# Whiting, Vermont

## Enhanced Energy Plan

**Adopted by Town:** August 24th, 2022
**Approved by Addison County Regional Planning Commission:**
February 8th, 2023

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# Section I. Introduction

## Intent of Energy Plan

The Town of Whiting recognizes our individual and collective responsibility to help reduce and conserve the energy we all use. Whiting believes it serves its citizen's interests by conserving energy, reducing our consumption of non-renewable energy and shifting our usage to carbon free or carbon neutral renewable energy sources. It also believes the Whiting Town Plan must create a vision and clear policy statements for the town to follow concerning energy conservation, consumption and generation within town. By this Plan Whiting intends to exercise more control over the types of energy choices made within town.

One of the principal ways for Whiting to gain more control over its energy policies is to meet the **Municipal determination standards** for enhanced energy planning enabled in 24 V.S.A. 4352. By pursuing enhanced energy planning Whiting agrees that its energy plan will further regional and state energy goals, including the goal of having **90%** of the energy used in Vermont obtained through renewable sources by **2050** ("90 x 50") and the following:

> ***Vermont's greenhouse gas reduction goals under 10 V.S.A. § 578(a);***
> ***Vermont's 25 by 25 goal for renewable energy under 10 V.S.A. § 580;***
> ***Vermont's building efficiency goals under 10 V.S.A. § 581;***
> ***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 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;***

To receive a **positive determination** of energy compliance, an enhanced energy plan must be duly adopted, regionally approved, and must 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.**

A positive determination of compliance with the requirements of enhanced energy planning will enable Whiting to achieve "**substantial deference**" from the Public Utilities Commission above the current standard of "due consideration". Plans that meet this standard carry a greater weight in the Section 248 siting process for energy generation facilities (wind, solar, hydro, etc.).

This plan includes the required analysis, target data, the goals, policies and implementation actions, and associated mapping necessary to meet the standards for an Enhanced Energy Plan. Topics covered include energy conservation and efficiency as it relates to thermal and electrical energy usage, transportation and land use planning. The plan also includes energy generation and siting standards and policies proclaiming the type and size, and suitable locations for energy generation facilities in Whiting. Lastly, it specifies the goals, policies and actions Whiting will undertake to help implement conservation and efficiency policies to help meet the State's larger renewable goals.

## Outline of How to Read this Plan

This plan breaks Whiting's current energy demand, usage and future projections and projects into the following five Sections:

1. **Section II**, Thermal Use: This Chapter focuses mostly on Energy used for space heating.
2. **Section III**, Transportation Use: This Chapter focuses on energy used for Transportation.
3. **Section IV**, Electrical Use: This Chapter focuses mostly on energy used for operating equipment, but electrical use is predicted to expand significantly to include transportation and heating equipment as indicated in the first and second sections.
4. **Section V**, Land Use, Generation and Transmission: This chapter focuses on land use planning as it relates to energy conservation (i.e.: reduction of vehicle trips), and siting of new energy generation and transmission resources. Additionally, this chapter includes a mapping analysis of Whiting's energy resources and constraints.
5. **Section VI**, Community Standards for Siting Energy Projects: Siting and visual mitigation standards for new energy generation facilities that reflect the land use policies of the individual communities.

Chapters 1-4 above contain the following three sub-sections:

**Use Analysis**
**Targets**
**Pathways to Implementation**

1. "Use Analysis" will analyze current usage data in Whiting for each of the four energy sectors. It includes charts of usage and a discussion concerning the usage data.
2. "Targets" will look at future projections of usage if Whiting is to meet the State goal of using 90% renewables by 2050. This sub-section contains projections of usage targets corresponding to one scenario that would theoretically meet that goal. In 2016, Addison County Regional Planning Commission worked with the Vermont Energy Investment Corporation (VEIC) and the Vermont Department of Public Service (PSD) to develop regional targets for future energy use and generation that met the State of Vermont's 90 x 50 goal. However, there are numerous ways for Vermont to achieve the 90 x 50 goal. The Target Scenario included in this plan represents Whiting's participation in the Region's goals. It also represents an approach that appears reasonable, and economic given current technology and understanding of probable technological advance in the timeframe from the present to mid-century. For more information about the regional targets, please see the Addison County Regional Energy Plan (www.acrpc.com).
3. "Pathways to Implementation", provides goals, policies and recommended actions to implement the plan.

Energy Plan Assumptions:

This plan is based on the assumptions that:

- Energy may not be abundant or cheap in the future;
- The full social, environmental, and economic costs of energy are not reflected in present market prices;
- The public interest is served by conserving energy, reducing consumption of nonrenewable energy and shifting reliance to renewable energy; and,
- Each town must play a role in shaping and implementing policies and actions that promote wise energy use.

**Equity Considerations**

This Enhanced Energy Plan has the potential to impact both financial and decision-making equity issues in Whiting.

Financial Equity and Energy Burden

On average Whiting residents spend a larger portion of annual household income on energy than all but 6 towns in Vermont. Energy burden is calculated as the amount a household spends on energy in a year divided by annual income, and can be broken down by sector (thermal, transportation, electricity). According to the Efficiency Vermont 2019 Energy Burden Report Whiting residents spend an average of 13% of their income on energy, 3% more than the statewide average. Whiting is also one of the top ten most burdened towns in the state with transportation and electric energy costs amounting to 5% and 3% of the median annual income respectively. Increased energy efficiency could improve the financial security of many Whiting households.

Unfortunately, the financial barriers are often too great, preventing many from taking advantage of opportunities to increase energy efficiency. This can result in greater inequity as wealthy households are able to implement energy saving projects and reap the long-term benefits, while lower income households cannot afford the up-front investments required.

This plan combats financial inequity in two ways. First, several of the policies and goals identified are designed to benefit the entire community regardless of the ability to pay. These include goals related to municipal leadership, creating public spaces that are more comfortable and allowing tax dollars to be spent on more valuable initiatives. Other examples include the promotion of greater density in town as well as increased public and active transportation infrastructure, resulting in easier, less expensive travel for all. Second, this plan combats inequity through the promotion of low or no cost services available to Whiting households. The programs delivering these services, such as those listed in the Thermal section of this plan, are designed to ensure all households have access to energy efficiency benefits and they are currently being expanded to benefit a greater number of residents in the future.

Decision Making Power and Equity

In addition to the financial benefits, the implementation of this plan will give Whiting residents greater decision-making power around the siting of new generation along with an opportunity to own and benefit from locally produced power. Once approved by the Regional Planning Commission, this plan will ensure that the Public Utility Commission gives substantial deference to land conservation measures and specific policies contained within the duly adopted municipal plan. In this way, the plan gives the local community greater control over where and how new generation facilities are developed. In addition, this plan promotes the development of community-owned generation facilities, creating an opportunity for all residents to invest in and benefit from locally produced power.

# Section II. Thermal Use

## Thermal Use analysis

An estimate of current residential thermal energy demand in Whiting, based on data from the American Community Survey ("ACS"), a product of the United States Census (2019, 5-year estimate), is shown in Table 1. The data shows that the majority of residences in Whiting use fuel oil as their primary heating source (61.5%). Fuel oil is followed by wood, serving about 26.4% of households and propane serving nearly all of the remainder about 8.8%[1].

**Table 1** shows that most residents in the Town of Whiting rely on fossil fuels (Heating oil and propane) to heat their homes.

| 1. Municipal Current Residential Thermal Energy Use | | | | |
|---|---|---|---|---|
| Fuel Source | Whiting Households (ACS 2019 5-yr estimate) | Whiting % of Households | Whiting Residential Heating sq. ft. | Whiting BTU (in Billions) |
| Natural Gas | 0 | 0.0% | 0 | 0 |
| Propane | 13 | 8.8% | 27,248 | 2 |
| Electricity | 5 | 3.4% | 8,378 | 1 |
| Fuel Oil | 91 | 61.5% | 174,971 | 10 |
| Coal | 0 | 0.0% | 0 | 0 |
| Wood | 39 | 26.4% | 75,438 | 5 |
| Solar | 0 | 0.0% | 0 | 0 |
| Other | 0 | 0.0% | 0 | 0 |
| No Fuel | 0 | 0.0% | 0 | 0 |
| **Total** | 148 | 100.0% | 286,035 | 17 |

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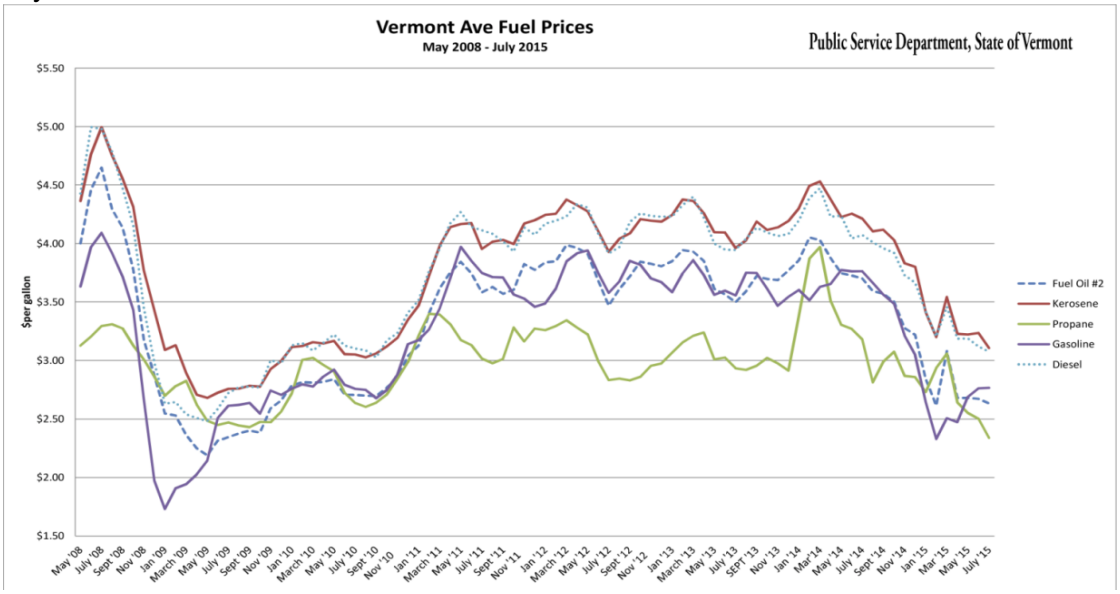
The following graph, Graph 1, compares the price trends of various fuels used by Vermont residents from May 2008 through July 2015.




**Graph 1. Vermont Average Fuel Prices, May 2008 – July 2015**

Like the graph above, the table below lists the relative cost per million BTUs of heating fuels in Vermont as of January 2015 (November 2014 for natural gas and September 2014 for green wood and pellets).

