public Service Board has frequently found that municipalities and regional planning commissions have not had language, or maps, that have provided for “land conservation measures” that are specific and/or well-reasoned enough to have a real impact on the siting of renewable generation facilities through the Certificate of Public Good process. Through the creation of the following regional energy generation maps, the NRPC is planning for the development of additional renewable generation facilities in the region (using the LEAP model targets as a basis of conversation) and providing for clarity regarding regional land conservation measures and specific policies.

The NRPC has developed renewable energy generation maps for four renewable energy resources: solar, wind, hydro, and biomass. The following subsection provides a basic explanation of how the maps were created and how they are intended to be used and/or integrated into the Northwest Regional Plan. This is followed by subsections explaining the intent behind the maps of each renewable energy resource. Maps created while developing this project are provided in Appendix C.

ENERGY GENERATION MAPS METHODOLOGY

NRPC staff worked with other regional planning commissions (RPCs), the Department of Public Service and other project partners in the state to develop criteria that would inform and guide the siting of renewable energy generation facilities. The NRPC and the other RPCs each create maps that provide a macro-scale look at different factors that impact the siting of facilities.

Spatial data showing generation potential, which was originally compiled by the Vermont Sustainable Jobs Fund, form the basis of the NRPC's mapping. The NRPC then identifies conservation resources in the region that are considered worthy of protection from development. These resources are selected through conversations with project partners, analysis of the current Northwest Regional Plan, and public input. Other known and possible constraints are developed at the state level.

Known constraints are conservation resources that shall be protected from all future development of renewable generation facilities. Possible constraints are conservation resources that the NRPC intends to protect, to some extent, from the development of renewable generation facilities. The presence of possible constraints on a parcel does not necessarily preclude the siting of renewable generation facilities on a site; siting in these locations could occur if impacts to the affected possible constraints are mitigated, preferably on-site.

When considering locations for future renewable energy generation facilities, the NRPC encourages developers to target regional locations with generation potential that do not contain any known or possible constraints. These areas are shown as "prime" on the renewable energy generation maps in Appendix C. Further, if prime areas are located within a half-mile of existing transmission or three-phase distribution infrastructure, the NRPC finds that these areas should be given further preference by the Public Service Board. Areas with high generation potential but that also contain possible constraints are identified on the regional energy generation maps as "base" areas. These areas may be appropriate for the development of renewable energy generation facilities, but they should be given less preference than prime areas.

A full list of the known constraints and possible constraints identified by the NRPC for each type of generation (solar, wind, biomass, hydro), along with information about data sources, may be found in Appendix B.

It should be noted that the energy generation maps are based on the best available geographic data. They are macro-scale maps meant to guide the development of renewable generation facilities. The NRPC expects that some applicants or parties will be able to provide on-site information that is more accurate regarding the presence of known and/or possible constraints. This information will need to be taken into account by the NRPC and the Public Service Board when reviewing applications for renewable generation facilities to ensure that known constraints are not impacted and to ensure that impacts to possible constraint areas are mitigated. The energy generation maps are not intended to be used without the accompanying goals and policies of the NRPC contained in this plan.

FIGURE 6.6 ROOFTOP SOLAR – POTENTIAL CAPACITY

NRPC has approximated potential solar generation from both commercial/industrial and residential rooftops in region. The analysis estimates that 25% of all residential, commercial and industrial structures may be correctly sized for solar generation and have actually installed solar panels. NRPC then estimated that a typical residential system would generate 4 kW of electricity and that a typical commercial or industrial system would generate 20 kW of electricity.

Based on these assumptions, the Northwest region could potentially generate 28.8 MW of electricity from rooftop solar generation. About 21.6 MW would come from residential rooftops and 7.2 MW would come from commercial and industrial rooftops.

Additional development of structures in the region would provide additional generation capacity. While these assumptions allow for only rough approximations, they do provide a sense that rooftop solar may be a viable way to meet at least a portion of the regional generation targets.

VII. FEASIBILITY AND CHALLENGES

A. FEASIBILITY

Combined with the LEAP model results, the analysis of existing energy demand and supply provides a framework for discussing the region's energy present and future. From that framework, the NRPC has developed goals, strategies, and implementation actions for both conservation and generation that will help the region achieve the CAP Mitigation Scenario. Despite challenges posed by grid limitation and by site-specific siting issues, the generation goals and strategies, guided by the LEAP generation targets, are feasible for the region to achieve in terms of both the amount of electricity needed to reach projected demand and the amount of land required to generate the electricity.

The identified conservation goals and strategies may be more difficult for the NRPC to implement. Energy conservation goals will require changes by individual consumers in the region. The NRPC can facilitate and help coordinate the efforts of other organizations in the region (e.g., public utilities, Efficiency Vermont, CVOEO) but has little influence in the area of electric and thermal energy.

The third area of conservation—transportation—is different. One of the NRPC's core functions is to coordinate transportation planning for the region. Combined with the NRPC's experience in land use planning—a discipline inextricably linked to transportation planning—the commission is well suited to implement transportation goals and strategies. Progress on transportation implementation actions will be prioritized, though electric and thermal goals will continue to be pursued.

B. IMPLEMENTATION CHALLENGES

The NRPC faces several challenges in achieving the CAP Mitigation Scenario. Many cannot be resolved by the NRPC alone and will require the cooperation and coordination of the federal government, state government, and private sector. Other challenges, such as those posed by Chittenden County's future electricity demand, will require the NRPC to make policy decisions that will have an impact on the achievement of state energy goals. Key implementation challenges include the following:

- **High Upfront Costs** – While efficient technologies such as heat pumps and electric cars are more affordable to operate, they also tend to have higher up-front costs. Incentives have been created to help Vermonters, especially low-income Vermonters, access these technologies. Unfortunately, many residents still find a gap between the subsidized cost and the amount they can afford. Increased incentives, especially for middle income households, as well as the quickly improving technology could help to alleviate this barrier for the region's residents. There is also a need to substantially increase the capacity of existing programs for low-income residents, such as the low-income weatherization programs to reduce wait times.
- **Complex and Intertwined Systems** – The ways in which we heat our spaces, fuel our vehicles, and power our homes are complex and can impact each other in surprising ways. Installing heat pumps or other electric technologies can often require expensive panel upgrades. Heating technologies like heat pumps are often only efficient if a home has been sufficiently weatherized, which can be a complicated and expensive undertaking. The expense of systems also means that residents will often only upgrade their furnace or other equipment when their current one fails. This slow rate of change, along with the complex upgrades often needed can be a barrier to implementation, but additional funding could encourage residents to make these improvements sooner and in an order that enables increased efficiency, such as weatherization before heat pump installation.
- **Split-Incentives** – in many rental housing options, the landlord is responsible for building maintenance while the tenant is responsible for utility bills. Typically, utility bill costs are not disclosed to future renters

industrial heating, too). The NRPC has some questions about how this increased demand will be met regionally and about the potential environmental impacts of increased reliance on wood—particularly with regard to climate change.

The continued reliance on cord wood for heating and its impacts on greenhouse gas emissions as well as the sustainability of its harvest in the region should be monitored. As the impacts of climate change on the Northwest region become clearer, the widespread use of cord wood should be reassessed to ensure that its use continues to be in the best interest of the region and the state. In addition, information from the Biomass Energy Research Center indicates that the region has less low-grade wood that can be used for biomass heating than other regions of Vermont. This may limit efforts in the region to expand the use of biomass for heat and electricity generation. Biomass generation that utilizes farm or landfill gas can help to meet renewable generation goals without threatening our forests.

- **Lack of Site-Specific Guidelines for Solar and Wind Generation Facilities** – The energy generation maps in the plan address which conservation resources should be protected from development of renewables and which conservation resources should be subject to mitigation if impacted by development of renewables. This plan does not provide site-specific guidelines for how solar or wind should be placed on a site if it is deemed appropriate for development. The issues of screening, stormwater management, fall distance, sound levels, and aesthetics have not been addressed in this plan. The NRPC did not address these issues directly in this plan primarily due to the unique challenges that each particular site poses to renewable development, but these factors are considered by the Project Review Committee.

The legislature has developed setback requirements for solar facilities and has enabled municipalities to develop solar facility screening ordinances, but concerns persist about whether enough has been done to protect the state’s working landscape. Sentiment is even stronger in the state regarding the need for siting standards for wind generation facilities. Of particular concern to the NRPC are the possible economic inequities that can result through the siting of large generation facilities in the region. The NRPC advocates for changes to the Section 248 process ensuring that the economic benefits provided by a developer are distributed equally to all municipalities that are impacted by a proposed facility.

- **Impacts on Local Energy Companies** – The changing energy landscape may have negative impacts on local energy companies, such as heating fuel and gas stations, that cannot evolve their business model. In the short term, this may hinder regional citizens from accessing new, innovative heating and transportation technologies locally. In the long term, it may lead some local energy companies to disband, with lost jobs as a consequence. There are several programs in the state and region to help retrain workers who currently work in the fossil fuel industry. Certain sectors, including weatherization and green technology installation, will require additional labor and can provide careers for those transitioning out of fossil fuel industries.
- **Lack of RBES and CBES Outreach and Enforcement** – Although Efficiency Vermont has provided some outreach to local contractors and the general public regarding the requirements of Residential Building Energy Standards (RBES) and Commercial Building Energy Standards (CBES), there is still a lack of knowledge about the programs. The state also lacks the ability to enforce the code. Combined, this could slow regional and statewide weatherization efforts. Increased education and outreach on these standards and the benefits of higher standard builds could help to increase implementation of RBES and CBES.
- **Limits of Regional Jurisdiction** – There are limits to how much the NRPC can do to ensure that the 2050 goal is accomplished. The commission can influence state policy and implement projects that fall within RPC’s jurisdiction in state statutes, but many of the changes that will be required will need to happen on

APPENDIX



APPENDIX B - ENERGY RESOURCE MAPPING

A. EXPLANATION OF CONSTRAINTS

B. SOLAR GENERATION MAPS

C. BIOMASS MAPS

D. WIND GENERATION MAPS

E. HYDRO GENERATION MAPS

F. EXPLANATION OF MUNICIPAL CONSERVATION LAND USE AREAS

- **State Significant Natural Communities and Rare, Threatened, and Endangered Species:** Rankings S1 through S3 were used as constraints. These include all of the rare and uncommon rankings within the file. For more information on the specific rankings, explore the methodology for the shapefile. (Source: VCGI)

OTHER MAP FEATURES

- **Three-Phase Distribution Lines:** All available utilities with service in any of the three regions (Source: Green Mountain Power, Swanton Village Electric Department, Vermont Electric Coop, and Village of Enosburg Falls) were mapped.
- **Transportation Infrastructure:** These were removed in the initial analysis performed by VCGI. Parking lots are not included. (Source: VCGI)
- **VELCO Transmission Lines and Substations:** (Source: VCGI)
- **Water Bodies:** Major water bodies (i.e., >1 square kilometer in surface area) are shown on maps as “Lakes/Ponds.” (Source: VCGI)

F. EXPLANATION OF MUNICIPAL CONSERVATION LAND USE AREAS

The NRPC conducted an analysis of municipal conservation land use area. The analysis reviewed the written descriptions of conservation land use areas from each municipal plan in the region. The intent of the analysis was to see if the conservation land use areas contained language that restricted future development (including the development of renewables). After review, the conservation land use areas from each municipal plan were divided into the following categories:

STRONGLY DETERS

These conservation land use areas use language that prohibits development or only permits limited, low-density residential development. These areas are included as Regional Known Constraints on the Regional Energy Generation maps. Municipal conservation land use areas that meet this description include:

- Alburgh Town & Village – Conservation Land A
- Enosburgh – Conservation District
- Enosburgh Falls – Conservation District
- Fletcher – Forest District
- Fletcher – Conservation District
- Franklin- Conservation District
- Grand Isle – Off-Shore Island District
- Montgomery – Conservation District II
- North Hero – Conservation District
- Richford – Recreation/Conservation District and Water Supply District
- St. Albans Town – Conservation District

DETERS

Several conservation land use areas in the region are described in municipal plans as areas where land use shall be restricted to conservation, forestry, and agricultural uses and/or are described as land that is geographically unsuitable for development. These areas are included as Regional Possible Constraints on the Regional Energy Generation maps. Municipal conservation land use areas that meet this description include:

- Alburgh Town and Village – Conservation Land B
- Bakersfield – Conservation District
- Fairfax – Conservation District
- Fairfield – Uplands District
- Fairfield – Pond & Swamp District
- Highgate – Forest Reserve District

Northwest Regional Energy Plan 2024

- Highgate – Protected District
- Montgomery – Conservation District I
- Richford - Forest/Conservation District
- Sheldon – Rural Lands II
- Swanton Town and Village – Conservation District

NEUTRAL

These conservation land use areas may be identified in municipal plans as being geographically or topologically unsuitable for development, yet contain language that allows for some types of development. These areas have not been included on the Regional Energy Generation maps. Municipal conservation land use areas that meet this description include:

- Berkshire – Conservation District
- Georgia – Natural Areas District
- Georgia – Recreation District
- South Hero – Conservation District

DEVELOPMENT MAY OCCUR

These conservation land use areas do not contain language that restricts development. These areas have not been included on the Regional Energy Generation maps. No municipal conservation land use areas currently meet that description.

