Two Rivers-Ottauquechee
REGIONAL COMMISSION

May 5th, 2025

Stuart Crocker
Planning Commission Chair
Town of Strafford
227 Justin Morrill Highway
Strafford, VT 05072

RE: Municipal Summary Worksheet & Energy Maps

cc: Peter G. Gregory, Executive Director, TRORC
John Echeverria, TRORC Commissioner

Mr. Crocker,

TRORC is pleased to enclose a copy of Strafford's updated Municipal Summary Worksheet and Energy Maps. This document summarizes the energy data, targets, and maps that are required by Act 174 of 2016 for inclusion in a Town Plan written to contain an "Enhanced Energy Plan."

An Enhanced Energy Plan is required for Town Plans seeking an affirmative determination of energy compliance. This is *optional* for municipalities. However, any Town Plan granted an affirmative determination of Energy Compliance will receive substantial deference in § 248 proceedings. During these proceedings, the Public Utility Commission (PUC) reviews proposed energy generation facilities for approval or disapproval. Any policies concerning the siting or operation of energy generation facilities within a Town Plan that has received substantial deference will inform the criteria applied by the PUC in their review of a proposed facility.

The data in the attached document provides analyses and targets for your municipality that TRORC derived from a variety of regional and municipal data sources. Municipalities may choose to rely on these analyses and targets to meet the municipal standards set by the Department of Public Service (PSD). Alternatively, your municipality may develop your own custom analyses and targets or supplement the analyses and targets provided by TRORC. If these options are chosen, your municipality must include all of the same analyses and targets and meet the same standards outlined in PSD's *Guidance for Regional & Municipal Enhanced Energy Planning Standards*.

The enclosed Municipal Summary Worksheet and Energy Maps can also be found on the TRORC website under your respective town page. If you have any questions about the attached document or energy planning for your community, please do not hesitate to contact us.

Sincerely,

Bryan Kovalick

Bryan Kovalick, Planner

Strafford

The following is an explanation of the information displayed in the Municipal Summary Worksheet for Strafford.

The intent of the Municipal Summary is to provide your municipality with energy data that meets PSD's analysis and target standards to ensure your municipality's compliance with the requirements of Act 174 and "Enhanced Energy Planning" (24 V.S.A. § 4352). The worksheet contains data that estimates current energy use and provides targets for future energy use across all sectors (transportation, heating, and electricity). It also sets a target for renewable energy generation within the municipality.

This data is meant to be a starting point for your municipality to begin planning its energy future and to talk about the changes that may need to occur within the municipality to ensure that local, regional, and state energy goals are met. This includes the goal that 90% of all energy demand be met by renewable sources by 2050 (90x50 goal).

Figure 1 - Data Sources

- American Community Survey (ACS)
- Vermont Department of Labor (DoL)
- Vermont Department of Public Service (PSD)
- Energy Information Administration (EIA)
- Efficiency Vermont (EVT)
- Long-range Energy Alternatives Planning (LEAP)
- Vermont Energy Investment Corporation (VEIC)
- Vermont Agency of Transportation (VTRANS)

Estimates of current energy use and targets for future energy use are reliant upon the Long-range Energy Alternatives Planning (LEAP) analysis for the region completed for PSD. To estimate the current energy use of your Town, TRORC used PDS's Municipal Consumption. This tool uses inputs of data from the American Community Survey (ACS), the Vermont Agency of Transportation (VTrans), and the Vermont Department of Labor (DoL).

Targets for both future energy use and energy generation have been generally developed using a "bottom up" method of disaggregating regional data into the municipal level using PSD's Analysis and Targets Aid. PSD also makes certain assumptions within these tools based on statewide averages for energy consumption.

The targets established here show the direction in which change needs to occur to meet local, regional, and state energy goals. It is important to remember that the targets established by LEAP represent only one way to achieve energy goals. There may be other similar pathways your municipality may choose to meet your 90x50 goal. Please keep this in mind when reviewing the worksheet.

For those towns interested in learning more about how these estimates and targets were created, or about creating their own estimates and targets, please see PSD's Guidance for Regional & Municipal Enhanced Energy Planning Standards.

Municipal Summary Worksheet

The Municipal Summary worksheet summarizes all data that is required to be in the Municipal Plan if the plan is to meet the "determination" standards established by PSD.