**Table 2. Comparing the Cost of Heating Fuels**

| Comparing the Cost of Heating Fuels — Public Service Department, State of Vermont | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type of Energy | BTU/unit | Typ Effic | $/unit | $/MMBtu | | High Efficiency | $/MMBtu |
| Fuel Oil, gallon | 138,200 | 80% | $2.84 | $25.73 | | 95% | $21.67 |
| Kerosene, gallon | 136,600 | 80% | $3.41 | $31.23 | | | |
| Propane, gallon | 91,600 | 80% | $2.73 | $37.25 | | 93% | $32.05 |
| Natural Gas, therm | 100,000 | 80% | $1.48 | $18.55 | * | 95% | $15.62 |
| Electricity, kWh (resistive heat) | 3,412 | 100% | $0.15 | $43.46 | | | |
| Electricity, kWh (cold climate heat pump) | 3,412 | | $0.15 | | | 240% | $18.32 |
| Wood, cord (green) | 22,000,000 | 60% | $ 227.14 | $17.21 | * | | |
| Pellets, ton | 16,400,000 | 80% | $294.00 | $22.41 | * | | |

* The natural gas price is based on the rate effective 11/1/14. *Wood green and Pellets updated 9/19/14.

The information contained in Tables 1, 2, and Graph 1 show the current state of thermal energy use in Whiting. Graph 1 and Table 2 illustrate the costs and efficiencies of these fuels.

**In order to reach the State targets, Whiting residents will need to significantly reduce the use of fossil fuels by 2050.** Making homes more thermally efficient is the first step in this process. Improvements in technology can make fuels work more efficiently. However, over the long-term, it will also be necessary to replace fossil fuel sources with renewable fuel sources, such as electricity produced through renewable generation. The cost of the change, principally the capital investment in new equipment, constitute a major barrier. However, Table 2 shows that the comparative costs of each type of fuel generally favors switching to wood heat and renewable electric heat pumps. Graph 1, shows that these costs, while fluctuating significantly over time, stay relatively constant with respect to each other. While the Town of Whiting has little control over the cost of energy, it can work to encourage conservation, efficiency and lower local generation costs. As an

example, Whiting does encourage its citizens to work with local providers of services promoting weatherization and efficiency. Services available that promote weatherization and efficiency include:

- The Champlain Valley Office of Economic Opportunity (CVOEO) provides fuel assistance to income-qualified residents either on a seasonal basis (call CVOEO at 800-479-6151) or on a crisis basis (call CVOEO Addison Community Action at 388-2285). The CVOEO website, CVOEO.org, describes additional fuel assistance programs available to Vermont residents.
- Efficiency Vermont, the nation's only efficiency utility, has a number of programs to improve energy efficiency. It describes most on its informative home page at Efficiencyvermont.com. Current programs, including energy audits, incentives for Home Performance with Energy Star, information on appliances and compact fluorescent and LED bulbs, building an Energy Star home, home heating help, rebate information, and Efficiency Vermont's reference library.
- Champlain Valley Weatherization Service, part of CVOEO, provides free weatherization services to income-qualified Addison County households.
- Neighborworks of Western Vermont also offers audits and subsidized weatherization services through their Heatsquad program https://heatsquad.org/.

Vermont also has residential energy standards. Officially called the "Residential Building Energy Standards" (**RBES**), the Residential Energy Code is a minimum standard of energy efficiency for all new residential construction in Vermont. The Vermont Residential Energy Code Handbook edition 4.1 March 1, 2015 contains Vermont's residential building standards. REBS encompasses two requirements:

1. A technical requirement that includes minimum standards for energy-efficient building components and construction practices. And
2. A certification requirement for reporting compliance. Upon completion state law requires every Vermont builder to self-certify that the home complies with the Code as built. The builder must complete and sign a certificate and submit it to the Town Clerk for filing. This should be on record before the Zoning Administrator issues a Certificate of Occupancy.

Residential structures consume roughly 75% of the thermal energy consumed within town. Most of the thermal energy changes that will need to take place in Whiting to meet the targets will need to be done by individual home owners.

The REBS standards noted above are enforced through the local Zoning Administrator. Because the Zoning Administrator needs to interact with the builder and home owner, the Zoning Administrator's duty to enforce the REBS also constitutes an opportunity for the Town to communicate with homeowners regarding energy programs and conservation opportunities.

Whiting also has commercial buildings using energy for heating. An estimate of total commercial thermal energy use, or heat, is provided in Table 3 and based on data from the Vermont Department of Labor (VT DOL) and the Vermont Department of Public Service (VT PSD).

**Table 3. Current Municipal Commercial Energy Use**

| Column1 | Commercial Establishments in Municipality (VT DOL 2019) | Estimated Thermal Energy BTUs per Commercial Establishment (in Billions) (VT Dept. of Public Service) | Estimated Thermal Energy BTUs by Commercial Establishments in Municipality (in Billions) |
|---|---|---|---|
| Municipal Commercial Energy Use | 21 | 0.725 | 15.225 |

As Table 3 shows, Whiting has a small number of commercial establishments, but they account for approximately 21% of the total thermal BTUs used in the town. Therefore, conservation and reduction of heat energy in this business community has the potential to significantly reduce Whiting's overall thermal use. Green Mountain Power ("GMP") has efficiency incentives for businesses as well as homeowners. While GMP's programs have traditionally focused on electric efficiency, the program has recently expanded to include thermal benefits. All businesses in Whiting are encouraged to speak with GMP about conducting an energy audit and determining improvements that may help them increase their thermal efficiency to reduce the amount of energy they use.

## Thermal Targets

In order to reach the thermal targets, set for Whiting, the town collectively needs to increase weatherization of homes and businesses, invest in new efficient wood heat systems and switch to efficient heat pump systems. See the tables below for one scenario of target numbers to meet the 90 X 50 State goal.[2]

| **TABLE 4A. Residential Thermal Efficiency Targets** | **2025** | **2035** | **2050** |
|---|---|---|---|
| Residential - Increased Efficiency and Conservation (% of municipal households to be weatherized) | 2% | 9% | 47% |
| **TABLE 4B. Commercial Thermal Efficiency Targets** | **2025** | **2035** | **2050** |
| Commercial - Increased Efficiency and Conservation (% of commercial establishments to be weatherized) | 17% | 18% | 47% |
| **Table 4C. Thermal Fuel Switching Targets (Residential and Commercial) - Wood Systems** | **2025** | **2035** | **2050** |
| New Efficient Wood Heat Systems (in units) | 0 | 1 | 6 |
| **Table 4D. Thermal Fuel Switching Targets (Residential and Commercial) - Heat Pumps** | **2025** | **2035** | **2050** |
| New Heat Pumps (in units) | 17 | 40 | 78 |
| **Table 4E.** Use of Renewables - Heating | **2025** | **2035** | **2050** |
| Renewable Energy Use as a Percentage of Heating BTUs | 48% | 61% | 87% |

To hit the goal of 90% renewable energy use in Whiting, targets have been established for each of the three major strategies to reduce or change the type of fuel used for space-heating. In order to hit the targets by 2050, property owners in Whiting will need to make significant improvements to their homes and businesses. Approximately half of the houses and businesses in Whiting will need to be weatherized to conserve energy used to heat those spaces. Currently, electricity plays an insignificant part in heating Whiting's homes. In order to meet targets, nearly all of the houses currently heating with oil or propane (and some heating with wood) will need to switch to efficient electric heat pumps. **Table 4E** assumes that the electricity powering the heat pumps referenced will be renewable. By 2050, 86.6% of heating BTU's will need to be supplied by renewable sources.

[2]Tables 4A-4E are based on a methodology developed by the PSD using data from the regional Long-range Energy Alternatives Planning (LEAP) analysis and ACS. The data in the table represents the percentage of municipal households that will need to be weatherized in the target years. The targets for Tables 4A and 4B are cumulative for the town.

## Thermal Pathways to Implementation - Goals, Policies and Recommended Actions

Given the large changes that Whiting will need to make to conserve energy and switch fuels in pursuit of its energy targets, Whiting adopts the following Goals, Policies and Recommended Actions for itself and its citizens.

## Goals

1. Reduce reliance on nonrenewable energy sources such as fossil fuels, and shift reliance to renewable energy sources such as solar electricity, heat pumps and/or wood pellets or cord wood.
2. Reduce emissions of greenhouse gases and substances that cause acid rain.
3. Reduce annual fuel needs and costs for heating structures. Maximize weatherization of residential, public and commercial buildings.
4. Foster the transition from non-renewable fuel sources to renewable fuel sources.

## Policies and Recommended Actions

1. Create an Energy Committee to promote thermal efficiency in Whiting's municipal buildings;
   a. Conduct an energy audit of all municipal buildings, town hall, fire station, town garage and town offices to Identify weatherization retrofits.
   b. Incorporate audit recommendations into the municipal capital budget.

2. Encourage Whiting residents to weatherize their homes, and support that effort by coordinating with CVOEO, NeighborWorks of Western Vermont, Efficiency Vermont and any other weatherization service providers.

3. Support the conversion of fossil fuel heating to efficient wood heating or electric heat pump systems and other technologies.

4. Encourage proposed development to optimize design features and energy systems that conserve energy and/or use renewable sources.
   a. Promote the installation of air source and geothermal heat pumps to reduce residential energy consumption and $CO^2$ production.
   b. Promote improved compliance with the residential and commercial building energy standards (RBES, CBES) by distributing code information to permit applicants and working closely with the Zoning Administrator.[3]
   c. Encourage new construction be sited so as to take advantage of southeast, southern or southwest orientations for passive solar gain

5. Encourage landscaping for shade and windbreaks to reduce heating and cooling costs.

6. Outreach: Host an energy fair at the Town Hall.

[3] Zoning Administrator's Handbook, Vermont Land Use: Education & Training Collaborative (October, 2015)

## Section III. Transportation Use

### Transportation Use Analysis

Like most Vermonters, the majority of Whiting residents drive themselves to work and to shop, rather than carpool or take public transport. More than any other sector, the transportation costs borne by Whiting's residential vehicle use demonstrate the scope of the change that will need to take place in Whiting to meet the State's energy goals.

| Table 5. Current Municipal Transportation Energy Use | |
|---|---|
| **Transportation Data** | **Municipal Data** |
| Total # of Vehicles (ACS 2019 5yr estimates) | 301 |
| Average Miles per Vehicle (VTrans) | 11,356 |
| Total Miles Traveled | 3,418,15 |
| | |
| Realized MPG (2019 - VTrans 2021 Energy Profile) | 19.3 |
| **Total Gallons Use per Year** | 177,106.53 |
| **Transportation BTUs (Billion)** | 21 |
| | |
| Average Cost per Gallon of Gasoline (RPC) | 2.31 |
| **Gasoline Cost per Year** | $409,116.08 |

**Table 5** above shows the number of vehicles, average miles for vehicle and miles traveled by vehicles per year in Whiting. It also shows the gallons of fuel used per year. Finally, it demonstrates that Whiting's residents spend over $409,116.08 per year on gasoline, a fossil fuel product produced outside the area. Clearly, conservation by reducing miles traveled, fuel-switching and alternative transportation infrastructure demonstrate potential to save Whiting's residents money over the long-term.

### Transportation Targets

The increasing expense of fossil fuels noted above should provide a significant incentive to move towards the proposed targets contained in **Tables 6A** and **6B** below.

| Table 6A. Transportation Fuel Switching Target - Electric Vehicles | 2025 | 2035 | 2050 |
|---|---|---|---|
| Electric Vehicles | 27.5 | 187.0 | 364.7 |

| Table 6B. Transportation Fuel Switching Target - Biodiesel Vehicles | 2025 | 2035 | 2050 |
|---|---|---|---|
| Biodiesel Vehicles | 6 | 10 | 15 |

As **Table 6A** illustrates, to meet the proposed targets by 2050, assuming growth, nearly all personal vehicles in Whiting will need to run on renewably generated electricity. Additionally, **Table 6B** illustrates that most commercial vehicles and farm equipment will need to switch from diesel to bio-diesel. To sustain the increase in electric vehicles, however, Whiting will need to develop infrastructure that supports electric vehicle charging stations throughout the town.