APPENDIX



APPENDIX C - REGIONAL GENERATION MAPS

Solar

Northwest Region, VT Act 174 Energy Development Improvement Act

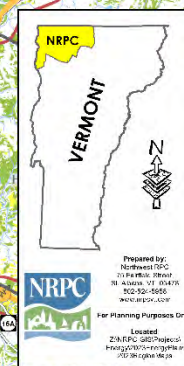
This map and the corresponding data is intended to be used to inform energy planning efforts by municipalities and regions. It may also be used for conceptual planning or initial site identification by those interested in developing renewable energy infrastructure. The maps do NOT take the place of site specific investigation for a proposed facility and cannot be used as siting maps.

Legend

-  Substation
-  3 Phase Power Line
-  Transmission Line
-  1/2 Mile Buffer* (3 Phase Power Line & Transmission Line)
-  Prime Solar/No Known Constraints
-  Base Solar/Possible Constraints

*The 1/2 mile buffer shows where generation facilities can be located without significant loss of power in transit to transmission lines.

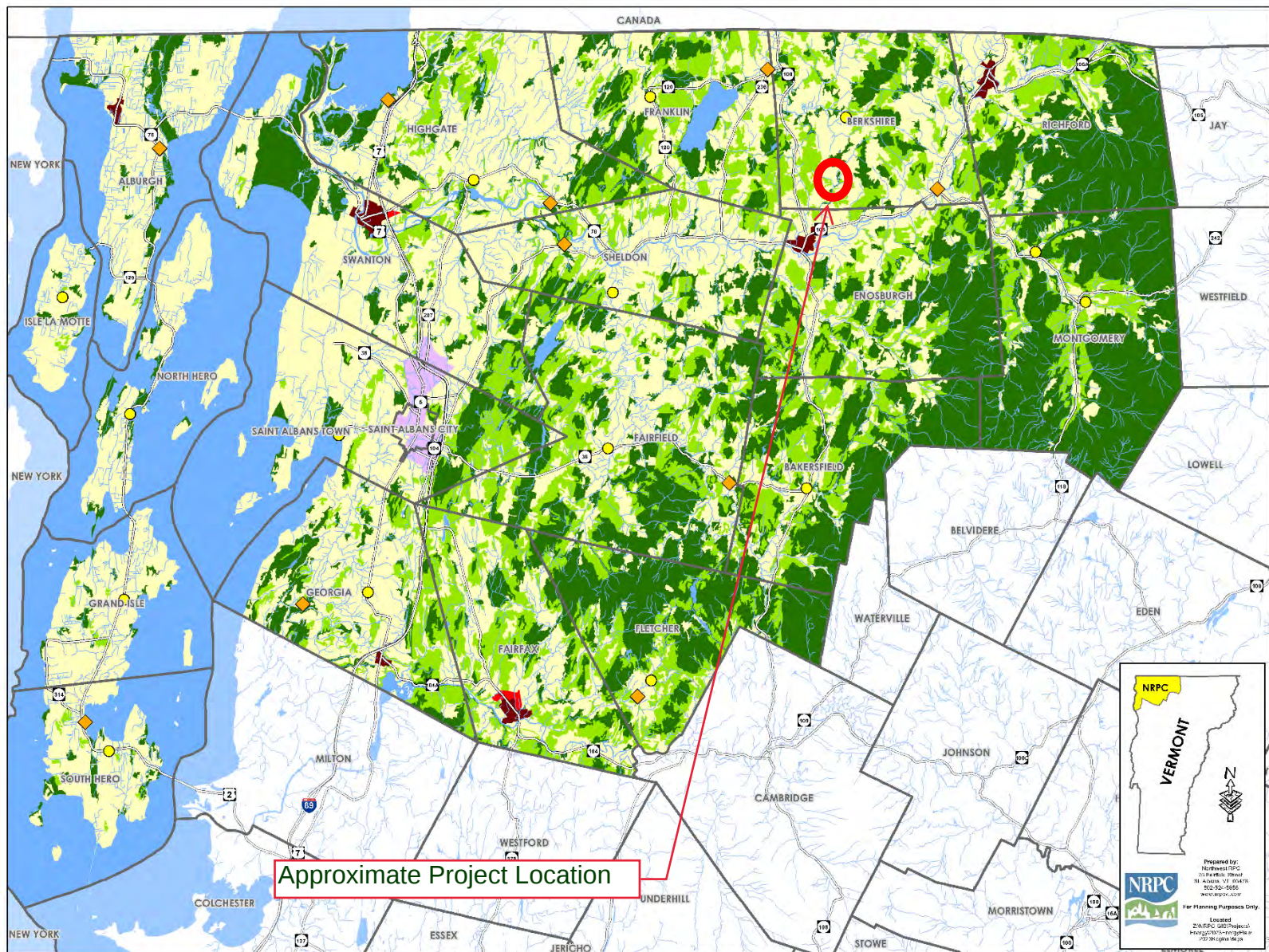
Sources: VCGI
Disclaimer: The accuracy of information presented is determined by its sources. Errors and omissions may exist. The Northwest RPC is not responsible for these. Questions of on the ground location can be resolved by site inspection and/or surveys by a registered surveyor. This map is not sufficient for delineation of features on the ground. This map identifies the presence of features, and may indicate relationships between features, but is not a replacement for surveyed information or engineering studies.



0 1 2 3 4 Miles



Approximate Project Location



Proposed Land Use

Northwest Region, VT
Act 174
Energy Development
Improvement Act

This map and the corresponding data is intended to be used to inform energy planning efforts by municipalities and regions. This map also may be used for conceptual planning or other site identification, but is not intended for developing renewable energy infrastructure. The maps do NOT take the place of site-specific investigation for a proposed facility and cannot be used as siting maps.

Legend

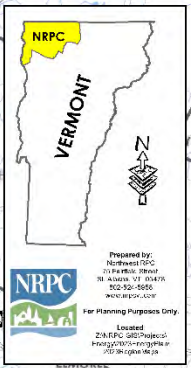
- Village
- Hamlet

Proposed Land Use Features

- Regional Growth Area
- Sub-Regional Growth Area
- Transitional Growth Area
- Agricultural Resource Planning Area
- Conservation & Forest Resource Planning Area
- Rural Planning Area

Sources: VCGI
Disclaimer: The accuracy of information presented is determined by its sources. Errors and omissions may exist. The Northwest RPC is not responsible for these. Questions of on-the-ground location can be resolved by site inspections and/or surveys by a registered surveyor. The map is not sufficient for delineation of features on-the-ground. This map identifies the presence of features, and may indicate relationships between features, but is not a replacement for a detailed information or engineering studies.

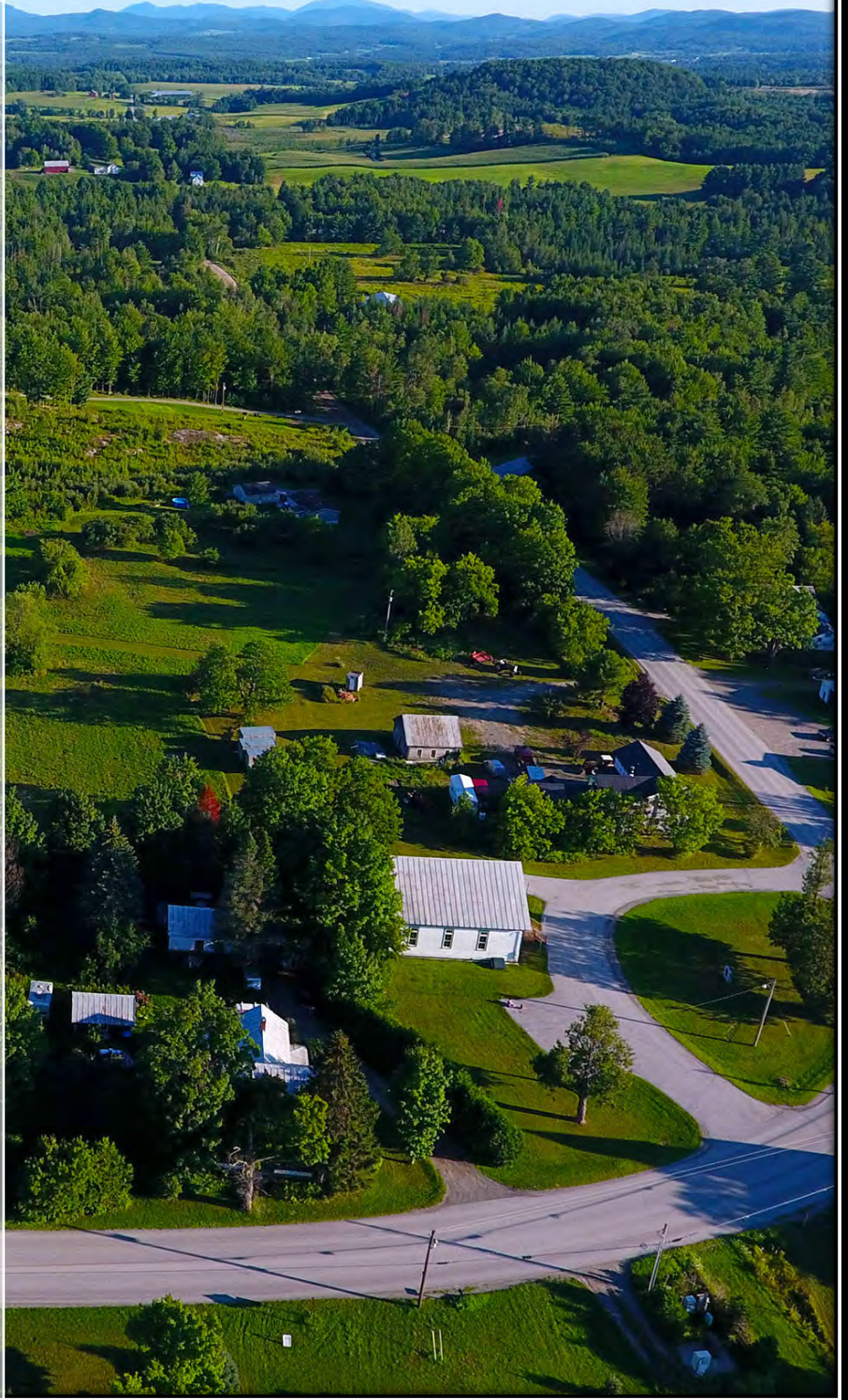
0 1 2 3 4 Miles



Berkshire Municipal Plan

Prepared by the Berkshire Planning Commission

October 5, 2020



ACKNOWLEDGEMENTS

Cover photo: Berkshire Center,
by Tami Lantz

Prepared by the Town of Berkshire with technical assistance from
the Northwest Regional Planning Commission

The Town of Berkshire website (<https://berkshiretownvt.weebly.com/>) provides
additional community resources and information.

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immediate attention and meeting the requirements of Act 200 should be on-going.

A) WORK PROGRAM

The Continuing Planning Process:

- Work to incorporate the goals and planning elements of Act 200 (Title 24, Chapter 117 V.S.A.) into the plan and the planning process (8 years).
- Pursue regular communication with neighboring communities, the Regional Commission, and state agencies in order to coordinate planning efforts.
- Sponsor public informational meetings and workshops to encourage public participation in the planning process.
- Pursue available grants as needed to fund planning efforts.

Previous Implementation Actions:

From 2015-2020 the Town of Berkshire completed two regulatory implementation actions identified in the previous Town Plan. As part of a 2017 Municipal Planning Grant project, the Town updated its Land Use and Development Regulations. This addressed two previous plan implementation actions.

- The regulations included strengthened flood hazard bylaws that mitigate risks to public safety, critical infrastructure, historic structures and municipal investments from inundation and erosion.
- The Town conducted an analysis of the current zoning districts to identify the effectiveness of the defined density per district for managing growth. The Town considered implementing a conservation district, but ultimately determined that this district was not necessary to protect the natural landscape of Berkshire due to the rural nature of the Town.

Additionally, the Town developed an official website to better communicate with Berkshire residents (<https://berkshiretownvt.weebly.com/>). This website should continue to be maintained by the Town.

Plan Implementation:

The Implementation Plan table below lists the strategies that the Berkshire Planning Commission recommends to implement the goals and policies of this Town Plan.