4A. Current Transportation Energy Use

2022 Transportation Data

Total Number of Internal Combustion Engine (ICE) Vehicles[1]	1,039
Total Number of Electric Vehicles (EVs)[2]	44
Total Number of ICE Vehicles and EVs	1,083
Average Yearly Miles Driven per Vehicle[3]	12,500
Total Miles Driven per ICE Vehicle	12,987,500
Total Miles Driven per EV	550,000
Total Miles Driven per ICE Vehicle and EV	13,537,500
Average Fuel Economy of ICE Vehicles (Miles per Gallon)[4]	22
Average Fuel Economy of EVs (Miles per Kilowatt Hour)[4]	3
Total Gallons of Fuel Consumed by ICE Vehicles per Year	590,341
Total Number of Kilowatt Hours Consumed by EVs per Year	183,333
Transportation Energy Consumed by ICE Vehicles (mmBtus)[4]	69,642
Transportation Energy Consumed by EVs (mmBtus)[4]	626
Transportation Energy Consumed by ICE Vehicles and EVs (mmBtus)	70,268

This table calculates the energy use and energy cost of your residents' light-duty passenger vehicles. This does not include the energy use or energy cost of medium-duty vehicles, heavy-duty vehicles, mass transit, rail, commercial vehicles, or other modes of transportation. The Average Miles per Vehicle and Realized Miles per Gallon are 2021 statewide averages for light-duty passenger vehicles in Vermont as reported in the LEAP model. The Transportation Energy Used is calculated in Million British Thermal Units (mmBtus) using PSD's LEAP Municipal Consumption Template.

Data Sources: 1. ACS 2022 5-year Estimates. 2. Efficiency Vermont. 3. VTrans, 2021. 4. LEAP Municipal Consumption Template.

4A. Current Residential Heating Energy Use

Fuel Source[1]	Number of Households[1]	Percentage of Households	Square Footage Heated[2] (mmBtus)
Gas from Bottle or Tank (propane, butane, liquified petroleum gas)	164	30.1%	18,040
Electricity	4	0.7%	440
Fuel Oil, Kerosene, etc.	199	36.6%	21,890
Coal or Coke	0	0.0%	0
Wood	163	30.0%	17,930
Solar Energy	14	2.6%	1,540
Other Fuel	0	0.0%	0
No Fuel Used	0	0.0%	0
Total	**544**	**100.0%**	**59,840**

This table displays 2022 ACS 5-year Estimates for the sources of fuel for occupied residences within Strafford. The square footage heated figure is calculated in the PSD Municipal Consumption Template based on a statewide average annual heating load for residences, measured in Million British Thermal Units (mmBtus).

Data Source: 1. ACS 2022 5-year Estimates. 2. LEAP Municipal Consumption Template.

4A. Current Commercial Heating Energy Use

Number of Commercial Establishments[1]	Total Thermal Energy Consumed by Commercial Establishments[2] (mmBtus)	Average Thermal Energy Consumed by Commercial Establishments[2] (mmBtus)
25	12,313	493

This table displays the number of commercial establishments within Strafford as reported by the Vermont DoL in 2022. The thermal energy estimate is calculated in the PSD Municipal Consumption Template based on a statewide average annual heating load for select commercial establishments, measured in Million British Thermal Units (mmBtus).

Data Sources: 1. VT DoL 2022. 2. LEAP Municipal Consumption Template.

4A. Current Electricity Use

Use Sector	Current Electricity Use
Residential (MWh)	3,911
Commercial and Industrial (MWh)	844
Total (MWh)	**4,754**

This table displays 2022 data from EVT for the commercial & industrial sector and residential sector within Strafford.

Data Source: EVT 2022.

4B. Residential Thermal Efficiency Targets

	2025	2035	2050
Weatherized for Increased Efficiency and Conservation	49%	57%	83%

This table displays targets for the cumulative percentage of residences within Strafford that will be weatherized by the target year, thereby achieving increased thermal efficiency and energy conservation. These targets were developed using the PSD Analysis & Target Municipal Aid in the CAP Central Mitigation Scenario. To be counted, each weatherized residence will have to achieve a 25% reduction in heat energy.

Data Sources: LEAP Analysis & Target Aid. ACS 2022 5-year Estimates.

4B. Commercial Thermal Efficiency Targets

	2025	2035	2050
Weatherized for Increased Efficiency and Conservation	44%	32%	54%

This table displays targets for the cumulative percentage of commercial establishments within Strafford that will be weatherized by the target year, thereby achieving increased thermal efficiency and energy conservation. These targets were developed using the PSD Analysis & Target Aid in the CAP Central Mitigation Scenario. To be counted, each weatherized commercial establishment will have to achieve a 25% reduction in heat energy.

Data Sources: LEAP Analysis & Target Aid. VT DoL.

4B. Thermal Fuel Switching Targets – Heat Pumps

	2025	2035	2050
Number of Heat Pumps used by Residences (in units)	204	562	854
Number of Heat Pumps used by Commercial Establishments (in units)	13	27	16
Total	**218**	**589**	**870**

This table provides a target of the number of new heat pumps in the commercial and residential sectors of Strafford in the CAP Central Mitigation Scenario. This dataset assumes there will be 1.3 devices per residence and one device per 512 square feet of commercial floorspace based on state averages.