However, converting fuels, but continuing to primarily rely on single occupancy vehicles will only produce so much savings. According to the U.S. Census, *American Fact Finder*, between 2011-2015, approximately 75% of all workers over 16 years and older drove their own vehicles to work, 14 % commuted in carpools, 5 % walked to work, 5 % worked at home and 1% commuted by other means. Increased efforts in carpooling would benefit residents by conserving money spent on fuel and on reduced maintenance of vehicles. Tri-Valley Transit and Go Vermont! offer Rideshare program that allows area residents to match their commuting needs with neighbors interested in carpooling.

Other efforts to reduce vehicle miles travelled include supporting and building alternative transportation infrastructure and promoting more compact land development options in specific areas close to necessary services. Offering increased public transportation options is a great way for residents to cut down on transportation costs and energy consumption. Currently there is no public bus service available to or from Whiting. Tri-Valley Transit (TVT) provides it's "Dial-a-Ride" to Whiting residents.

Finally, Whiting can create infrastructure that promotes biking and walking within the town as a means to reduce vehicle miles travelled. Establishing a strong, diverse and vibrant village center, by implementing Whiting's Town Plan and Zoning policies to create a center with services and jobs for Whiting's residents constitutes other ways to reduce the community's reliance on single occupancy vehicular travel.

## Transportation Pathways to Implementation - Goals, Policies and Recommended Actions

Given the significant changes that Whiting will need to adopt to switch fuel sources in order to meet statewide targets, Whiting promotes the following Goals, Policies and Recommended Actions for itself and its citizens.

### *Goals*

1. Reduce reliance on nonrenewable fossil fuels, and shift reliance to renewable energy sources.
2. Reduce emissions of greenhouse gases and substances that cause pollution by reducing single occupancy car trips.
3. Increase walkability and bike-ability (and acceptance of) within Whiting village region.

### Policy and Recommended Actions

1. Create infrastructure supporting electric vehicles within Whiting.
   a. Plan for and install electric vehicle charging infrastructure on municipal and school property.
   b. Incorporate EV ready standards into building code. (This can be as simple as requiring 220v outlets in garages)

2. Encourage walking and cycling within the town with appropriate sidewalk and paths connecting amenities and services;
   a. Review municipal road standards to ensure that they reflect all “complete streets” principles applicable to our rural roads.
   b. Work with the Road Commissioner to make small, but important infrastructure improvements to roadways benefiting bicycle travel each time Whiting repaves a road.

3. Support state and regional public transportation programs serving Whiting. Work with TVT and other service providers to understand ways in which service to Whiting could be improved.

4. Support use of a Park and Ride in Whiting and encourage Whiting residents to consider ride-sharing. Utilize services of *GoVermont*.

5. Prioritize development proposals with driveway siting and design scenarios which support energy efficiency and access to public transit, park and ride, and safe walking and cycling opportunities.

6. Prioritize fuel-switching for municipal equipment and support alternative fuels for farm equipment.

# Section IV. Electrical Use

## Electrical Use Analysis

Table 7 depicts an estimate of current electricity use in Whiting. This data, from June 2014-2020, is available from Efficiency Vermont and GMP. These numbers represent everyday electrical use by Whiting residents, commercial and industrial businesses. Whiting annually consumes a total of 2,220,783 kWh of electricity, or an average of 169,779 kWh/month.

**Table 7. Current Electricity Use - Town of Whiting**

| Sector | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|
| **Commercial & Industrial (kWh)** | 229,391 | 185,785 | 242,691 | 300,328 | 285,803 | 255,003 | 266,380 |
| **Residential (kWh)** | 1,701,107 | 1,741,099 | 1,736,414 | 1,723,917 | 1,751,542 | 1,736,440 | 1,954,403 |
| **Total (kWh)** | **1,930,498** | **1,926,884** | **1,979,105** | **2,024,245** | **2,037,345** | **1,991,443** | **2,220,783** |

Currently, lighting and appliances drive residential electrical use in Whiting. Residential customers use roughly 88% of Whiting's electricity. Commercial use stems from lights, motors, pumps and other equipment. These commercial uses account for roughly 12% of all electricity currently consumed in Whiting.

## Electrical Targets

Like the thermal targets noted above, Whiting will need to focus on efficiency and conservation to impact the amount of electricity that it uses. Since residential uses drive most of the electrical consumption in Whiting, the targets will require individual home owners to increase the efficiency of their homes' electrical fixtures, motors and bulbs.

Commercial businesses will also need to improve their electrical efficiency to meet the goals noted below. As roughly 12% of the electric load, making changes in the relatively few commercial accounts may constitute a quick way to make significant electrical efficiency gains.

Table 8A, below, shows that Whiting must increase its efficiency and conservation, not including the transportation and heating changes noted in Tables 8B and 8C below by 59.2% by 2050 to meet the proposed targets. This plan anticipates significant decreases in residential, non-thermal electricity consumption due to investments in more efficient technology and conservation. By 2050, these new improvements should save an amount equal to 51% of the total residential, non-thermal electricity used by Whiting residents in 2015. It's not magic. These numbers are realistic based upon efficiency gains we as a society have been achieving through technology. Think of a compact florescent lightbulb. They use about 25% of the energy of a traditional incandescent bulb. Increased use of these bulbs and other technology can drive this change. [4]

[4] The percentages noted in Table 8A constitute the percentage savings based upon the reference scenario (limited changes) calculated in the LEAP model for Addison County. In other words, by changing how we act and the tools we use, we will use 51% less energy in 2050 to accomplish the same tasks that we currently perform at a much higher rate of energy consumption.

However, even with significant efficiency steps taken by businesses and residents, the models predict that Whiting's electrical usage will increase. The electric heat pumps and electric cars discussed in the previous two sections as technological innovations to reduce our reliance on fossil fuels, will increase Whiting's overall consumption of electricity.

Tables 8B and 8C reflect the significant percentages of conversions illustrated as necessary in the previous two chapters to reduce reliance on carbon-based fuels.

| Table 8A. Electricity Efficiency Targets | 2025 | 2035 | 2050 |
|---|---|---|---|
| Increase Efficiency and Conservation | 10.8% | 37.2% | 59.2% |

| Table 8B. Use of Renewables - Transportation | 2025 | 2035 | 2050 |
|---|---|---|---|
| Renewable Electrical Use - Transportation | 2.7% | 18.2% | 83.5% |

| Table 8C. Use of Renewables - Heating | 2025 | 2035 | 2050 |
|---|---|---|---|
| Renewable Electrical Use - Heating | 48.0% | 60.8% | 86.6% |

| Table 8D. Use of Renewables - Electricity | 2025 | 2035 | 2050 |
|---|---|---|---|
| Total Renewable Electrical Use – (MWh) | 945.9 | 1891.8 | 2866.4 |

Table 8D shows the projected additional electricity needed as a result of the fuel switching. Whiting's use of electric renewable energy will increase by an additional 2866.40 MWh to meet the 2050 goal. However, this increase in electric use will replace fossil fuels in both heating and transportation, which generally comprise more than 70% of all fuel use in Vermont. Moreover, since the electricity Whiting uses will be derived from renewable sources, its use of fossil fuels will drop even more significantly.

## Electrical Pathways to Implementation - Goals, Policies and Recommended Actions

Given the significant changes that Whiting and its residents and businesses will need to adopt to conserve energy and increase efficiency in order to meet statewide targets, Whiting promotes the following Goals, Policies and Recommended Actions for itself and its citizens.

### *Goals*

1. Reduce reliance on nonrenewable energy sources such as fossil fuels, and shift reliance to renewable electrical energy sources.
2. Reduce emissions of greenhouse gases and substances that cause acid rain.

### *Policies and Recommended Actions*

1. Support energy conservation efforts and the efficient use of energy across all sectors.
2. Promote energy efficiency in all buildings, especially new ones;
    a. Promote improved compliance with the residential and commercial building energy standards (RBES, CBES) by distributing code information to permit applicants and working closely with the Zoning Administrator;[5]
    b. Incorporate EV ready standards into building codes. (Beginning with changes as simple as installing a 220v outlet in garages);
3. Investigate installing municipal solar and/or wind net-metering facilities to off-set municipal electric use;
4. Create opportunities for citizens to invest in local renewable energy projects to power their homes and businesses;
5. Plan for increased electric demand with the support of Green Mountain Power.
6. Encourage the shift from nonrenewable energy reliance to renewable energy sources, such as solar and residential wind, by encouraging conversion to electric heat pumps, electric cars and renewable energy storage batteries.

[5] Zoning Administrator's Handbook, Vermont Land Use: Education & Training Collaborative (October, 2015)

# Section V. Land Uses, including Generation and Transmission

## Land Use, Generation and Transmission Analysis

Land use and energy are closely related. Land use patterns exert a strong influence on major end uses of energy, including transportation, heating and cooling of buildings, and the energy used in developing infrastructure. Clustered development generally provides for greater energy efficiency. Clustering can potentially reduce the miles of road needed to connect homes and commercial buildings. As a result, school buses and snow plows travel shorter distances, and electric utility lines need not extend as far. Carefully considered placement of a building on a lot adds to the efficiency of any new structure by increasing passive solar gain and decreasing wind pressures. Whiting has tied this energy land use section closely to its Municipal Plan's Land Use Section. Readers are encouraged to look there for housing and general development policies and actions promoting energy efficient land use. An important land use goal for Whiting is to focus new development and infrastructure improvement in its Village Center District in order to stimulate a compact pattern of housing, businesses and services. In its Medium Density Residential District, Whiting supports clustered development with the potential of shared septic systems, allowing for increased housing on smaller lots and discouraging sprawl. Whiting incorporates all state designated high priority forest blocks in its Conservation District, restricting the development of both structures and energy generation in these areas. This is reflected in the inclusion of high priority forest blocks as a possible constraint on renewable generation siting. The remainder of this chapter focuses on land use decisions addressing energy infrastructure.

### Current Renewable Energy Generation

Although Whiting's energy supply is largely consistent with statewide patterns, Whiting does have a number of alternative energy installations that tap local energy resources. A growing number of homes have photovoltaic systems that supply at least a portion of their electrical energy. Thanks to Vermont's net-metering law, owners of these systems can sell excess power back to the grid during periods of high solar production, and purchase grid power when needed. A number of other homes have solar domestic hot water systems. No homeowners currently use wind energy to generate electricity. Table 8 depicts Whiting's existing generation resources as of January 12, 2022 (Data was taken from the GMP Solar Map 2.0).

Table 9. Existing Generation Sites in Municipality

| Source | Sites | Generation (in MW) | Generation (in MWh/year) |
|---|---|---|---|
| Solar | 15 | .748 | 917.3 |
| Wind | 0 | 0 | 0.0 |
| Hydro | 0 | 0 | 0.0 |
| Biomass | 0 | 0 | 0.0 |
| Other | 0 | 0 | 0.0 |
| **Total** | 15 | .748 | 917.3 |

As Table 9, demonstrates, 15 different sites create 917.3 MWh (or 917,347 kWh) of renewable power within Whiting. The discussion below encompasses several types of renewable generation available to Whiting's residents and addresses how they might harness them to meet generation targets for the community.