Responsible Parties: PC (Planning Commission), SB (Selectboard), DRB (Development Review Board), ZA (Zoning Administrator), Town (to be determined),

Partners: NRPC (Northwest Regional Planning Commission), FPR (VT Forest, Parks, & Recreation), VANR (VT Agency of Natural Resources), DHCD (VT Department of Housing & Community Development), USFWS (U.S. Fish & Wildlife Service), VTTrans (VT Agency of Transportation), PPP (Public Private Partnership)

Timeline: Short (1-4 years), Medium (5-8 years), Long (>8 years), Ongoing

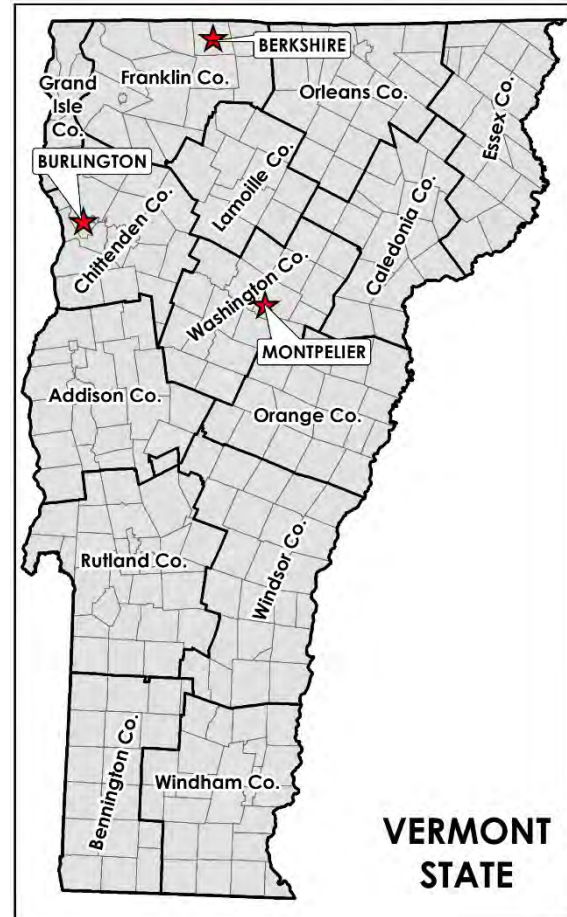
IMPLEMENTATION ACTIONS	RESPONSIBLE PARTY & PARTNERS	TIMELINE
The Sense of Place		
Explore adding two additional water source protection areas to the applicable zoning district. The two water supplies that should be considered include the area associated with spring supplying the East Berkshire Water Coop as well as the Berkshire Elementary School supply.	PC	Medium
Identify historical structures for potential nominations to the state and national historic registers	SB, Historical Society	Medium
Conduct a Scenic Resource Inventory to identify important viewsheds in Town	PC	Medium
Develop a management plan for the Town Forest Contact the County Forester.	Town, FPR	Short
A Place for a Home		
Promote programs that provide housing rehabilitation grants and low-interest loans such as those provided by Champlain Housing Trust, USDA Rural Development and Vermont Housing & Conservation Board.	Town	Ongoing
Conduct a local housing study to evaluate the	PC	Short

IMPLEMENTATION ACTIONS	RESPONSIBLE PARTY & PARTNERS	TIMELINE
Review municipal road standards to ensure that they reflect the “complete streets” principles as outlined by Vermont Agency of Transportation and Vermont Department of Health.	PC, SB	Ongoing
Promote a working landscape outside of designated growth and residential areas, e.g. by working with land trusts and landowners of farm and forest tracts to conserve key parcels of land.	PC	Ongoing
Investigate and facilitate the installation of a community-based renewable energy project.	PC	Long
Provide firefighters with training in fighting fires on structures that have solar installed. Utilize training resources provided by the VT Department of Public Safety Division of Fire Safety.	SB, Fire Dept.	Short/Ongoing
Develop and adopt a municipal solar screening ordinance.	PC, DRB	Medium
Investigate the need for a municipal park and ride facility.	SB	Medium
“Keeping It Rural” In The Future		
Promote resources that educate landowners on the best management practices of forest stewardship by distributing information on available resources from the County Forester and existing programs such as the Vermont Woodlands Association	PC, FPR	Medium

A) PHYSICAL LOCATION AND BOUNDARIES

The Town is located in the northeast corner of Franklin County, which is in turn situated in northwestern Vermont. Berkshire is bounded by the Province of Quebec to the north, the Town of Franklin to the west, the Town of Richford to the east, and the Town of Enosburgh and the incorporated Village of Enosburg Falls to the south.

The Town of Berkshire covers more than forty-three square miles of land (27,900 acres), and due to an error in computation, was granted 2,000 acres more than was normally granted to Vermont towns at that time in history. Berkshire is therefore larger, geographically, than most towns in the State.

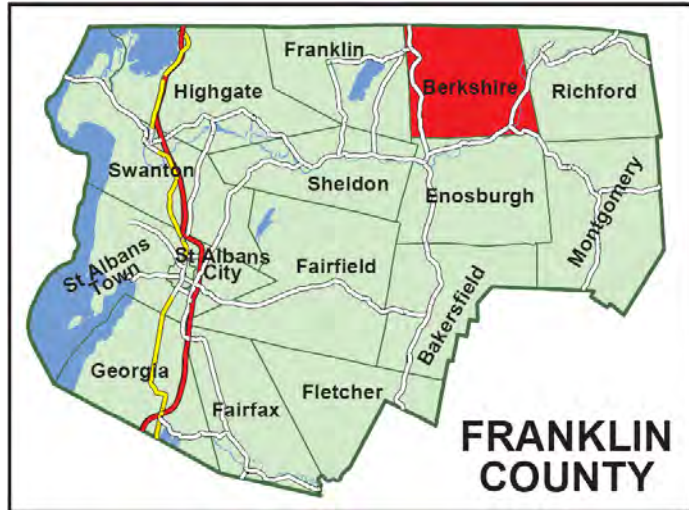


B) RELATIONSHIP TO THE NORTHWEST REGION

Berkshire is predominantly a rural town lying within the eastern sub-region of the Northwest Region. It is recognized within the Regional Plan as one of the most important agricultural towns in Franklin County. Under the Regional Plan, most of the Town lies within designated "agricultural lands" and the remaining land, considered unsuitable for farming, is included in a "conservation/forest resource" category. The three hamlets of the community, West Berkshire, Berkshire Center, and East Berkshire, are expected to remain the principal areas of population within the Town.

The Town of Berkshire is located between two urban service areas, Richford Village and Enosburg Falls. It is anticipated that the residents of Berkshire will continue to rely upon these areas for services such as medical and educational facilities, and retail services. While, Berkshire is experiencing the effects of the expansion of employment opportunities of Burlington and St. Albans, northern Franklin County is not experiencing as much growth as southern Franklin County. The neighboring municipalities of Enosburg Falls and Richford provide expanded market opportunities for Berkshire.

The Missisquoi River furnishes the Town and the Region with an important natural asset. The Regional Plan calls for protection of the river and adjacent lands to protect water quality and to preserve its scenic character. The Northern Forest Canoe Trail has been established in Berkshire along the Missisquoi River.



Within the Regional Plan, it is expected that Berkshire will retain its rural, agrarian character.

Continued economic health for the Town lies in the protection of its agricultural resource base and maintaining a viable agricultural industry, principally dairy, supplemented by tourism and other related land uses. It is also anticipated that the Town will not be the site of significant urban-type development over the life of the Regional Plan. Growth in the adjacent urban service areas; however, is expected to increase the pressure for residential development on roads leading into Berkshire from these centers. It is recommended within the Regional Plan that most new residential growth occur in and between the communities of West Berkshire and Berkshire Center, on soils suitable for on-site systems.

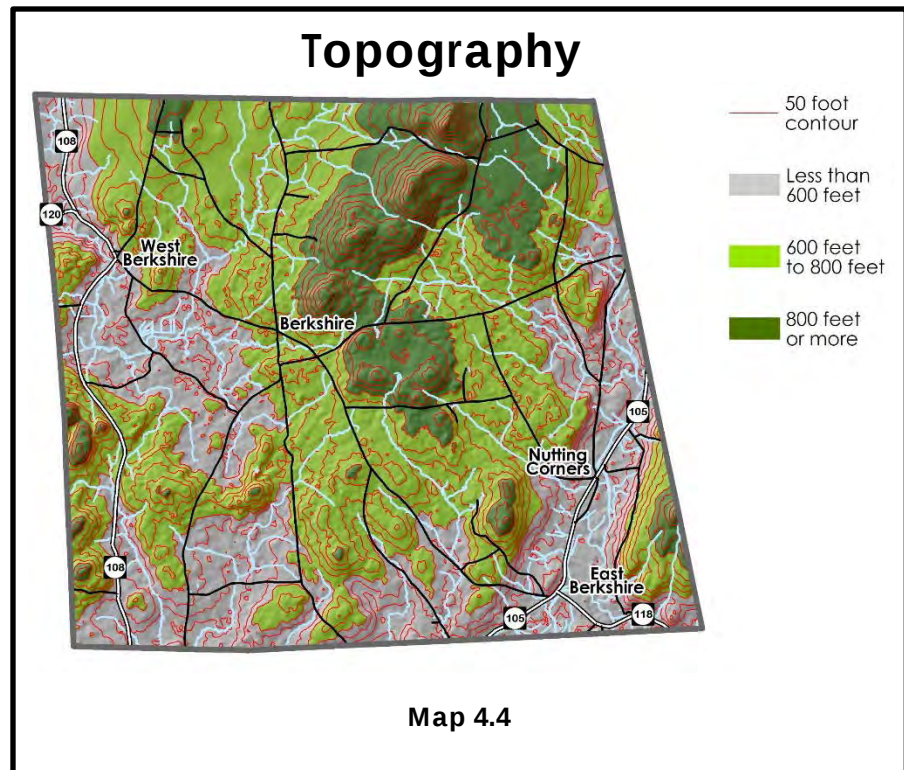
C) NOTABLE MOMENTS IN BERKSHIRE'S HISTORY

First Settlement

The first "European" settlers arrived in Berkshire in 1791 and established farms in the following years. Job L. Barber and Daniel Adams were the first individuals to settle in Berkshire. However, possibly the most influential early settlers of Berkshire were Stephen Royce, Sr. and his son. Stephen Royce, Sr. moved from Franklin, Vermont to Berkshire and established a farm in 1792. Mr. Royce erected the first frame house in Berkshire in 1799, which still stands today in East Berkshire. His son, Stephen Royce, Jr., resided in this same house until his death in 1868. Stephen Royce, Sr. was very active in promoting the organization of the Town of Berkshire in 1794. He was the first representative to the State Assembly from Berkshire in 1796. His son Stephen Royce, Jr. served in the Vermont Supreme Court, the United States circuit and district courts, and he was elected Governor of Vermont in 1854. Following the arrival of these first settlers in 1792, additional settlers moved to Berkshire for the opportunity to establish farms in an area where the soil produced plentiful harvests.

Topography

Because topography provides natural barriers to movement and often influences the accessibility and use of land, topographic information is important in planning for land use, transportation routes, and the location of public services and facilities. A general observation regarding past development is that “grade follows grade.” In other words, graded land uses such as transportation routes, just as water, follow paths of least resistance. It is no coincidence that roads and railways often follow stream and river valleys.



Elevation

Elevations in Berkshire range from around 415 feet above mean sea level (m.s.l.) along the Missisquoi River southwest of East Berkshire, to 1,326 feet atop Ayers Hill near the northern border (Map 4.4). Most development in the Town is located between 450 feet and 750 feet. Areas of high elevation, including ridge and hill tops, are often visible and contribute much to the scenic beauty of the area. The hills in north central Berkshire, including Ayers Hill, have also been identified as probable bedrock aquifer recharge areas. Consequently, ridge and hill tops, and areas over 800 feet in elevation, should be protected from unsightly and potentially harmful development.

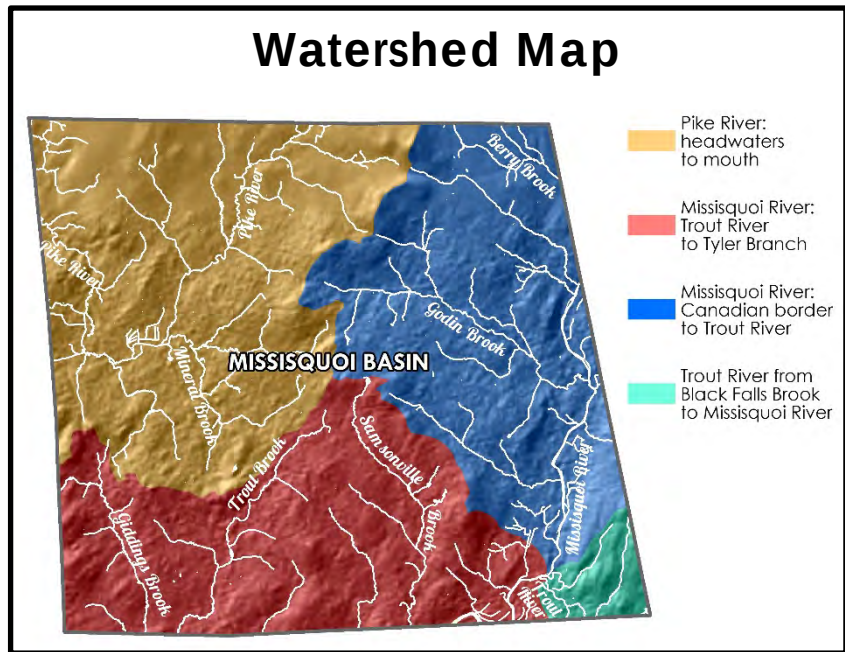
Slope

One of the most important factors controlling the potential use of a given parcel of land is slope. Slope is the inclination, or change in elevation, of land over a horizontal distance, and is often expressed as a percentage (number of feet of vertical rise over 100 feet of horizontal distance). Slopes are an important consideration not only because of the environmental constraints that they impose with regard to drainage and bearing capacity, but also because of the environmental damage that may result from their alteration. Major causes of

Water Resources

Water is to the earth as blood is to the human body. Water is essential to the life of the individual and the community, but too often, its continued availability and purity are taken for granted. Consideration of the quantity and quality of water resources, and the fact that water does not recognize political boundaries in its movement, are basic to the planning process.

This requires some understanding of the way water circulates through the environment (the "hydrologic cycle"), how human actions can modify this cycle, and the possible impact of these modifications on the water supply and the environment.



Map 4.9

Surface Water

Berkshire is located within the Missisquoi Basin (Map 4.9), a network of rivers and streams stretching across northern Vermont and ending in Missisquoi Bay and Lake Champlain. The Missisquoi River and its tributaries drain most of Berkshire. The Missisquoi crosses the southeast corner of Berkshire and flows in a southwesterly direction through Town. A major tributary, the Trout River, flows into the Missisquoi at East Berkshire. Other tributaries include Trout Brook and Giddings Brook in the southwest corner of Town.

The Pike River and its tributaries drain the northwest part of Town into Missisquoi Bay. This river originates in the north central hills of Berkshire, flows southwest where it joins with Mineral Brook, and then flows northward into Franklin where it receives water from Lake Carmi. It then reenters Berkshire and exits at the Canadian border.