## Types of Generation Potential

### Solar Energy

On average, the energy equivalent of about six thousand megawatt hours of solar energy falls on each acre of land in Vermont annually. Despite long winters and a variable climate, there is a relative abundance of sunshine and potential for utilizing solar energy. The challenge to using solar energy in Vermont is the seasonal difference in the amount of daylight hours between summer and winter. So, it would probably not be feasible at this time to rely solely on solar energy as the only power source in Whiting. However, it can and does contribute to Whiting's energy mix. There are currently 15 Whiting customers using solar net-metering. Net metering involves the installation of grid-connected, on-site renewable electric generation. Net-metering customers purchase power from the grid when needed, and export power to the grid when output exceeds demand, resulting in a credit against charges for purchased power.

The simplest use of sunlight is passive use for lighting and heating. Properly insulated buildings oriented so that their long axis is within 30 degrees of true south with unobstructed south facing windows can offset their space heating costs by 15 to 50 percent. Taking this one step further, floors and walls can be built of materials that will capture and store warmth from the sun. In many cases, passive solar buildings can be constructed at little or no extra cost, providing free heat and light – and substantial energy cost savings – for the life of the building.

Solar water heating is another cost-effective solar application. Water heating is one of the largest energy costs for the town's households. A water heating system that utilizes solar energy can reduce energy costs by up to 65 percent. A solar water heater cannot generally supply all the hot water needed year-round because of the climate and weather, so a back-up system is required. Consumers currently heating their domestic hot water with electricity would see the largest energy cost savings.

New developments in photovoltaic cell (PV) technology, which converts solar energy into electricity, has led to PVs that are smaller, less expensive and more consumer-friendly – trends that should continue into the future. Photovoltaic cells come in a wide range of sizes and applications, from large collectors for utility-sized power plants to tiny cells built into consumer appliances

### Biomass

Biomass consists of renewable organic materials, including forestry and agricultural crops and residues, animal manure, wood and food processing wastes, and municipal solid waste. All these products or waste products can be used as energy sources. The benefits of these resources are that they are local, sustainable and often waste materials. Some biomass materials, such as wood, have been traditionally burned to provide heat. However, by adding technology to burn the gases produced by biomass combustion these materials can be used in more efficient ways and generate additional heat and/ or power.

### Wind

Wind power can be harnessed for both large and small-scale power generation. In recent years, several studies have shown that Vermont's wind resource is abundant enough to meet a significant portion of the state's electric energy needs. Ridgelines provide the best location for wind generation facilities, with elevations between 2,000 and 3,500 feet above sea level being ideal for maximum power production.
While large-scale generation is unlikely to be located in Whiting outside of the areas discussed above, residential wind turbines are possible. Small wind turbines, designed for individual residential or business use, usually generate under 15 kW. They have two or three blades usually with a diameter of eight to 24 feet. They are often mounted on a guyed monopole or a freestanding lattice tower ranging in height from about 80 to 120 feet. Turbines need to be 40 to 60 feet above nearby trees or other obstructions for optimum efficiency. This technology is developing rapidly and over the next decade it is expected that small wind turbines will become

smaller, more efficient and affordable. Whiting supports residential scale wind in all Regions that allow residential uses.

### Geothermal Energy

Energy trickles from Earth's interior to the surface at a modest average rate of about 350 watts per acre, far less than the solar input. For Whiting, far from major geological activity, that number is almost certainly significantly lower. In addition, solar energy warms the Earth, especially in the summer, and some of that energy is stored as heat in the upper layers of soil and rock. The result of these geothermal and solar effects is that soil temperatures just a few yards deep under Vermont average around 45˚F to 50˚F year-round. This temperature is too low for direct heating, although it can help with summer cooling. Nevertheless, the constant ground temperature represents a significant energy resource, and with appropriate technology it can be used as a heat source. On the other hand, subsurface water has high heat capacity and can be used with water-source heat pumps to provide home heating in a way very similar to air-source ("cold climate") heat pumps. These systems often use existing potable well water systems for the heat exchange. The principal energy input required is electricity for pumping water through the system, as well as driving the compressor, so economic feasibility is related to well depth.

### Hydropower

While Whiting recognizes that hydro, like all other forms of energy generation has its own adverse consequences, all things being equal, this Plan supports the reasonable increase of hydroelectric generation from the assets within town.

## Mapping Generation Potential[6]

### Renewable Generation Resource Mapping

ACRPC created a series of maps depicting generation resources and also potential constraints for the Town of Whiting. These maps show data as required by the **Department of Public Service Determination Standards** and are a required element of enhanced energy planning. The maps show areas that are potentially appropriate or inappropriate locations for future renewable generation facilities**. The maps are a planning tool only. They generally, but not precisely, indicate locations where siting a facility is acceptable. When proposing a generation facility, applicants must verify the presence or absence of the natural resources and other specific characteristics of the site as a part of the application.**

**Map 1**, "State and Local Known Constraints" (only local if Whiting adds 'Local critical constraints') identifies natural resource areas that preclude renewable energy development. Due to the presence of these natural resources, it would be prohibitive to secure permits for commercial scale renewable energy development. A full description of each type of "Known Constraint" is included on Table 10, page 21.

**Map 2**, "State and Local Possible Constraints" depicts places where natural resources exist, but may not prohibit development. A full description of each type of "Possible Constraint" included on Map 2 is also located in Table 10. Prime agricultural soils constitute one example of a "Possible Constraint". Statewide "Possible Constraints" are listed first, followed by locally identified resources that also serve as "Possible Constraints" on commercial scale renewable energy production.

[6] All maps depict information available at the time of their creation. Energy Developers and others must use the most current maps available. "Local known constraints" and "Local possible constraints" maps are available from the Town of Whiting.

**Map 3,** depicts the current transmission and distribution resources and constraints within Whiting. Construction of new transmission facilities to support renewable energy generation can be a substantial driver for the total cost of the power the facility will generate. Knowing what infrastructure is available, and where, is an important planning component for renewable power development.

The remaining maps show the location of where solar resources, wind resources and biomass resources exist in quantities that would support generation; **Map 4**, Solar Resources, **Map 5**, Wind Resources and **Map 6**, Biomass Resources (pages 25-27 respectively). These maps depict where generation resources exist, in relationship to the natural resources "Known Constraints" and "Possible Constraints" identified on Maps 1 and 2.

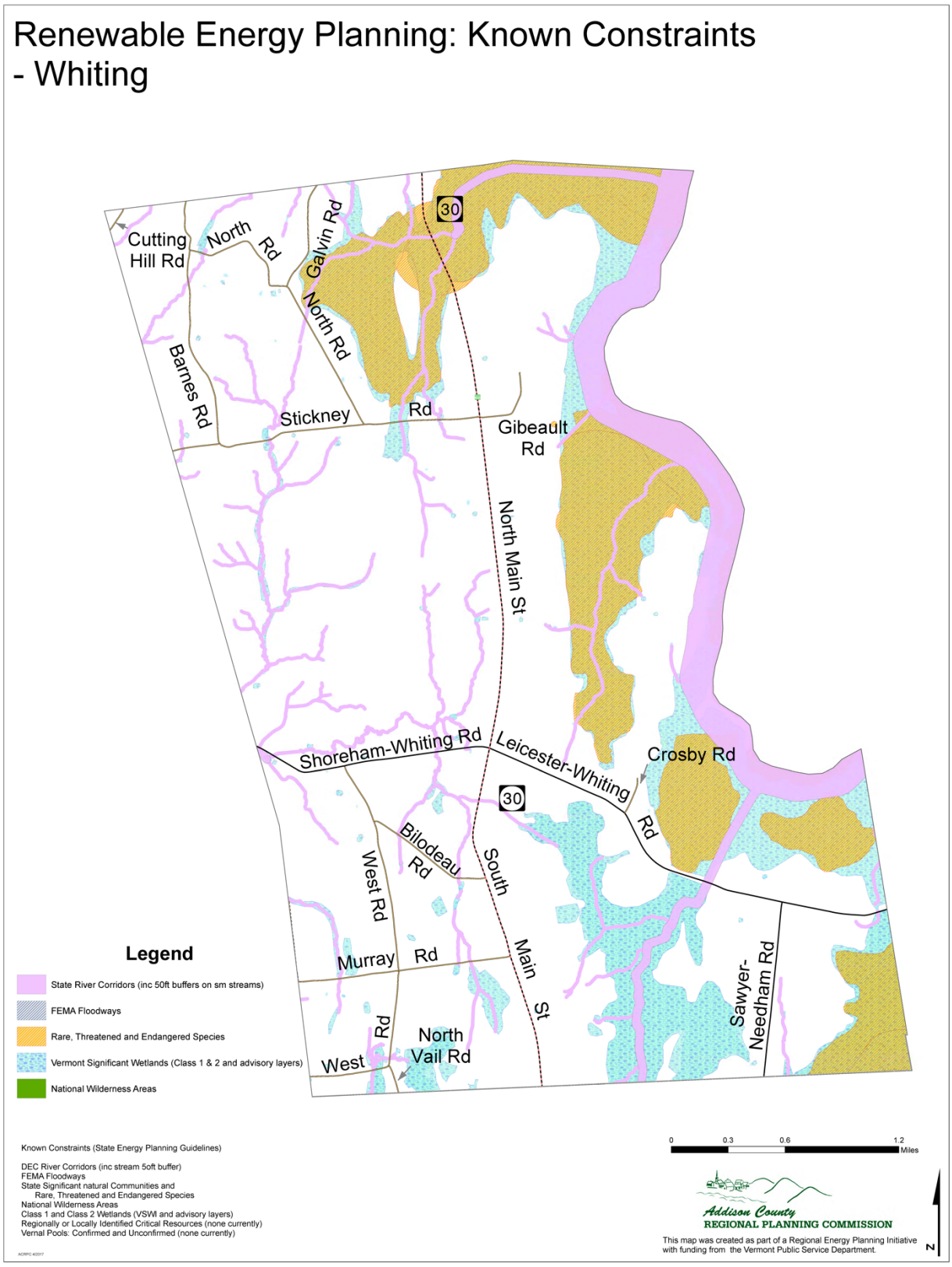
- Places with no "Known Constraints", no "Possible Constraints" and baseline generation potential are depicted as "**Primary siting areas"**.
- Places with "Possible Constraints" and baseline generation potential are depicted as "**Secondary siting areas**".

Since the maps depict baseline generation resources, not necessarily the "best" places for generation resources in the area, users are encouraged to treat them cautiously. For example, the "Primary siting areas" on the Wind Resource Map depicts where the wind blows at the minimum velocity necessary to support wind power and where no "Known or Possible" natural resource constraints exist. As noted in the wind discussion above, while many places may meet the minimum criteria for wind development, they may not be the 'best" areas for wind resources.

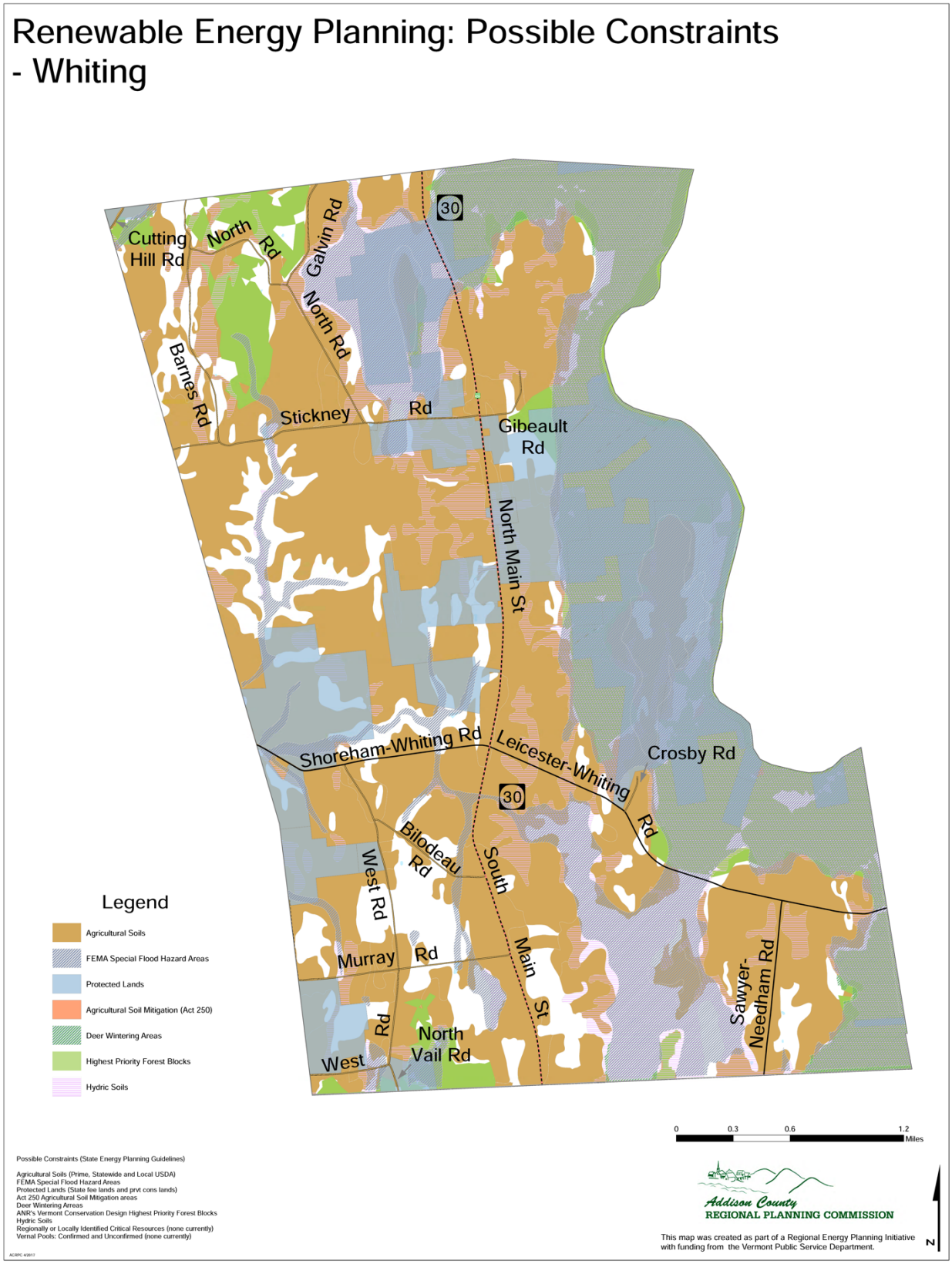
Maps similar to those contained in this plan are available in a searchable format at ACRPC's website. The "scalability" of the digital version of the maps makes them a much more valuable tool for those desiring to understand resources or constraints within a small area of the Region. However, these Regional maps do not contain locally identified constraints and should be read in that context.
http://54.172.27.91/public/energysiting/regional_maps_sm/
A full list of known and possible constraints included on the maps is located in Table 10. The known constraints and possible constraints used to create the maps include constraints that are required per the State Determination Standards from the Department of Public Service.

| Table 10 – 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 |
| **DEC River corridors** | Mapped River Corridors were depicted. | ANR |
| **National Wilderness Areas** | Parcels of Forest Service land congressionally designated as wilderness. | VCGI |
| **Class 1 and Class 2 Wetlands** | Vermont State Wetlands Inventory (VSWI) and advisory layers from site specific work collected by the municipality | VCGI |
| Solar, Wind and Biomass Maps - Possible Constraints | | |
| **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 held by non-profit organizations. | VCGI |
| **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. | ANR |
| **FEMA Flood Insurance Rate Map (FIRM) special flood hazard areas** | Special flood hazard areas as digitized by the ACRPC 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 Addison County Regional Plan. | ACRPC |
| **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 Addison County Regional Plan. (Source: ANR) | ANR |