The section of the Missisquoi River from the Quebec border at East Richford to its mouth, including the segment in Berkshire, has been identified as an important recreational river for boating and fishing. The 10.5 mile segment through Berkshire has also been cited as an important fishery for natural populations of smallmouth bass, and natural and stocked populations of brown trout. The Trout River into

East Berkshire is also a fishery-- the home of natural populations of brown and rainbow trout (Vermont Rivers Study 1986).

Additionally, after a three year study, the Missisquoi and Trout were officially designated by Congress as National Wild and Scenic Rivers in 2015. This places these two rivers among the Nation's most valued and beautiful rivers that remain in their natural state. Designation as a Wild and Scenic River ensures that about 70 miles of the Missisquoi and Trout Rivers will continue to be protected as natural assets in the area and provides access to grants to support efforts to increase recreational access to these rivers by fisherman, hunters and paddlers. The two rivers are also part of the Northern Forest Canoe Trail, which maps a network of waterways from Canada across Lake Champlain into New York State. The trail is a recreational paddling route that includes lakes, rivers and streams and attracts a variety of visitors.

Water Quality

While water quality is generally good, many rivers and streams in Berkshire have been experiencing water quality issues associated with point and non-point sources of pollution. Historically, "point" sources of pollution, such as the Village of Richford Sewage Treatment Plant, were considered the most significant threats to water quality. However, as state and federal permitting requirements have begun regulating these facilities, the "nonpoint" sources of pollution (i.e., decentralized activities across the landscape that result in pollution, such as farming and development) have come to be recognized as the dominant source of pollution in the watershed. Water quality issues in the rivers and streams in Berkshire are contributing to the water quality issues experienced in Missisquoi Bay and greater Lake Champlain, where they all ultimately flow.

"Stormwater" is a non-point source of pollution that applies to rain and snowmelt that runs off impervious surfaces like roofs, driveways and roads. As it flows into streams and lakes, stormwater runoff often picks up pollutants such as oils, fertilizers and sediment. Excess stormwater also contributes to erosion and increases stream volumes during peak storm events. Berkshire's stormwater drainage system consists of a network of culverts and ditches along the town highway network.

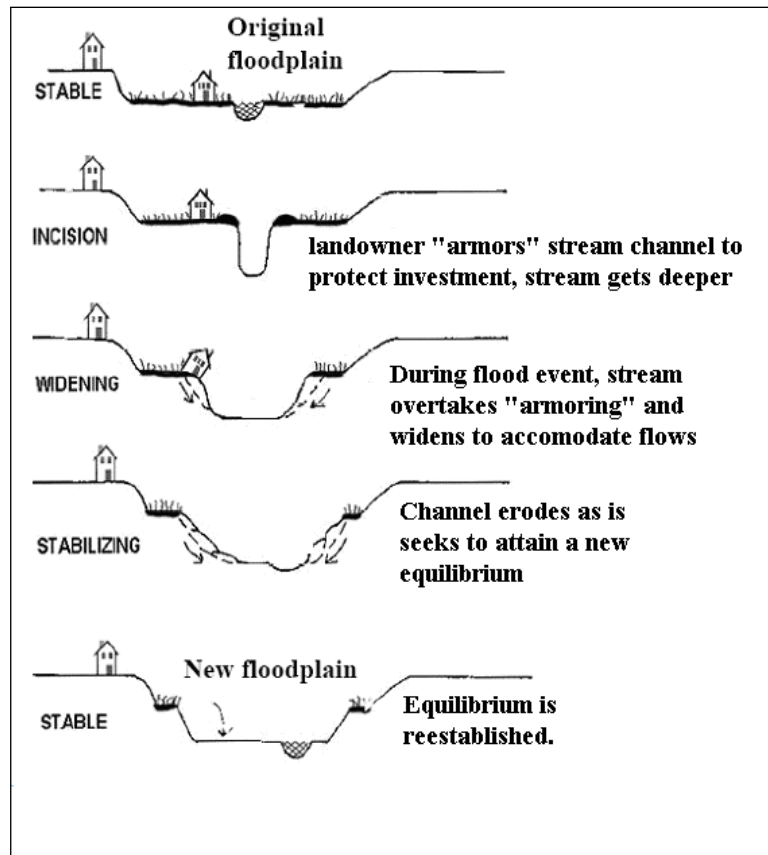
New residential and commercial development in Berkshire is encouraged to implement stormwater mitigation strategies, otherwise known as Low Impact Development (LID). The main aim of LID is to design a site that prevents and minimized environmental degradation. Common LID techniques that mitigate the adverse impacts of stormwater runoff include minimize total land disturbance, reduce the amount of impervious surfaces and protect existing natural areas like forest stands and stream buffers.

Local conservation efforts are taking place around Berkshire's waterways to improve water quality. The Missisquoi River Basin Association (MRBA), a local volunteer organization has formed partnerships with the federal Fish and Wildlife Agency and the Natural Resources Conservation Service to carry out various projects to protect water quality and recreational opportunities throughout the Missisquoi Watershed.

Data has been collected by the Vermont DEC River Management Program about the physical condition of the mainstem of the Missisquoi River, Trout River, and the Pike River. These studies, called stream geomorphic assessments, document a stream's general characteristics, including width, slope, streamside vegetation and streambed materials, as well as issues impacting the stream, including erosion, modifications of the stream channel, the presence of bridges and culverts, etc. This comprehensive information about a river can provide important baseline data from which restoration projects and needs assessments can be determined.

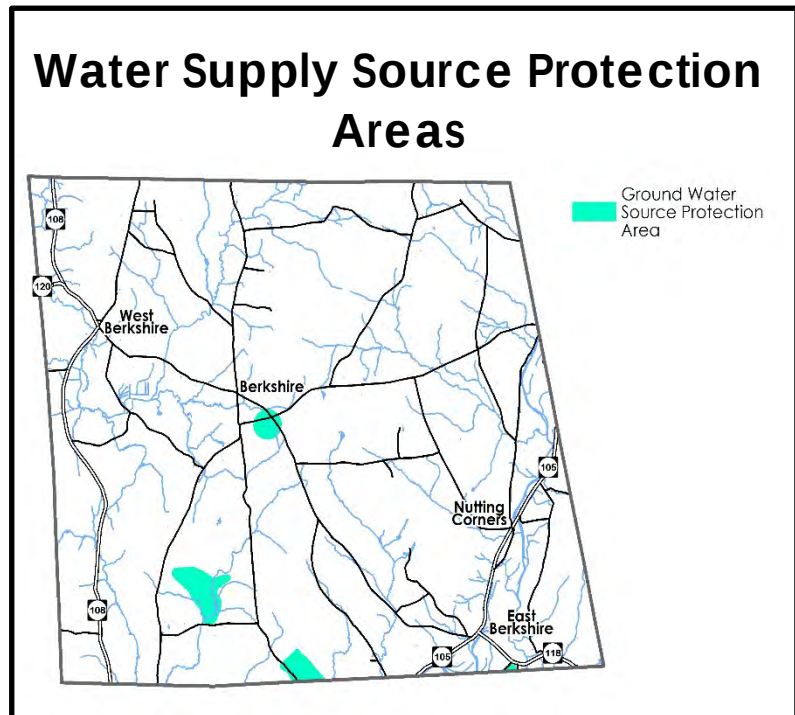
In order to protect local streams, restore equilibrium, and improve water quality, a number of strategies can be employed such as limiting development in the floodplain, maintaining vegetated buffers along stream channels, and properly sizing public and private bridges and culverts. Vegetation along the streambank can help to naturally stabilize the stream, to filter out pollutants before they reach the stream and provides habitat. Berkshire currently requires that new development be setback at least 100 ft from any pond and a setback of at least 100 feet or the width of the mapped River Corridor (whichever is greater) for streams and river for water quality protection.

Figure 4.2. Stream Channel Evolution



can affect the quality and quantity of the ground water supply. Paving large areas of land or pumping too much water can deplete the supply. Leaking septic systems and underground gas tanks, road salt, industrial wastes, and agricultural applications of chemicals are common sources of ground water pollution. Once a ground water system is contaminated, cleaning it up is very expensive and difficult, if not impossible.

The Federal Source Water Protection Program was established to protect groundwater that supplies public drinking water systems. Since 1985, the delineation of Public Water Source Protection Areas (SPA) has been required for all proposed new sources for Public Community Water Systems. This program emphasizes proper management of lands within Source Protection Areas to reduce or restrict potentially contaminating activities. The State also has the Groundwater Protection Rule and Strategy that was adopted in 2005. This provides restrictions, prohibitions, standards, and criteria for a groundwater protection.



Map 4.10

There are four Water Supply Source Protection Areas in Berkshire (See Map 4.10), two of which are protected through local zoning. This plan proposes to add the remaining two ground water source protection areas to the zoning regulations to afford them equal protection as identified on the Proposed Land Use map. The water supplies protected in zoning include the one located on the north side of Reservoir Road associated with two gravel wells that supply the Enosburg Falls Water System and another associated with the water supply for the Dairy Center. It is located on the border of Enosburgh and Berkshire surrounding the Dairy Center on Route 105. The area located on the border of Berkshire and Enosburgh between Perley and Woodward Neighborhood Roads, associated with spring supplying the East Berkshire Water Coop should be protected. Additionally, the groundwater source protection area associated with the Berkshire Elementary School and surrounding the School should also be protected.

Critical Areas

Critical areas, for the purposes of this plan, are defined as natural areas requiring special protection from development. They include areas that have environmental, ecological, educational, and/or scenic value, such as wetlands, shorelands, flood hazard areas, important wildlife, and endangered or threatened species habitats, and other areas of biological, hydrological, or geological significance.

Wetlands

Four large wetland areas are located in Berkshire (see Map 4.11, page 43). Two are located along the Pike River and Mineral Brook, another is found on the south side of the Berkshire-Richford Road near Lost Nation Road, and the fourth is located east of Lost Nation Road. Wetland areas are defined by the state as “those areas ... that are inundated by surface or ground water with a frequency sufficient to support vegetation or aquatic life that depend on saturated or seasonally saturated soil conditions for growth and reproduction” (10 V.S.A. 902). This definition includes but is not limited to marshes, swamps, sloughs, potholes, fens, river and lake overflows, mud flats, bogs, and ponds.

Wetlands are indispensable but fragile natural resources. They are important for a variety of reasons. They provide temporary storage for floodwaters and thereby reduce flooding and protect the quality and quantity of ground water. They improve surface water quality by storing organics, chemically breaking down or removing pollutants, and filtering eroded sediments. They provide spawning and feeding habitat for fish and other aquatic life, and a wide diversity of habitat for other wildlife, including waterfowl, birds, mammals, furbearers, amphibians, and reptiles. Wetlands also provide habitat that may be critical for the survival of rare, threatened, or endangered species, valuable resources for education and research in the natural sciences, and a diversity of recreational opportunities and economic benefits. Finally, wetlands contribute to community open space, and the overall beauty of the landscape.

The U. S. Fish and Wildlife Service, using color infrared aerial photography, identified nearly 200 smaller wetland areas scattered throughout Berkshire. These are located on National Wetlands Inventory Maps. Most of these wetlands are small marshy (palustrine) areas, characterized by open water, emergent plant growth (e.g., aquatic plants), forested cover, or shrub and scrub growth.

Unique and Fragile Areas

Unique or fragile areas are landscape features other than those already defined that have scientific and/or educational value. In Berkshire, these include three unique geologic features described as follows:

Ayers Hill

This is a singularly unique area of 400 acres on Ayers Hill where the volcanic lava flows and volcanic bombs of the Tibbit Hill formation are readily apparent. Currently, it is in private ownership and is in need of protection. This site is considered to be of state significance for its educational, scientific, and scenic value.

Berkshire Copper Mine

The Berkshire Copper Mine is a 10-acre site associated with the old copper mine that is now considered an important mineral collection area. It is also in private ownership and in need of protection. The site is considered to be of state significance because of its historical, educational, and scientific value.

Berkshire Kettle Hole

The Berkshire Kettle Hole is a well-preserved glacial feature, known as a kettle hole, which formed when a chunk of buried glacial ice melted and left a hollow or depression in the landscape. The Berkshire Kettle Hole is located on a three-acre site southwest of the hamlet of Berkshire. The kettle hole is in private ownership and in need of protection. As a glacial feature, it is considered locally significant.

Because of their significance, these areas should be protected from any type of development that would affect their character, value, and integrity. Controlled public access, in cooperation with private landowners, should be encouraged for educational and scientific pursuits.

The Town has not officially identified specific viewsheds as scenic resources. The Planning Commission recognizes that conducting a scenic resource inventory is a future action that can inform the next plan update. This inventory can inform opportunities such as road pull-offs to enjoy these resources and ways to protect them.

B) HISTORIC LEGACIES

Historic Districts and Structures

Berkshire contains four historic districts and 75 historic buildings and farms, as identified in a survey conducted by the Vermont Division for Historic Preservation in 1983. The four designated historic districts include the three hamlets-- the West

GOALS AND POLICIES: THE SENSE OF PLACE

- GOAL 1:** To protect in good quality the abundant natural and historic resources in Berkshire.
- GOAL 2:** To support the continuation of agriculture and forestry, which contribute to the rural character and sense of place in Berkshire.
- GOAL 3:** To protect the citizens, property and economy of Berkshire and the quality of their rivers as natural and recreational resources by using sound planning practices within designated Flood Hazard Areas and river corridors.