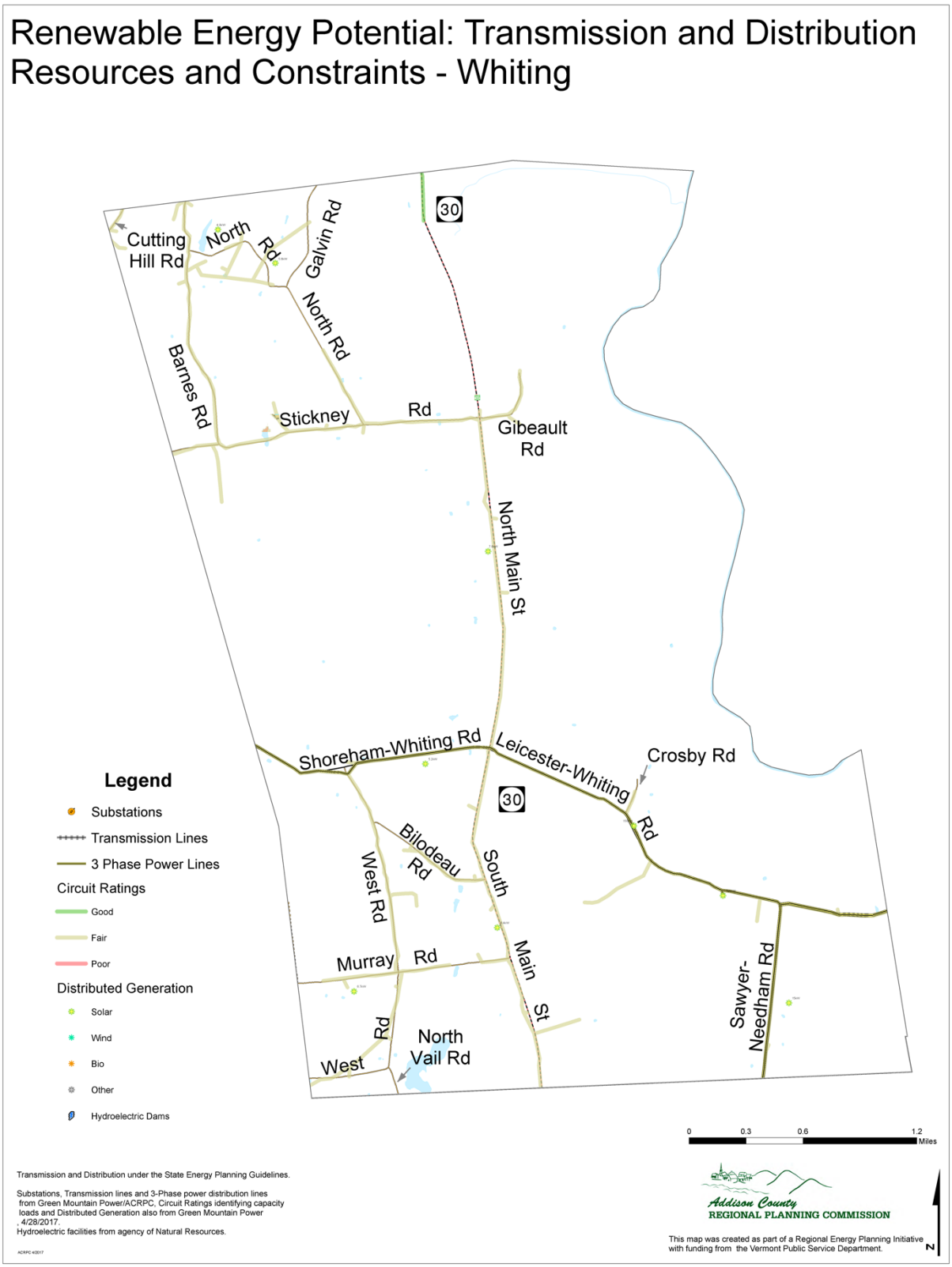
## Maps 1: Known Constraints



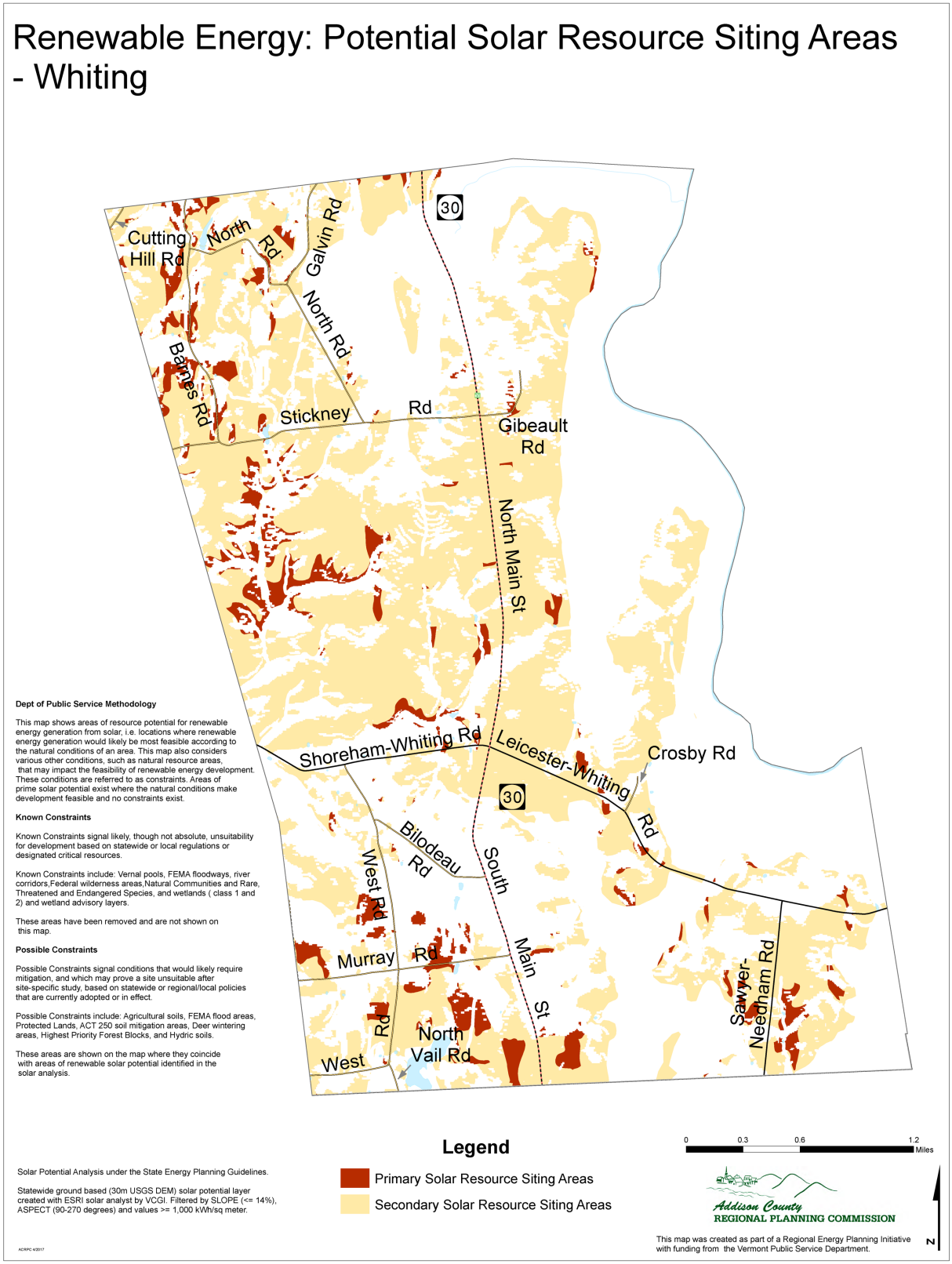
## Map 2: Possible Constraints



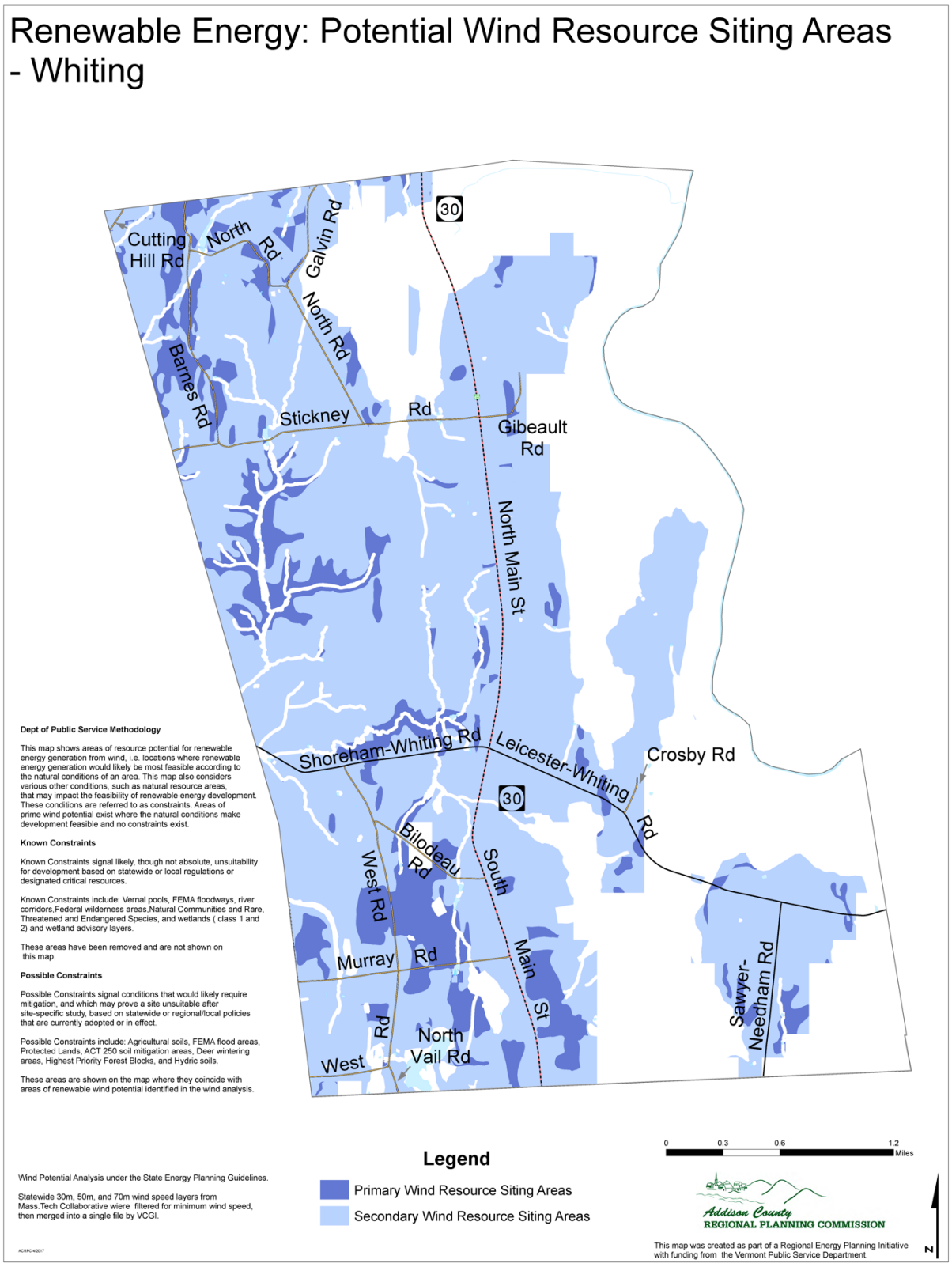
## Map 3: Transmission and Distribution



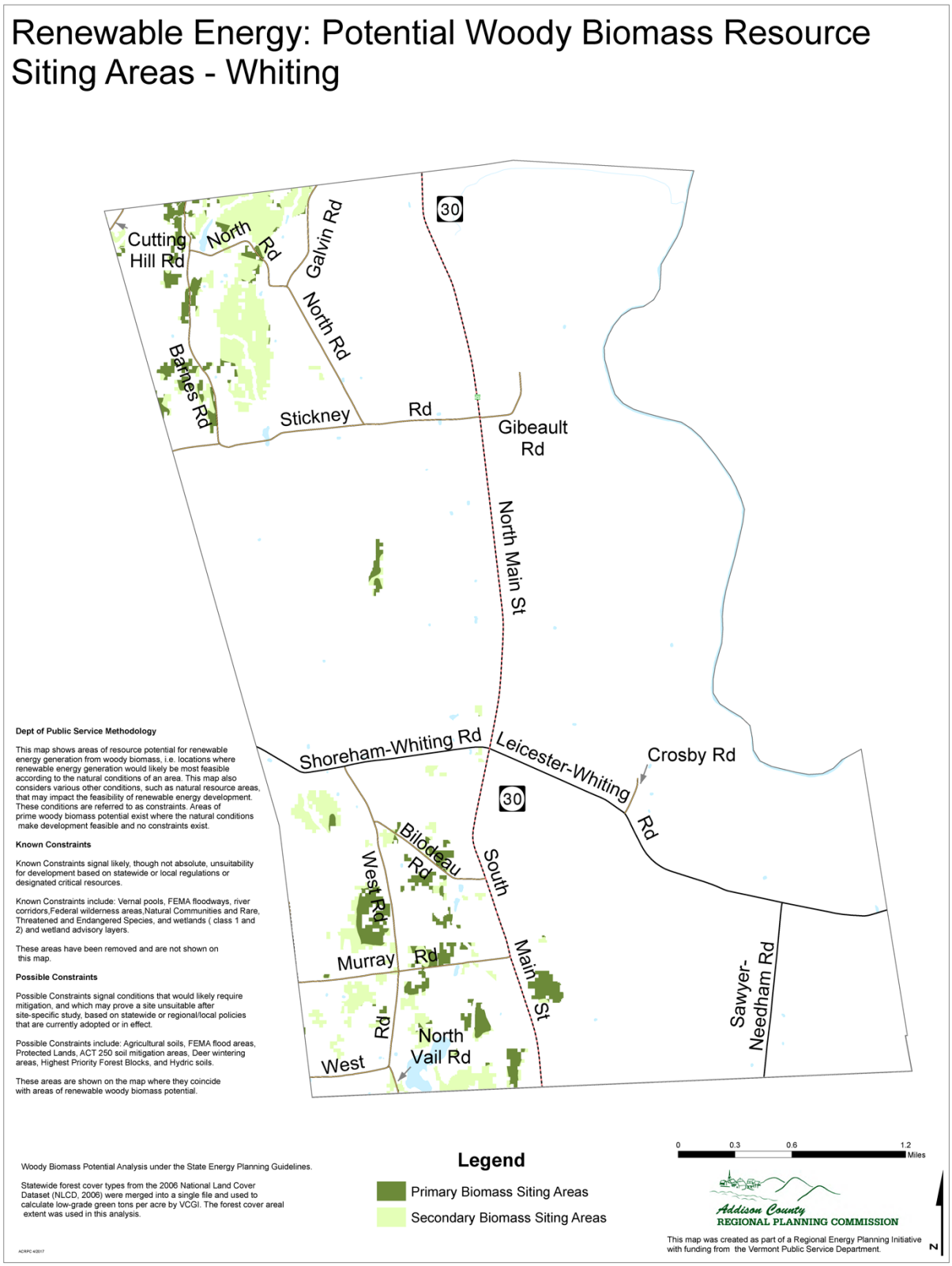
## Map 4: Solar Potential



## Map 5: Wind Potential



## Map 6: Biomass Potential



## Calculating Theoretical Generation Potential

The ACPRC has used the maps above to identify the amount of energy potential in Whiting. In addition to the maps, the calculations use some assumed values for the amount of land necessary to produce specified amounts of solar and wind energy. The results of this analysis, which constitutes a required part of the PSD's "**determination standards" to establish an "enhanced energy plan**," are depicted in Table 11, entitled, "**Renewable Generation Potential in Municipality**".

**Table 11. Renewable Generation Potential in Municipality**

| Source | Generation Potential (in MW) | Generation Potential (in MWh) |
|---|---|---|
| Rooftop Solar | 1 | 1,131 |
| Ground-mounted Solar | 403 | 494,239 |
| Wind | 1,353 | 4,148,298 |
| Hydro | 0 | 0 |
| Biomass and Methane | 0 | 0 |
| Other | 0 | 0 |
| **Total** | 1,756 | 4,643,668 |

As Table 11 shows, the amount of renewable generation potential in Whiting, as theoretically calculated from the maps, stands at **4,643,668 Megawatt hours**. To provide context, Table 7 shows us that Whiting currently uses **2,037.345 Megawatt hours** (2037.345 MWh = 2,037,345 kWh as depicted in Table 7). Additionally, Table 9 shows us that Whiting currently produces 1,054.85 Megawatt hours of renewable electricity (1,054.85 MWh).

Whiting recognizes that the theoretical generation potential shown in Table 11 above dramatically overestimates the potential generation available. Not every acre that could be developed for energy in Whiting will be developed. However, it also illustrates that Whiting has an abundance of land from which it could theoretically generate renewable electricity. Therefore, Whiting can carefully consider the areas in which it wants to **prefer** and to **allow renewable energy generation** and the areas in which it wants to restrict generation, especially in the context of its renewable energy targets.

## Land Use - Renewable Generation Targets

As a part of PSD requirements for Enhanced Energy Planning, ACRPC calculated renewable energy generation targets for the Town of Whiting for the years 2025, 2035 and 2050. A set of regional targets for solar and wind energy were produced for each planning commission by the Northwest Regional Planning Commission (NWRPC) and the PSD. Due to the amount of renewable energy currently generated in the Region, ACRPC chose to work with the low targets for solar and wind generation, to more closely match the Region's targets to the Region's projected use. ACRPC then used the Regional targets to create targets for each town within the Region. ACRPC calculated that by 2050 Whiting will need to produce an additional 2,866.4 MWh of electricity from renewable sources annually to meet the State's 90 x 50 goals (Table 12). (See also the Addison County Regional Energy Plan, Table 1, page 7-92 (2018).

| Table 12. Renewable Generation Targets | 2025 | 2035 | 2050 |
|---|---|---|---|
| Total Renewable Generation Target (in MWh) | 945.9 | 1891.8 | 2,866.4 |

As noted previously, usage is expected to increase largely because of the increased use of electric heat pumps and electric vehicles (Table 8D). Given that this projection is 30 years into the future, and the data comes from different sources, Whiting should continue to plan and adjust these targets as future need and conditions dictate.

ACRPC and the Town of Whiting recognize these targets as a framework for renewable energy generation. The town has developed goals and actions for energy conservation and generation that support the attainment of Vermont's energy goals, while also considering the demand required by Whiting's residents and businesses.

For future solar generation facilities, the Town of Whiting encourages **roof mounted panels**, especially on dairy barns and other larger commercial or municipal structures (see below). The town is also supportive of a municipal, community solar array.

181 KW ROOF TOP SOLAR ARRAY ON GOAT BARN AT AYERS BROOK GOAT DAIRY IN RANDOLPH

For a sense of how much land area is needed for Whiting to support future generating facilities (**2866.4 MWh**) see the following calculations. To generate 1 Megawatt of electricity:

- a commercial solar facility would require 8 acres of land,
- a commercial wind facility would require 4 acres of land,
- a bio digester 'cow power' would require 3000 cows.

| | | |
|---|---|---|
| All solar: | 2866.4MWH/8760/.14=2.337MW | 2.34MW*8acres =18.96 acres needed |
| All Wind: | 2866.4MWh/8760/.35= .934MW | .934MW*4acres=3.74 acres needed |
| All 'Cow Power': | 2866.4MWh/8760/.467= .700MW | .700MW*3000cows=2102 cows |

The Town has identified four areas for preferred solar development in Map 7. In total, these areas encompass 828 acres in Whiting, providing over 40 times more land than required to meet minimum energy production targets.

## Project Size Descriptions

**SOLAR**:

Residential-scale:
Capacity ≤ 15kW

Commercial-scale:
Capacity ≤ 500 kW


Utility-scale:
Capacity > 500 kW


**Residential scale solar projects**, defined as grid-connected/ net-metered projects less than 15 kW, whether rooftop or ground mounted, are encouraged in all areas of the Town of Whiting. Owners are encouraged to use the siting standards noted below when siting their array on their property.

**Net metered commercial solar projects**, defined as any project subject to Rule 5.100 governing net-meter solar arrays and ranging in size from 15kW – 500kW are encouraged in Whiting, subject to the siting criteria below, within the preferred areas as designated by this Plan and depicted on Map 7.

**UTILITY/ INDUSTRIAL SOLAR PROJECTS, ARE OF A SIZE GREATER THAN THAT PERMITTED BY THE NET-METERING RULES (>500KW) ARE PROHIBITED IN THE TOWN OF WHITING.**

A 'POLLINATOR FRIENDLY' COMMUNITY SOLAR PROJECT.

**WIND**:



**Residential (on property) Scale Wind** consists of a single tower less than 120 feet high generating less than 15kW of energy.

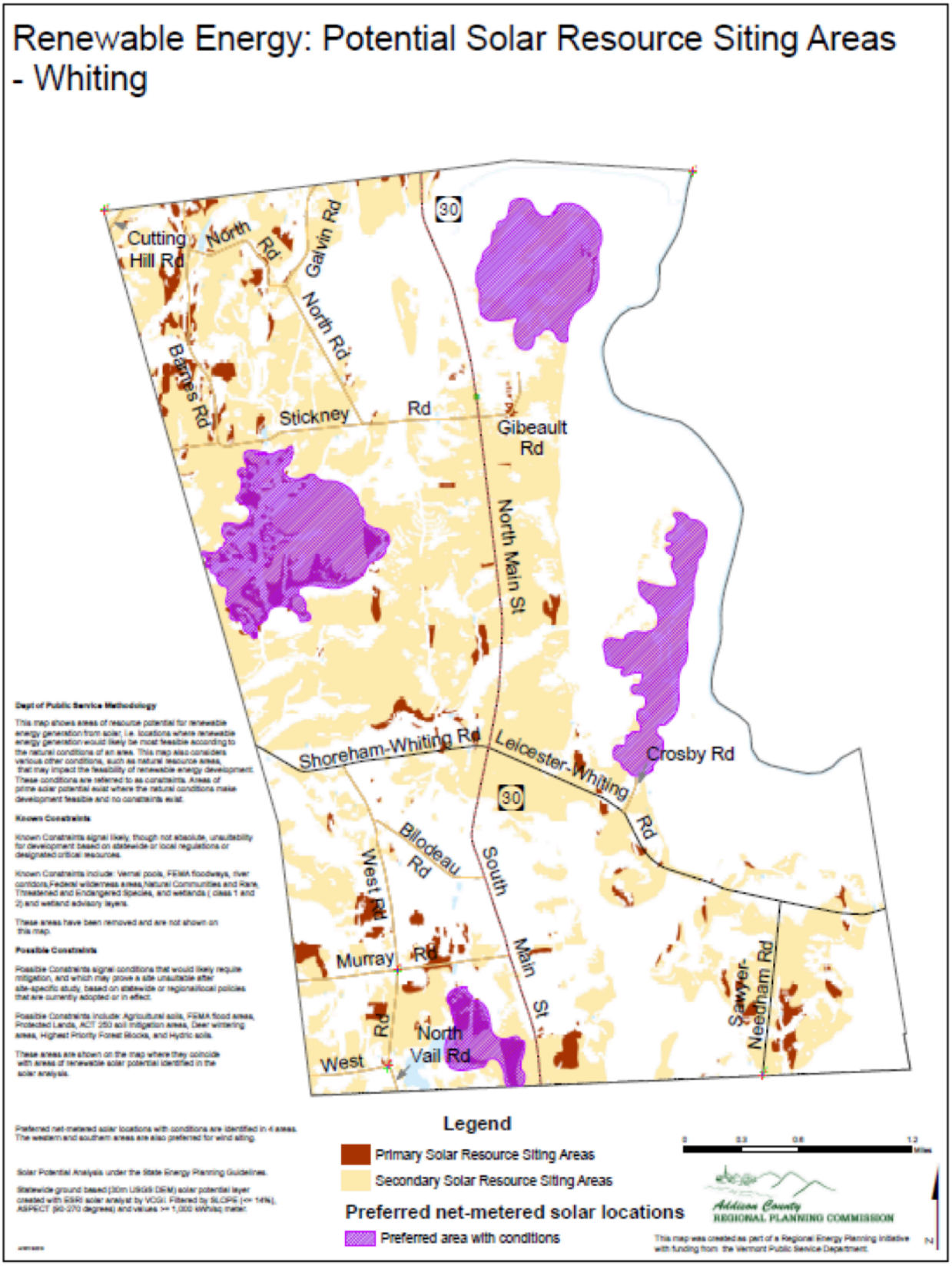
**Community (Commercial) Scale Wind** consists of 1 or more towers all less than 200 feet high (so as not to require night lighting) and producing less than 1 MW of electricity.

**Industrial / Utility Scale wind** consists of wind projects with a total capacity of greater than 1MW or with a tower or towers taller than 200 feet or requiring night lighting for any reason.

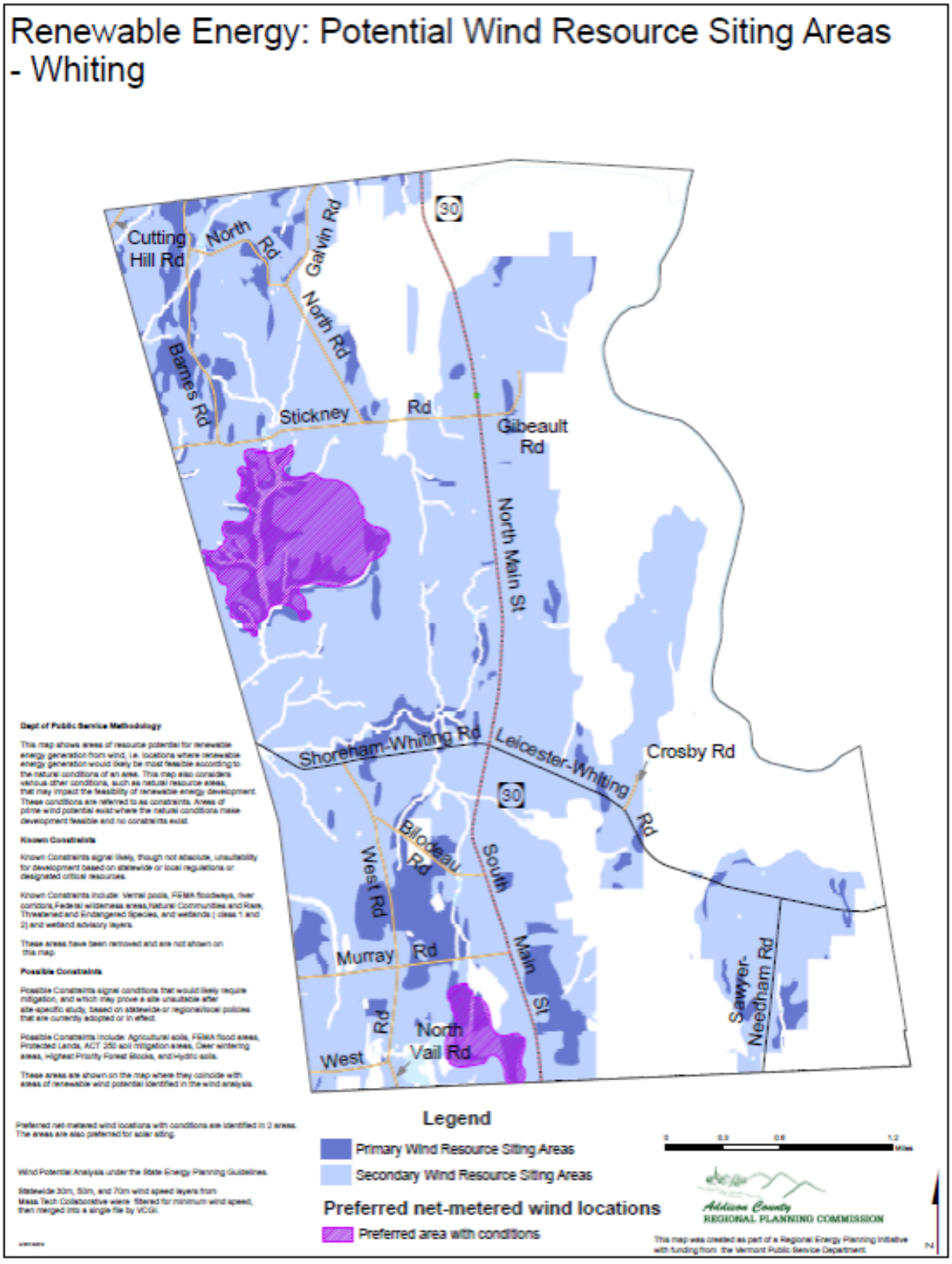
Due to the potential area available to develop moderately scaled generation facilities, Whiting has decided to prohibit industrial/utility scale wind and solar facilities.