Policies:

- 1) Local climatic and weather conditions, and impacts on local air quality, should be considered in planning for suitable use of the land.
- 2) Regional, state, national, and international efforts to improve and protect environmental quality shall be supported at the local level.
- 3) Development shall be sited to avoid significant geologic features, and to permit future extraction of economically viable sand and gravel deposits.
- 4) New residential and commercial development in Berkshire is encouraged to implement stormwater mitigation strategies, otherwise known as Low Impact Development.
- 5) Intensive land development, including structures, shall be discouraged on slopes greater than 25% and as much vegetative cover as possible shall be maintained.
- 6) To maintain or improve the quality of land through the consideration of soil characteristics in determining its capability for development.
- 7) Development within agricultural and forested areas shall be discouraged on primary agricultural or forestry soils.
- 8) Any development activity that degrades surface and/or ground water quality shall be discouraged.
- 9) Streams, rivers, ponds, and wetlands shall be maintained in their natural

state, and be protected from pollution through appropriate health and land use regulations. Local regulations shall provide buffer areas to maintain the environmental, recreational, and scenic value of water courses, water bodies, and shorelines.

- 10) Development within close proximity of streams and rivers shall be compatible with the natural beauty of the area, shall protect existing vegetation, shall be set back sufficiently to prevent erosion along stream-banks or pollution from subsurface sewage disposal systems, and where possible shall retain visual and physical access to the water bodies.
- 11) Development shall be carefully sited in areas with a depth to ground water of two feet or less, or in ground water Source Protection Areas.
- 12) Fragile and sensitive resources, and endangered species, including but not limited to critical habitat, wetlands, and significant natural communities, shall be protected from adverse impacts.
- 13) Forestry and agricultural operations should be conducted in accordance with the Acceptable Management Practices and Required Agricultural Practices for maintaining water quality and to comply with the Vermont Water Quality Standards.
- 14) Prohibit land development resulting in the loss of wetland storage capacity or additions to the marsh areas of any substances which are likely to increase the concentration of materials beyond the assimilative capacities.
- 15) The public acquisition of land, development rights, or conservation easements shall be considered where appropriate to ensure long-term protection of particularly important critical areas and maintain open space.
- 16) Encourage the protection and restoration of floodplains and upland forested areas that attenuate and moderate flooding and fluvial erosion.
- 17) Utilize River Corridors as defined by VT DEC to discourage future development in high risk areas for flooding or erosion hazards.
- 18) Maintain standards higher than the NFIP minimum for land development in the Special Flood Hazard Area and restrict uses to agriculture, recreational and open space in order to increase public safety and reduce future damages.
- 19) Incorporate mitigation measures when developing improvements or

expansion to municipal infrastructure.

20) Promote emergency planning for flood response.

21) Maintain the identified historic, cultural, and scenic resources, including the historic sites, landscape features, and archaeological sensitive areas.

22) Development, which would adversely affect historical resources, including destruction or alteration, isolation from or alteration of immediate surroundings, or the introduction of disharmonious visual, audible, or atmospheric elements, shall be discouraged.

23) Rehabilitation of significant historic sites and structures shall be encouraged; and adaptive use of historic structures shall be emphasized whenever it is economically feasible.

24) Public uses and/or ownership shall be sought to preserve historic sites and structures that are particularly significant to the community.

25) Promote the Current Use Program to better manage and conserve agricultural lands.

26) Conduct an inventory of forestland, natural resource features and existing development to aid in the evaluation of the current land use district's effectiveness in meeting the Town's goals.

27) Coordinate the preservation of forestland, agricultural land, and open space throughout the Town to create connected corridors of undeveloped land.

GOALS AND POLICIES: EARNING A LIVING

GOAL 1: Promote a balanced, diverse economic base, with a focus on locally owned enterprises.

Policies:

- 1) To encourage that agricultural and forest land be maintained for viable economic use, encourage value added business, promote locally grown products, and encourage the implementation of agricultural/forestry best management practices.
- 2) Diversification of the economic base, including the development of compatible businesses and light industry, and the promotion of home occupations should be encouraged.
- 3) Economic development should be pursued to provide maximum economic benefit with minimal environmental impact.
- 4) To promote opportunities for increased communications infrastructure, such as broadband internet access, cell phone service, DSL and the like while ensuring that infrastructure to develop these opportunities maintains the rural character and does not impact scenic resources.

ENHANCED ENERGY PLANNING

A) ENHANCED ENERGY PLAN

The intent of this section is to meet the municipal determination standards for enhanced energy planning enabled in 24 V.S.A. 4352. The purpose of enhanced energy planning is to further local, regional, and state energy goals, including the goal of having 90% of energy used in Vermont come from renewable sources by 2050 (90 x 50 goal), and the following:

- A. Vermont's greenhouse gas reduction goals under 10 V.S.A. § 578(a);*
- B. Vermont's 25 by 25 goal for renewable energy under 10 V.S.A. § 580;*
- C. Vermont's building efficiency goals under 10 V.S.A. § 581;*
- D. State energy policy under 30 V.S.A. § 202a and the recommendations for regional and municipal energy 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 (State energy plans); and*
- E. 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.*

A positive determination of compliance with the requirements of enhanced energy planning, as provided by the Regional Planning Commission, will enable Berkshire to achieve “substantial deference” instead of “due consideration” in Certificate of Public Good (CPG) proceedings for energy generation facilities (ex. wind facilities, solar facilities, hydro facilities, etc.) under Criteria (b)(1)-Orderly Development. In short, this means that Berkshire will have a greater “say” in CPG proceedings before the Vermont Public Utility Commission about where these facilities should or should not be located in the community.

To receive a positive determination of energy compliance, an enhanced energy plan must be duly adopted, regionally approved, and contain the following information:

- A. An analysis of current energy resources, needs, scarcities, costs, and problems.*
- B. Targets for future energy use and generation.*
- C. “Pathways,” or implementation actions, to help the municipality achieve the established targets.*
- D. Mapping to help guide the conversation about the siting of renewables.*

B) ENERGY RESOURCES, NEEDS, SCARCITIES, COSTS AND PROBLEMS

The following subsection reviews each sector of energy use (thermal, transportation, electricity) and electricity generation in Berkshire. Several different units of measurement are used in this section. Please refer to Table 8.13 for more information about unit conversions.

Thermal Energy

Table 8.1 shows an estimate of current residential thermal energy demand in Berkshire, based on data from the American Community Survey (ACS 2011-2015). The data shows that 55.3% of household in in Berkshire depend on fuel oil as their primary source for home heating and 33.2% depend on wood. Wood includes both cord wood and wood pellets. Fuel oil and wood sources combined are estimated to be the primary heating source for 88.5% of homes in Berkshire. The remainder of homes heat primarily with propane. The nearest natural gas pipeline is located in Enosburg Falls and is not likely to be extended to Berkshire in the future.

Table 8.1 - Current Berkshire Residential Thermal Energy Use				
Fuel Source	Berkshire Households (ACS 2011-2015)	Berkshire % of Households	Berkshire - Households Square Footage Heated	Municipal Thermal Energy Use in British Thermal Units (BTUs) BTU (in Billions)
Natural Gas	2	0.3%	3,808	0
Propane	46	7.9%	77,728	5
Electricity	0	0.0%	0	0
Fuel Oil	320	55.3%	557,184	33
Coal	0	0.0%	0	0
Wood	192	33.2%	356,416	21
Solar	0	0.0%	0	0
Other	19	3.3%	36,176	2
No Fuel	0	0.0%	0	0
Total	579	100.0%	1,031,312	62

Estimates for commercial and industrial thermal energy use are more difficult to calculate due to the lack of accurate information available. Table 8.2 provides an estimate of total commercial energy use (thermal and electricity). The estimate is based on data from the Vermont Department of Labor (VT DOL) and the Vermont Department of Public Service (VT DPS). According to NRPC, it is assumed that the majority of this energy use, 6 billion BTUs per year, is used as thermal energy for commercial uses.

Table 8.4 – Current Berkshire Transportation Energy Use	
Transportation Data	Municipal Data
Total # of Passenger Vehicles (ACS 2011-2015)	1,213
Average Miles per Vehicle (VTrans)	11,356
Total Miles Traveled	13,774,828
Realized MPG (2013 - VTrans 2015 Energy Profile)	18.6
Total Gallons Use per Year	740,582
Transportation BTUs (Billion)	89
Average Cost per Gallon of Gasoline in 2016 (NRPC)	\$2.31
Gasoline Cost per Year	\$1,710,745

Transportation

Table 8.4 contains an estimate of transportation energy use in Berkshire. NRPC estimates that Berkshire residents drive personal vehicles approximately 13.7 million miles per year and spend about \$1.7 million on transportation fuel expenses per year. This calculation does not include expenses for commercially owned and operated vehicles.

It is difficult to track electric and hybrid vehicle registrations in Berkshire. This is because vehicle registrations with the Vermont Department of Motor Vehicles are based on zip codes and there are three zip codes that cover the Town of Berkshire. It is unknown how many electric

vehicles are currently registered in Berkshire.

Table 8.5 – Existing Renewable Electricity Generation		
Generation Type	MW	MWh
Solar	0.07	85.85
Wind	0.01	29.13
Hydro	0.00	0.00
Biomass	0.60	2454.55
Other	0.00	0.00
Total Existing Generation	0.68	2569.53

Electricity Generation

There is currently .68 MW of electricity generation capacity from renewable generation facilities located in Berkshire. This capacity results in approximately 2,569.53 MWh of electricity generation per year. The amount of electricity generation in Berkshire is roughly equal to the annual electricity use of about 383 households in Vermont based on information available from the U.S. Energy Information Administration (6696 kWh per VT household per year).

Table 8.5 organizes information about existing generation in Berkshire by type of facility. Map 8.3 shows the location of all electricity generators in Berkshire with a capacity greater than 15 kW. A full list of electricity generators in Berkshire can be found at the end of this section (Table 8.12).

Berkshire has relatively good access to electric transmission and three-phase distribution lines. These types of lines are used to transmit large quantities of electricity and are needed to serve large industrial users and commercial centers. The relatively good access to this type of infrastructure in Berkshire may make development of renewable energy facilities easier and more cost-effective than in other surrounding communities with more existing grid infrastructure.

Map 8.2 shows the electricity transmission and three-phase distribution infrastructure in Berkshire. The map shows a three-phase distribution line in the town along Richford Rd, King Rd. and VT Route 118. There is also a three-phase distribution line that serves West Berkshire. Two larger transmission lines exist parallel to VT Route 105 and another provides service to West Berkshire via Franklin. Access to renewable generation resources, such as solar and wind, will be addressed below in the mapping section.

C) TARGETS FOR USE AND GENERATION

The second required element of an enhanced energy plan is creation of targets for future energy use. Northwest Regional Planning Commission worked with the Vermont Energy Investment Corporation (VEIC) and the Vermont Department of Public Service in 2016 to develop regional targets for future energy use and renewable electricity generation to meet the State of Vermont's 90 x 50 goal. The targets represent only one scenario that would meet this goal. There may be many different ways that would also enable Vermont to achieve the 90 x 50 goal. For more information about the regional targets, please see the Northwest Regional Energy Plan (www.nrpcvt.com).

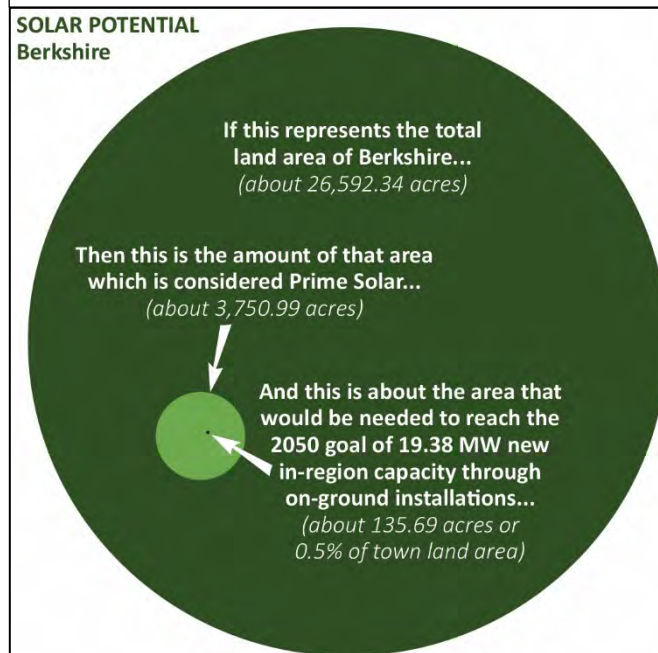
Regional targets for energy use and renewable electricity generation were disaggregated to create municipal targets. These municipal targets were also designed to ensure compliance with the Department of Public Service's Municipal Determination Standards. Tables 8.6, 8.7 and 8.8 show the targets for future energy use for Berkshire by sector (totals are cumulative).

One thermal target for Berkshire in 2050 is to have 88.9% of structures be heated by renewable energy sources. Much of this transition is likely to come from conversion to electric heat pumps as the primary heating source for single family homes as the technology becomes more readily available and affordable. Regionally, the target also relies on wood heating being a continued source of residential heating. However, Berkshire does not have a high target for new efficient wood heat systems. This is due primarily to the high proportion of existing households in Berkshire that already use wood heating systems. Although there is small target (4), Berkshire strongly encourages residents' conversion of existing wood heating systems to more advanced wood heating systems. Newer wood heating systems are more efficient and have less greenhouse gas emissions than

Table 8.9 shows the electricity generation targets for new electricity generation in Berkshire in 2025, 2035, and 2050. All new wind, solar, hydro, and biomass electricity generation sites will further progress towards achieving the generation targets (in MWh). Given the difficulty of developing additional hydro generation, and the constraints upon wind development, it is likely that solar generation will need to be a substantial component of meeting these generation targets. Meeting the generation targets will take considerable effort over the next 30 to 35 years. The 2050 generation target (26,685.43 MWh) is about 10 times more than the current generation capacity (2569 MWh) within the Town of Berkshire.

Table 8.9 – Renewable Electricity Generation Targets			
Renewable Generation Targets	2025	2035	2050
Total Renewable Generation Target (in MWh)	8,806.19	17,612.39	26,685.43

Table 8.10 - Renewable Electricity Generation Potential		
Resource	MW	MWh
Rooftop Solar	1	759
Ground-mounted Solar	1,056	1,294,707
Wind	22	67,567
Hydro	0.004	14
Biomass and Methane	0	0
Other	0	0
Total Renewable Generation Potential	1,078	1,363,047

Figure 8.1 – Ground Mounted Solar Potential

Based on mapping and calculations completed by NRPC, Berkshire has sufficient land to meet the above electricity generation targets. Berkshire has access to the renewable electricity generation capacity outlined in Table 8.10. This estimate shows that Berkshire has considerably more potential for renewable electricity generation than what is needed to meet the renewable electricity generation targets in Table 8.9. This generation capacity was calculated using the “base” layers for solar and wind. For an explanation of what constitutes a “base” layer, please see the mapping subsection below.

Berkshire supports NRPC’s position regarding “commercial” and

“industrial” wind facilities. The NRPC Regional Plan finds that the construction of new “industrial” or “commercial” wind facilities within the region does not conform to the Regional Plan (NRPC considers any wind facility with a tower height (excluding blades) in excess of 100 feet tall to be considered an “industrial” or “commercial” wind facility).

Energy potential from biomass and methane sources is not estimated. This is due to a variety of factors including insufficient information on which to create estimates. Berkshire encourages the use of these sources for electricity and thermal energy generation, especially on farms.

D) TARGETS FOR USE AND GENERATION

The third required element of an enhanced energy plan is the inclusion of maps that will provide guidance to the community and developers regarding the location of new renewable generation facilities. **Berkshire has incorporated maps provided by NRPC.** These maps show data as required by the Department of Public Service Municipal Determination Standards, including access to energy resources and constraints to renewable development. All maps may be found at the end of this section.

The intent of the maps is to generally show those areas that may be good locations, or may be inappropriate locations, for future renewable electricity

generation facilities. However, it is important to note that the maps are a planning tool and do not precisely indicate locations where siting a facility is necessarily acceptable. When an electricity generation facility is proposed, the presence of all natural resources constraints on site shall be verified as a part of the application.

Mapping Methodology

Spatial data showing the location of energy resources formed the basis of the maps developed by NRPC. This is the data that shows where there is solar, wind, hydro, and biomass “potential” in Berkshire based on information provided by the Vermont Sustainable Jobs Fund. “Known” and “possible” constraints were subsequently identified on the maps. Known constraints are conservation resources that shall be protected from all future development of renewable electricity generation facilities. Possible constraints are conservation resources that shall be protected, to some extent, from the development of renewable generation facilities. The presence of possible constraints on land does not necessarily impede the siting of renewable generation facilities on a site. Siting in these locations could occur if impacts to the affected possible constraints are mitigated, preferably on-site.

A full list of known and possible constraints included on the maps is located in Table 8.11. The known constraints and possible constraints used to create the maps include constraints that are required per the Municipal Determination Standards from the Department of Public Service and regional constraints selected by NRPC.

Solar and Wind

The solar and wind maps show both “base” and “prime” areas. Base areas are areas with electricity generation potential, yet may contain possible constraints. Prime areas are areas that have electricity generation potential that do not contain known or possible constraints. Areas that do not contain electricity generation potential, and areas that contain a known constraint, are shown as white space on the map.

The solar map indicates abundant base and prime solar areas in Berkshire including several areas near transmission and distribution lines. The following preferred locations for solar generation facilities by the Town of Berkshire: rooftops, parking lots, and landfills. Brownfield sites located outside of the village areas of West Berkshire, Berkshire, and East Berkshire are also considered preferred locations.

Berkshire has a strong preference for solar facilities that have less than 5 MW in generation capacity. This preference is a reflection of the community’s

dedication to preserving the aesthetic and rural qualities of Berkshire by restricting the geographic size of solar facilities. In addition, Berkshire prefers that solar facilities greater than 149 kW in generation capacity to be sufficiently separated from other similarly sized solar facilities to “break up” the visual impact of two or more solar facilities located next to each other and to preserve Berkshire’s rural character. All solar facilities to be sited in Berkshire shall include proper screening.

There generally isn’t much land available in Berkshire that has base and prime wind resources. The small areas that do exist are generally concentrated in the central Berkshire along Hammond Road.

Hydro and Biomass

The biomass map is somewhat similar to the solar and wind maps. The biomass map also displays “base” and “prime” areas. However, these categories are not necessarily indicative of electricity generation potential. They instead indicate areas of contiguous forest that may be used for the harvesting of woody biomass for use in either thermal or electric generation.

The hydro map is unique from the other types of generation maps. It shows existing dam sites used for electricity generation. It also shows existing dam sites that are not used for electricity generation, but could be retrofitted to provide electricity generation capacity. Data about these dams comes from a study commissioned by the Vermont Agency of Natural Resources. The hydro map also shows some known and possible constraints that could impact the redevelopment of some dam sites. Berkshire has one existing dam site that could be retrofitted to generate electricity, but redevelopment of the site, or the development of a new dam, is extremely unlikely due to Berkshire’s upland location and the extensive regulatory process involved in developing new dams.

E) CONCLUSION

Achieving the 90 x 50 goal, and the other energy goals in state statute, will be difficult. Berkshire is committed to playing its part in working towards accomplishing these goals and in creating a more sustainable, affordable, and secure energy future.

GOALS AND POLICIES: ENHANCED ENERGY PLAN

- GOAL 1:** Plan for increased electric demand with the support of local electric utilities and Efficiency Vermont.
- GOAL 2:** Reduce annual fuel needs and fuel costs for heating structures, to foster the transition from non-renewable fuel sources to renewable fuel sources, and to maximize the weatherization of residential households and commercial establishments.
- GOAL 3:** Hold vehicle miles traveled per capita to 2011 levels through reducing the amount of single occupancy vehicle (SOV) commute trips and developing public transit ridership.
- GOAL 4:** Focus growth within and adjacent to the villages.

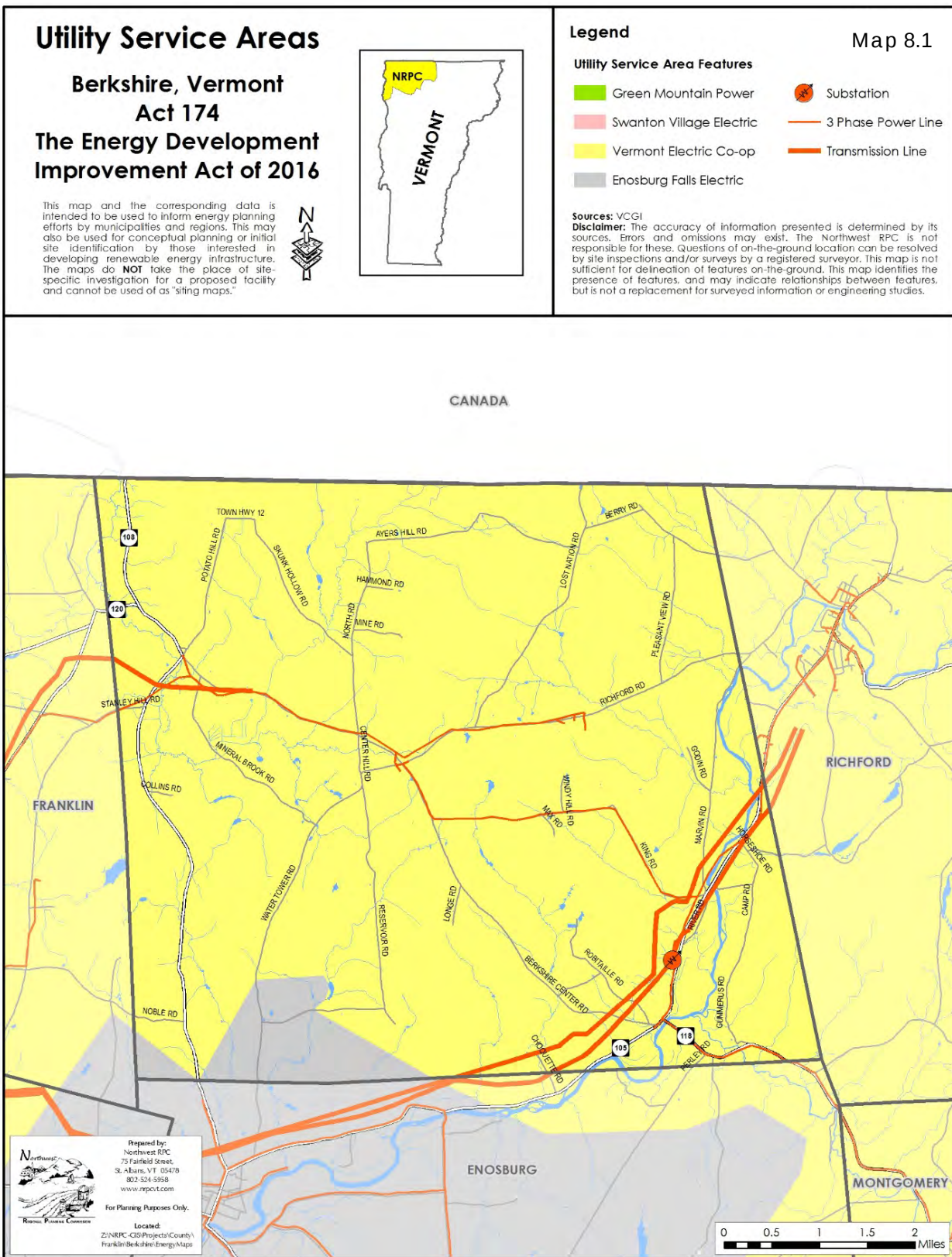
Policies:

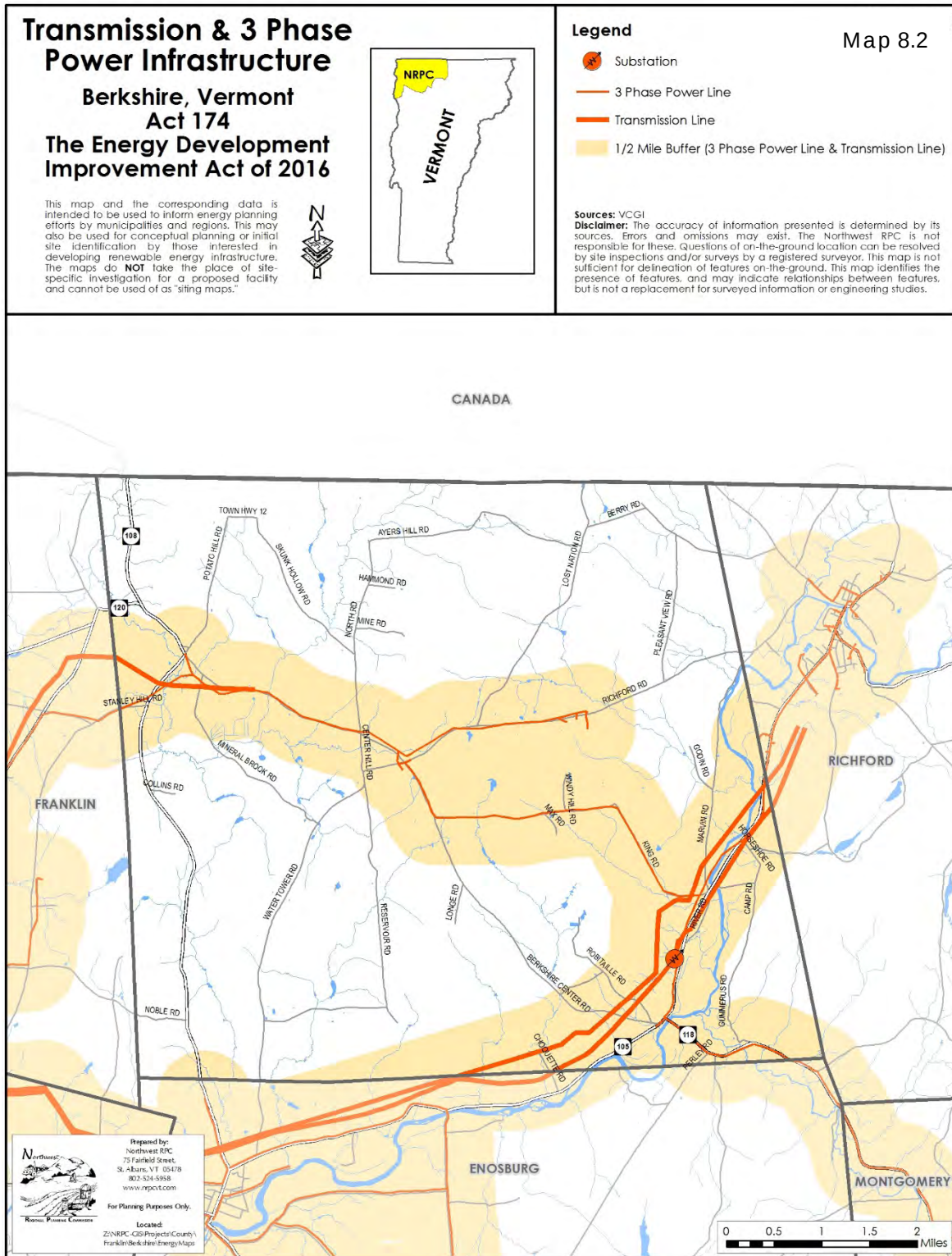
- 1) Berkshire supports energy conservation efforts and the efficient use of energy across all sectors.
- 2) Berkshire supports the reduction of transportation energy demand, reduction of single-occupancy vehicle use, and the transition to renewable and lower-emission energy sources for transportation.
- 3) Berkshire supports patterns and densities of concentrated development that result in the conservation of energy. This includes support of public transit connections from Berkshire to other parts of the region.
- 4) Berkshire supports the development and siting of renewable electricity generation resources in the Town that are in conformance with the goals, strategies, and mapping outlined in this plan. Development of electricity generation in identified preferred locations shall be favored over the development of other sites.
- 5) Berkshire supports the conversion of fossil fuel heating to advanced wood heating systems or electric heat pumps.
- 6) Berkshire supports local farms and the local food system.