Several sites have been identified by the town as appropriate for commercial, net-metered wind and ground mounted solar projects. Maps 7 and 8 illustrate these "**Preferred Sites**" for future generation.

## Map 7: Preferred Solar Siting Areas



## Map 8: Preferred Wind Siting Areas



## Land Use and Generation Pathways to Implementation – Goals, Policies and Recommended Actions

In order to meet the energy generation targets cited elsewhere in this document, Whiting promotes the following Goals, Policies and recommended Actions for itself and its citizens.

### *Goals*

1. Increase generation and transmission of renewable energy in conformance with the goals, strategies, mapping and community standards outlined in this energy plan and the town plan.

2. Improve access, understanding, and implementation of residential, municipal/community and commercial wind, solar, and other renewable energy sources for daily use.

3. Promote Land Use planning that supports reducing energy usage and conserving resources.

### Policies and Recommended Actions

1. Development of renewable generation shall be favored in identified **preferred sites** over the development of other locations.

2. Encourage the development of solar panels on barn roofs and municipal buildings.

3. Encourage the use of residential solar and wind facilities which do not negatively impact scenic and natural resources outlined in the Whiting Town Plan.

4. Support a Community Solar Project. The Town, led by an energy committee, should pursue opportunities to develop community-owned solar projects to power municipal (and residential) buildings.

5. Support production of energy from methane digester as a desirable agricultural practice and/or support a regional facility.

6. Whiting recommends that all new generation facilities are equipped with an energy storage system.

7. Encourage settlement patterns that reduce travel requirements for work, services and recreation.
    a. Encourage increased residential density and the development of compact neighborhoods within Whiting's Village Region planning area.
    b. Promote economic development strategies to support new and existing businesses in the area.
    c. Provide opportunities for appropriate home occupations and telecommuting.

8. Amend Whiting's zoning regulations to ensure the Town Plan's Energy section is enforceable at the zoning level.

# Section VI. Community Standards for Siting Energy Projects

The Town of Whiting, VT supports responsibly sited and developed renewable energy projects within its boundaries. Whiting recognizes that financial considerations require projects to be located in close proximity to electric power lines capable of transmitting the proposed generated load and easy access from major transportation networks for construction. However, it also desires to maintain the open landscape and scenic rural views important to its agricultural and rural cultural aesthetic and the tourism economy of the area. Not all commercial or community scale energy projects proposed can meet this standard. Projects must meet the following criteria in order to be supported by this plan, our Board of Selectmen, and our Planning Commission: Whiting shall not apply the siting standards so strictly so as to eliminate the opportunity to meet its electrical generation targets.

1) COMMUNITY STANDARDS: The Town of Whiting welcomes energy projects that meet the standards our community has created by consensus and sets forth herein. New energy development projects shall not exceed the anticipated capacity of Whiting's user base or of the town's transmission infrastructure.
2) ENERGY PROJECT SITING: Where a project is placed on the landscape constitutes the most critical element in the aesthetic siting of a renewable energy project. Poor siting cannot be adequately mitigated – or screened. Accordingly, the first element any energy developer must consider is the proposed facility's aesthetic impact on the surrounding landscape.

   A. ***Good sites*** generally have several of the following characteristics:
      a) South facing [for solar].
      b) Close proximity to existing larger scale, commercial, industrial or agricultural buildings;
      c) Close proximity to existing hedgerows or other topographical features that naturally screen the proposed array from view from at least two sides.
      d) Avoids or minimizes impacts to prime agricultural or recreational lands, wetlands, floodplains, wildlife habitat and migration, ecologically and archeologically sensitive areas, and scenic viewsheds.
      e) Reuse of former brownfields or otherwise impacted property.
      f) Roof-mounted systems.
      g) Designed in a way to take advantage of natural topography to minimize appearance to neighbors and passersby.
      h) Does not interfere with the orderly development of the town.
      i) "Preferred" areas as defined by Public Utilities Commission Rule 5.100 governing net metered sites.
      j) Sites designated as "Preferred" areas by this Plan, Map 7.

   B. ***Poor Sites*** generally have several of the following characteristics:
      a) The removal of productive agricultural land from agricultural use.
      b) Are out of scale with the surrounding structures or development.
      c) North facing [for solar].
      d) No natural screening.
      e) Topography that causes the project to be visible against the skyline from common vantage points like roads or neighborhoods;
      f) Potential adverse impacts to prime agricultural or recreational lands, wetlands, floodplains, ecologically and archeologically sensitive areas, scenic viewsheds, significant wildlife habitat as identified by the 'Important Resources' map in the Natural Resource section of this plan.
      g) Sites that obscure views of historic buildings from common vantage points like roads and neighborhoods.

h) Sites that require rate-payer investment in transmission or distribution infrastructure [rather than the developer].

Projects found to have poor siting characteristics pursuant to the standards contained in Section 2 above and cannot be mitigated by the methods contained in the policy, violate these standards regarding orderly development.

In Whiting, transmission projects with tower heights greater than 72 feet are higher than the tree line and nearly all other structure within the town. They cannot be adequately screened or mitigated to blend into the landscape and therefore must be designed to travel underground or to limit the total height of the structures to 72 feet.

C. ***Setbacks for solar projects***. As required by 30 V.S.A. § 248(s), all in-state ground-mounted solar electric generation facilities must comply with the following minimum setbacks:

a) This subsection does not require a setback for a facility with a plant capacity equal to or less than 15 kW (DC).

b) The requirements of the setbacks in this section may be decreased to the minimums set forth in Act 56 if the project developer can demonstrate to the Board of Selectmen that the topography of a site naturally screens 100 percent of project view from the boundary line in question.

c) For a facility with a plant capacity exceeding 150 kW:

(a) 100 feet from a State or municipal highway, measured from the edge of the traveled way

(b) 50 feet from each property boundary that is not a State or municipal highway

d) In order to diminish mass and scale of multiple energy projects, no energy project shall be located within 500 feet of any other energy project, unless clustering of projects allows for secondary project to be screened by existing topography and/or existing vegetation screen.

e) On review of an application, the PSB may:

(a) Require a larger setback than this subsection requires; or

(b) Approve an agreement to a smaller setback among the applicant, the municipal legislative body, and each owner of property adjoining the smaller setback.

3) <u>MASS AND SCALE:</u> The historical working landscape that defines Whiting currently, and that Whiting desires to preserve, is dominated by viewsheds across open fields to wooded hillsides and mountains. Rural structures like barns fit into the landscape because their scale and mass generally do not impact large tracts of otherwise open land. All commercial scale energy projects should also be limited in mass and scale, and/or have their mass and scale broken by screening, to fit in with the surrounding landscape. Projects larger than 150kW cannot be adequately screened or mitigated to blend into the municipality's landscape and are therefore required to be broken into segments more amenable to screening measures. This uses a standard that is a similar size to most other structures in town. For example, 150kW solar arrays cover about an acre of land, which is similar to a 200 cow free-stall barn.

4) <u>SCREENING - ENERGY DEVELOPERS SHOULD PRACTICE A "GOOD NEIGHBOR POLICY"</u> The siting and screening of any energy project should be done in such a manner that it creates no greater burden on neighboring properties than existed prior to installation. As an example, a landowner may not site an energy project on his or her property in a location calculated to diminish the visual impact of the array from his or her residence, but places the array immediately within their neighbor's *or the public's* viewshed.

a) Each project, any part of which is proposed to be constructed within the Town, must be designed and constructed of materials, colors and textures that blend into the surrounding natural or built environment to the maximum extent feasible.

b) Each project shall incorporate screening that (i) breaks up the visible area of the project so as to

prevent unobstructed views; (ii) mitigates adverse aesthetic impacts on views from residences and public highways; and (iii) harmonizes the project with the character of the surrounding landscape and neighborhood.

c) In addition to the requirements of subsection b above, any project whose total footprint exceeds 25,000 square feet must incorporate sufficient screening to ensure that the visible area of the project represents no more than 5% of the field of view* from any of the following:

   (i) any point within a residence,

   (ii) any point within 150 feet of a residence, or

   (iii) any point on a public highway.

   *"Field of view" from a given point means the area visible within a photograph taken from that point with either of two camera and lens combinations as follows: a digital camera with a full-frame sensor and a 50mm focal length lens, OR, a digital camera with an APS-C sensor and a 35mm focal length lens.

d) Plantings for screening purposes shall be of sufficient height, density and maturity to achieve the screening standard within five years of planting.

e) The screening requirements of this Section apply year-round during the entire period of existence of a project. Screening must remain in place until a project has been fully decommissioned and the site restored to its pre-installation condition.

f) A project shall be sited within a parcel in such a manner as to make maximum use of pre- existing vegetation, hedgerows, hills, ridges, buildings, and other topographical features and structures that naturally screen the project, thereby minimizing the need for the installation of new screening materials.

g) Where new screening materials must be installed or planted to ensure compliance with this interim Bylaw, natural, living, native screening materials such as native trees and shrubs shall be used in lieu of artificial screening materials such as walls, fences, and other structures; provided, however, that limited use of artificial screening materials is permissible to the extent that

   (i) The use of living screening in that area is not feasible, and

   (ii) The artificial screening is of size, scale and materials that are consistent with the character of the surrounding neighborhood and landscape.

h) Maintenance of landscaping and screening shall be the joint and several responsibility of the developer and property owner on which the energy project or new commercial development resides. Dead, dying or diseased plants used in screening shall be promptly removed and replaced as soon as possible, consistent with good landscape planting practice, and in the case of any solar project such obligations shall be a condition of any certificate of public good granted by the Public Service Board, or any successor body having jurisdiction over such project.

i) The screening standards set out above shall be achieved entirely within the property containing the project, and not on "borrowed" lands or lands of any affected property owner.

5) AVERAGE PERSON: For the purposes of this plan, either the Whiting Board of Selectmen, or the Whiting Planning Commission – depending on who represents the Town at any Section 248 hearing – shall be deemed to represent the voice of the "average person" with respect to the "Quechee test" when evaluating the aesthetics of a proposed energy project.

6) MITIGATION METHODS: Energy developers must take the following action to mitigate all energy project sites:
   1. Locate the structures below the horizon line, as viewed from public and private vantage points;
   2. Choice panel heights in correlation to siting restrictions, so that projects can adhere to 6)1 above;

3. Observe the setbacks above in 2-C(c);
4. Use the existing topography, development or vegetation on the site to screen and/or break the visual mass of the energy project;
5. In the absence of existing natural vegetation, at least the north side of the array must be screened [see section 4. above] by native plantings that will grow to a sufficient height and depth to fully screen that end; partial screening to break the mass of the site may also be necessary to protect public and private views on other sides of the energy project.

7) DECOMMISSIONING & SITE RESTORATION: In order to preserve the agricultural aesthetic qualities of Whiting's rural character, all energy projects shall be decommissioned at the end of their useful life and the property shall be restored to its pre-project condition. Developers of all energy projects 30 kW and greater shall provide the town with appropriate assurances to guarantee funding exists to decommission the project. The end of the useful life of the project shall be deemed to occur when less than 20 percent of the project is used for its original purpose. Review and align with proposed net metering rules on decommissioning.