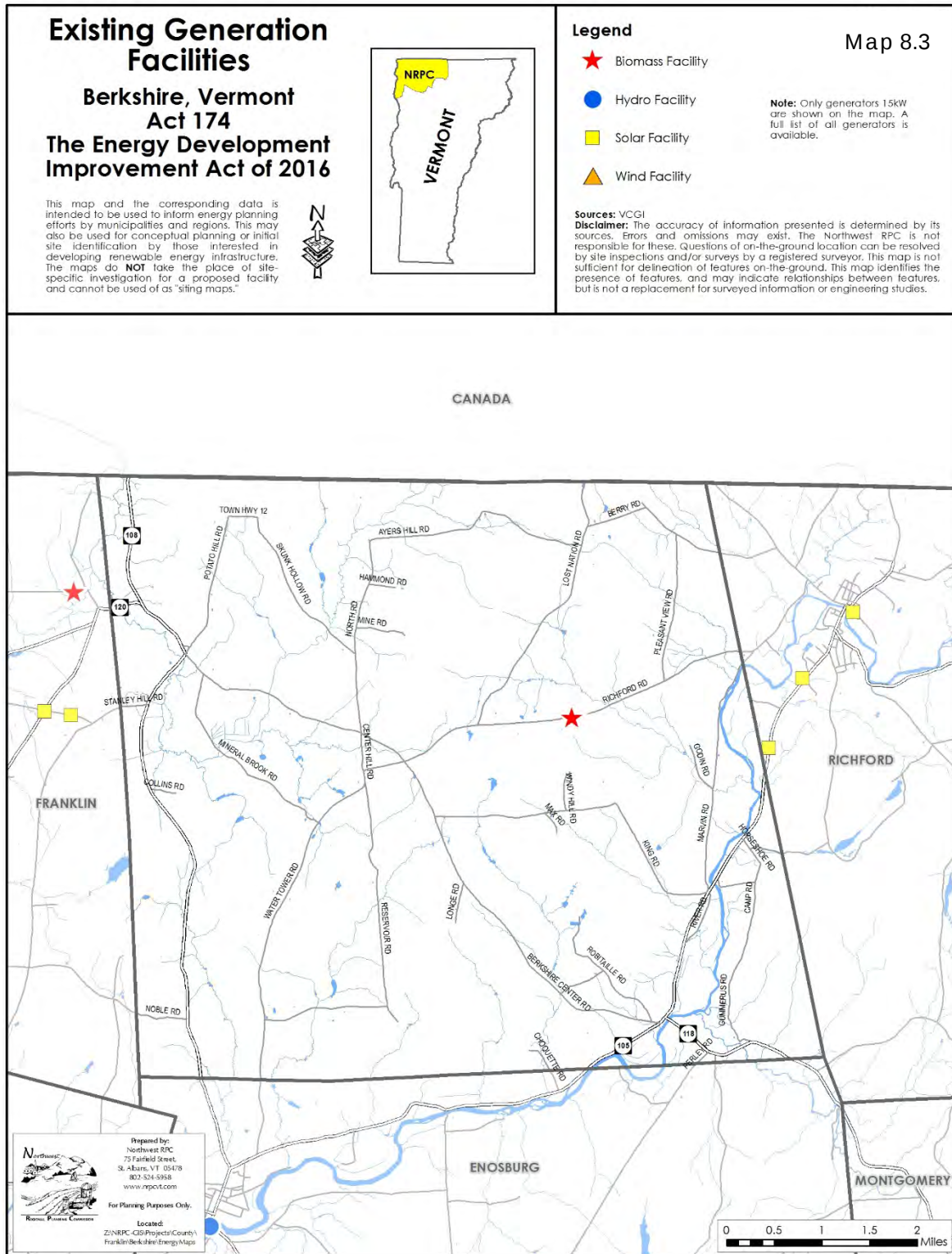
Table 8.11 – Mapping Constraints		
Solar, Wind and Biomass Maps - Known Constraints		
Constraint	Description	Source
Confirmed and unconfirmed vernal pools	There is a 600-foot buffer around confirmed or unconfirmed vernal pools.	ANR
State Significant Natural Communities and Rare, Threatened, and Endangered Species	Rankings S1 through S3 were used as constraints. These include all of the rare and uncommon rankings within the file. For more information on the specific rankings, explore the methodology for the shapefile.	VCGI
River corridors	Only mapped River Corridors were mapped. Does not include 50 foot buffer for streams with a drainage area less than 2 square miles.	VCGI
National wilderness areas		VCGI
FEMA Floodways		VCGI/NRPC
Class 1 and Class 2 Wetlands		VCGI
Designated Downtowns, Designated Growth Centers, and Designated Village Centers	These areas are the center of dense, traditional development in the region. This constraint does not apply to roof-mounted solar within such designated areas. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan.	NRPC
FEMA Flood Insurance Rate Map (FIRM) special flood hazard areas	Special flood hazard areas as digitized by the NRPC were used (just the 100-year flood plain -500-year floodplain not mapped). The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan.	NRPC
Ground and surface waters drinking protection areas	Buffered Source Protection Areas (SPAs) are designated by the Vermont Department of Environmental Conservation (DEC). SPA boundaries are approximate but are conservative enough to capture the areas most susceptible to contamination. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan.	ANR

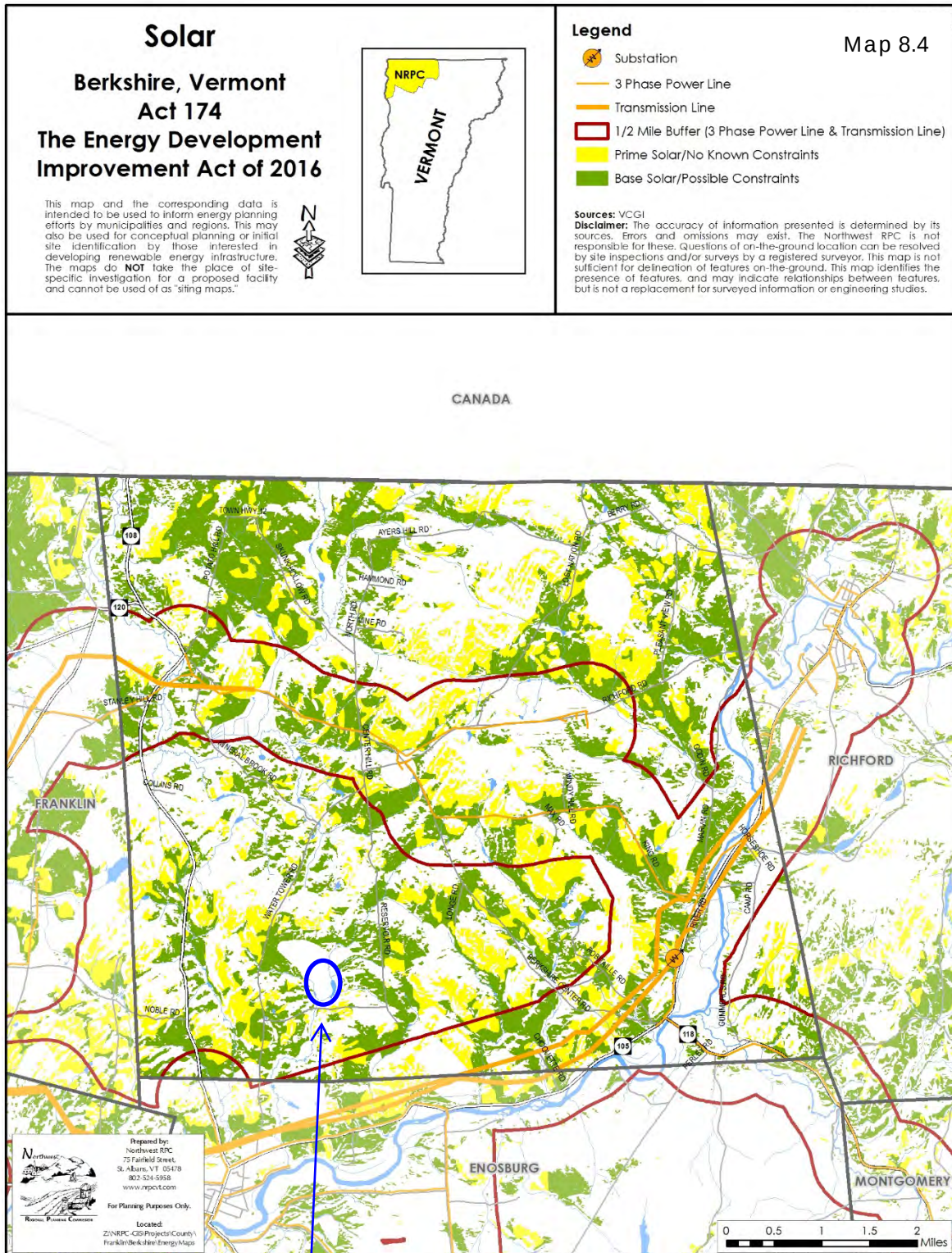
Vermont Conservation Design Highest Priority Forest Blocks	The lands and waters identified here are the areas of the state that are of highest priority for maintaining ecological integrity. Together, these lands comprise a connected landscape of large and intact forested habitat, healthy aquatic and riparian systems, and a full range of physical features (bedrock, soils, elevation, slope, and aspect) on which plant and animal natural communities depend. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan. (Source: ANR)	ANR
Public water sources	A 200-foot buffer is used around public drinking water wellheads. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan.	ANR
Municipal Conservation Land Use Areas	Conservation Land Use Districts, as designated in municipal plans, that include strict language that strongly deters or prohibits development have been included as a regional known constraint. The inclusion of this resource as a regional constraint is consistent with the goals and policies of the Northwest Regional Plan. Specific municipal land use districts included are outlined in Section D of the Regional Energy Plan. No areas identified in the Berkshire Town Plan were included in this category.	NRPC
<u>Solar, Wind and Biomass Maps - Possible Constraints</u>		
Constraint	Description	Source
Protected lands	This constraint includes public lands held by agencies with conservation or natural resource oriented missions, municipal natural resource holdings (ex. Town forests), public boating and fishing access areas, public and private educational institution holdings with natural resource uses and protections, publicly owned rights on private lands, parcels owned in fee by non-profit organizations dedicated to conserving land or resources, and private parcels with conservation easements	VCGI

	held by non-profit organizations.	
Deer wintering areas	Deer wintering habitat as identified by the Vermont Agency of Natural Resources.	ANR
Hydric soils	Hydric soils as identified by the US Department of Agriculture.	VCGI
Agricultural soils	Local, statewide, and prime agricultural soils are considered.	VCGI
Act 250 Agricultural Soil Mitigation Areas	Sites conserved as a condition of an Act 250 permit.	VCGI
Class 3 wetlands	Class 3 wetlands in the region have been included as a Regional Possible Constraint. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan.	ANR
Municipal Conservation Land Use Areas	Conservation Land Use Districts, as designated in municipal plans, that include strict language that deters, but does not prohibit development, have been included as a regional possible constraint. Specific municipal land use districts included are outlined in Section D of the Regional Energy Plan. No areas identified in the Berkshire Town Plan were included in this category.	NRPC
<u>Hydro Map - Known Constraints</u>		
Constraint	Description	Source
None		
<u>Hydro Map - Possible Constraints</u>		
Constraint	Description	Source
"303d" list of stressed waters		ANR
Impaired waters		ANR
State Significant Natural Communities and Rare, Threatened, and Endangered Species	Rankings S1 through S3 were used as constraints. These include all of the rare and uncommon rankings within the file. For more information on the specific rankings, explore the methodology for the shapefile.	VCGI







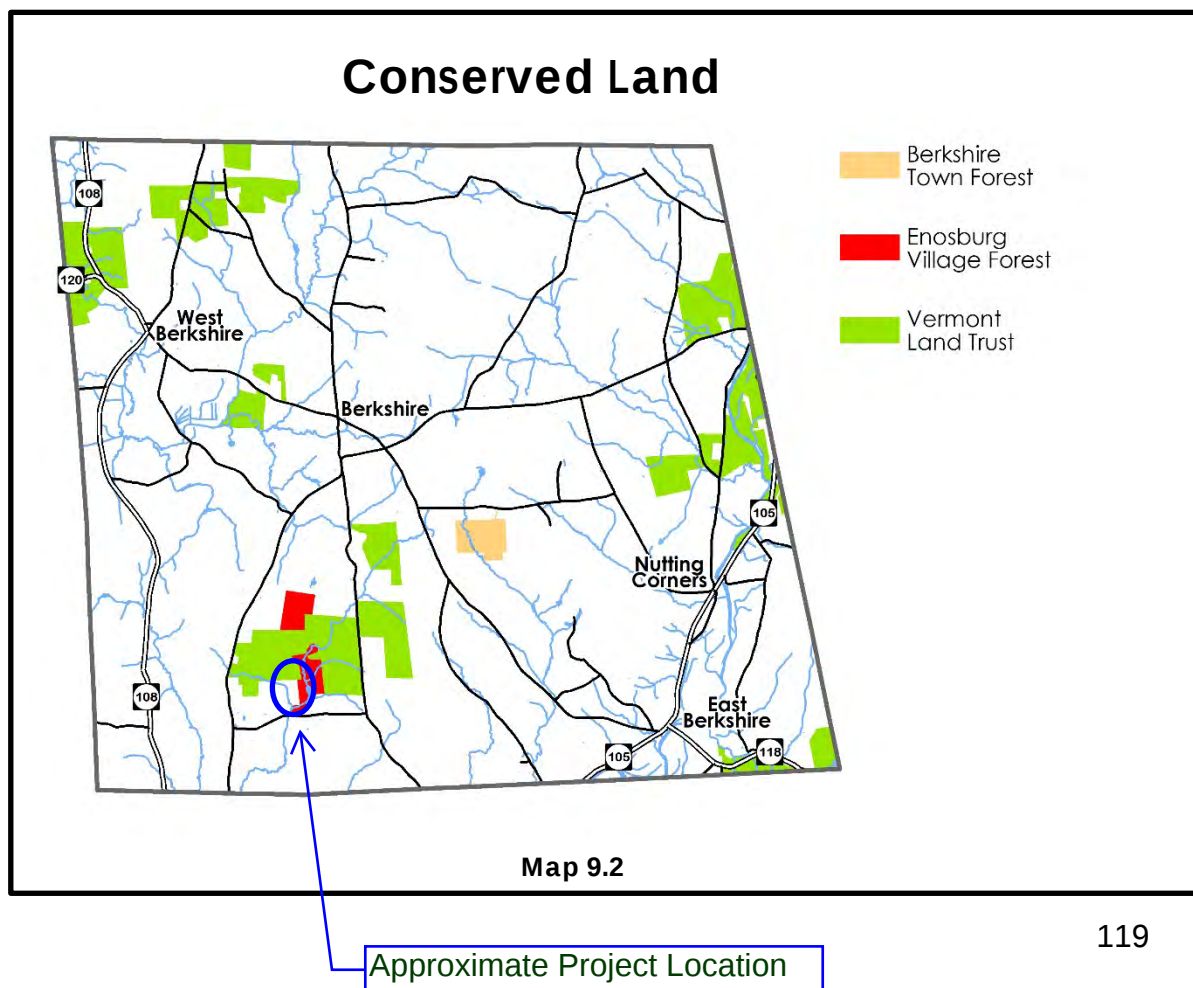


Approximate Project Location

Forest Land

At one time, before clearing began for agriculture, Berkshire was covered by mature hardwood and softwood forests. As of 2003, forest or woodland made up roughly 40 percent of total land area in Berkshire. Most of this acreage is found on the ridges and hilltops of north central Berkshire, and on other areas of steep slope or wet soil scattered throughout the Town. Little of this land is suitable for higher density development.

All of the forested land in Berkshire, except for that in the Berkshire and Enosburgh Town forests, is privately owned (see Map 9.2 for location of Town forests). As noted earlier, many of the forested soils in Berkshire are considered highly productive (Type I and Type II) soils for forest growth, although timber stands would have to be properly nurtured and managed for commercial use. Many landowners now manage their woodlots on a much smaller scale for private use. All forestland owners are encouraged by the State to adopt Acceptable Management Practices (AMPS) for maintaining water quality, and a long-term forest management plan. At present, no management plan has been developed for the municipal forest.



There are several forestry operations in Town at present including two firewood processors, a woodworking shop, a procurement yard and a sawmill. There are also several maple sugaring operations in Berkshire that utilize its forests.

Berkshire forests provide wood for fuel and construction, and recreational opportunities for hikers. Maintaining large swaths of forests is especially important for both hunting and the maple sugar industry. Additionally, they also serve a number of important environmental functions, which include providing important wildlife habitat, preventing soil erosion in areas of steep slope, and maintaining surface and groundwater quality.

Large, unfragmented stretches of forest are especially important for preserving wildlife habitat and maintaining a working landscape for the forest industry.

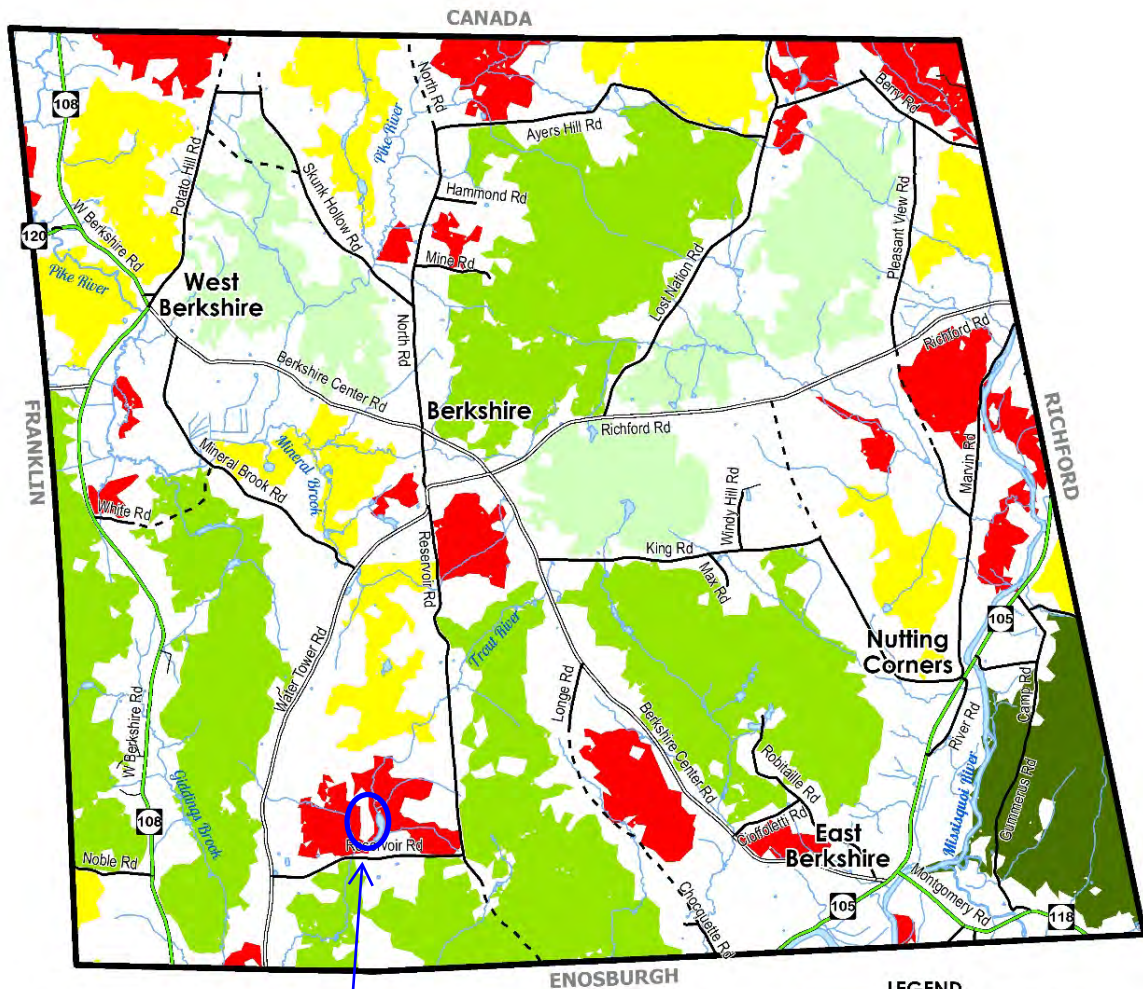
Such large tracts of undeveloped forestland, known as forest habitat blocks, can be fragmented by development when it infringes upon the boundaries of the forest, cuts a path through it, and breaks it up into smaller parcels that may be managed differently. Another important area of forest is habitat connectors which are land and water that link forest habitat blocks and enable wildlife to move from one forest habitat block to another. The forest areas which the state has identified as a priority for conservation are included in Map 9.3.

In 2017, Berkshire received a Municipal Planning Grant to update their development regulations. As part of this process, Berkshire examined creating a Forest District to preserve forest lands in the Town. However, the Town ultimately decided not to adopt this district. The general sentiment in Town is that given the lack of major infrastructure in Berkshire, there is not a need for another district to protect against development.

Given that the Town's forests and woodlands add to the diversity of the natural environment and local landscape, providing an appealing and necessary change from open fields and the built environment; long term management strategies and forest stewardship practices are needed to ensure the continued protection of existing forests and their economic benefits.

Map 9.3

HABITAT BLOCKS



Approximate Project Location

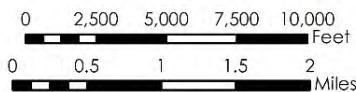
Vermont Coordinate System
Transverse Mercator, NAD 83.
For planning purposes only.



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February, 2020.

Data Sources: All map features
derived from VGIS digital coverages.
North arrow on map refers to Grid North.

Location: z:\gis\projects\county\
franklin\berkshire\townplan2020



LEGEND

- State Highway
- Class 2 Town Highway
- Class 3 Town Highway
- - - Class 4 Town Highway
- Private Road
- Town Boundary
- Stream or Brook
- Lake or Pond
- Habitat Blocks 20 - 250 Acres
- Habitat Blocks 250 - 500 Acres
- Habitat Blocks 500 - 1,000 Acres
- Habitat Blocks 1,000 - 2,000 Acres
- Habitat Blocks > 2,000 Acres

and most of this is in the Berkshire Municipal Forest, and the Town's road network. Community buildings, including the town clerk's office, the town garage, the fire department, and the Berkshire Elementary School occupy little land. Small acreages of land should be identified near existing facilities to allow for future expansions. Much of the land within present ownership, such as the municipal forest and Class IV roads, could be developed and maintained for community educational and recreational use. As noted earlier, the Town also may want to consider the acquisition of land, development rights, or easements to protect its important resources.

B) WELLHEAD PROTECTION OVERLAY DISTRICT

The Wellhead Protection Overlay District encompasses the Source Protection Areas for the East Berkshire Water Cooperative and the Enosburg Falls Water System (Map 9.4). The purpose of the District is to maintain or improve the quality of these water resources, including surface and ground waters, and to ensure that surface water bodies and corridors are protected and well-managed. Limited residential development should be allowed only as a conditional use.

C) RURAL LANDS DISTRICT

The Rural Lands District encompasses the majority of land area in the Town of Berkshire, excluding the village centers, flood hazard areas, and source water protection areas (Map 9.4). The purpose of the Rural Lands District is to conserve the integrity and natural qualities of the agrarian tradition and rural open space for the betterment and future use of the community. The District will provide for rural residential development and compatible commercial establishments at a density the land can support without central water or sewage disposal and that maintains the forest and agricultural character of the Town.

Agriculture, Forestry, and Forested Land

Retaining land in agriculture is critical to the continued vitality of farming in the Rural Lands District. Agricultural land is highly susceptible to development pressures as it often has soils well suited for development. The preservation of productive agricultural lands and primary agricultural soils need to be balanced with the need for some growth.

Forested land covers much of the Rural Lands District. Much of this land is unsuited for development because of poor soil and slope conditions and its importance for wildlife habitat. Many of Berkshire's forests are well-suited for use as small woodlots and low impact recreation, as well as some limited opportunities for larger scale forest industries. However, there are also wooded areas in Town that can provide a quiet, secluded setting for lower density residential development.

GOALS AND POLICIES: KEEPING IT RURAL IN THE FUTURE

GOAL 1: To maintain the rural, agricultural character of the Town of Berkshire, including the historic settlement pattern of small hamlets separated by rural countryside.

GOAL 2: To protect important natural resources and agricultural use of the land, while at the same time providing sufficient space in appropriate locations for residential, commercial, industrial development, and for community facilities.

Policies:

- 1) The town encourages agricultural and forest land be maintained for viable economic use, encourages value added businesses, promotes locally grown products, and encourages the implementation of agricultural/forestry best management practices.
- 2) Forest fragmentation should be minimized through the Land Use and Development Regulations. This may include defining forest fragmentation and adoption of specific zoning standards.
- 3) Clustered development, including Conservation Subdivisions, shall be allowed only where feasible and appropriate in order to protect and maintain important farmland, forestland, and open space. Strip development shall be discouraged.
- 4) Only development incidental to agricultural production should occur on important agricultural lands. Good management practices, participation in tax incentive programs, and the acquisition of development rights or conservation easements to protect farm and forestland shall be encouraged.
- 5) Commercial, light industrial and intensive residential development shall be encouraged on suitable lands located in or immediately adjacent to existing population centers. Development should be designed to be in keeping with the character of the area, should not interfere with traffic flow, should provide adequate parking for employees and customers, and should provide landscaping, screening and/or buffers to minimize any adverse impacts on adjacent lands, important natural resources, or the community.
- 6) Community facilities and services should be provided in convenient and suitable locations for the safety, use, and enjoyment of local residents. New