Data Sources: LEAP Analysis & Target Aid. ACS 2022 5-year Estimates. VT DoL.

4C. Use of Renewables - Transportation

	2025	2035	2050
Light Duty Electric Vehicles	5%	52%	100%

This table shows the percentage of light duty vehicles that are electric vehicles in the target years within Strafford in the CAP Central Mitigation Scenario.

Data Source: LEAP Analysis & Target Aid. EVT 2022.

4C. Transportation Fuel Switching Target – Electric Vehicles

	2025	2035	2050
Battery Electric	48	624	1,425
Plug In Hybrid Vehicles	7	7	2
Total	**55**	**631**	**1,427**

This table shows the count of light duty vehicles that are electric vehicles in the target years within Strafford in the CAP Central Mitigation Scenario.

Data Source: LEAP Analysis & Target Aid. EVT 2022.

4D. Electric Efficiency Targets

	2025	2035	2050
Cumulative Electricity Conserved – Residential (MWh)	80	468	889

This table shows the megawatt hours (MWh) of electricity cumulatively conserved by residences within Strafford by 2025, 2035, and 2050 based on modelling completed by EVT's 2022 Energy Efficiency Market Potential Study and PSD.

Data Source: EVT 2022 Energy Efficiency Market Potential Study. PSD Potential Study Data for RPCs Tool.

4D. Renewable Energy Generation Targets

	2025	2035	2050
Incremental Renewable Energy Generation (MWh)	23	216	1,799
Total Renewable Energy Generation (MWh)	7,736	7,929	9,512

This table shows targets for electric generation from renewable resources in megawatt hours (MWh) within Strafford. This table also reports the incremental generation of new renewable energy needed by each target year. This figure shows the increase in generation needed from Strafford's 2022 renewable energy generation levels.

The figures for 2035 and 2050 were developed using PSD's LEAP model. The figures for 2025 were developed by TRORC equating to a 0.3% increase from 2022 generation figures. TRORC used this approach because the LEAP model does not provide targets for 2025 renewable energy generation that are higher than the region's 2022 renewable energy generation.

Data Source: LEAP Generation Scenarios Tool.

4D. Use of Renewables - Heating

	2025	2035	2050
Residences	30%	76%	100%
Commercial	25%	65%	69%

This table displays the percentage of residences and commercial establishments within Strafford using heat pumps for thermal heating by the target year.

Data Source: LEAP Analysis & Target Municipal Aid.

9A. Existing Renewable Generation

Renewable Type	MW	MWh
Solar	5.8	7,684
Wind	0.0	29
Hydro	0.0	0
Biomass	0.0	0
Other	0.0	0
Total	**5.9**	**7,713**

This table shows existing renewable generation within Strafford for 2022, in both megawatt (MW) and megawatt hours (MWh), based on figures provided by PSD.

Data Source: PSD.

9B. Renewable Generation Potential

Renewable Type	MW	MWh
Ground-mounted solar	53	69,830
Rooftop Solar	9	10,866
Wind	35	69,133
Biomass	0	0
Hydro	0	0
Other	0	0
Total	**97**	**149,829**

Renewable generation potential is based on mapping completed by TRORC that is based on the Municipal Determination Standards and associated guidance documents developed by PSD. The renewable generation potential is expressed in MW and MWh by the type of renewable resource (solar, wind, hydro, etc.).

Data Sources: PSD. TRORC.

9C. Sufficient Land

Renewable Type	Land Available	Acreage Needed to Meet 2025 Target		Acreage Needed to Meet 2035 Target		Acreage Needed to Meet 2050 Target	
	Acres	Acres	%	Acres	%	Acres	%
Solar	372	41	11.0%	42	11.3%	50	13.4%
Wind	1,403	1	0.1%	1	0.0%	2	0.2%
Biomass	0	0	0.0%	0	0.0%	0	0.0%
Hydro	0	0	0.0%	0	0.0%	0	0.0%
Total	**1,775**	**42**	**2.4%**	**43**	**2.4%**	**52**	**2.9%**

This table shows there is sufficient land within Strafford to meet the renewable generation targets based on the renewable generation potential. The 'land available' category in this table only includes prime areas for wind and lands for solar generation that have no constraints and are not part of a priority forest block.

Data Sources: These prime areas for wind and solar generation were calculated by the Vermont Center for Geographic Information. TRORC excluded the acres of priority forest blocks mapped by the Vermont Agency of Natural Resources.

Existing Energy Generation

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SOLAR KW		HYDRO KW		BIOMASS KW	
·	15 - 25	·	15 - 100	•	19
○	26 - 100	○	101 - 500	●	20 - 375
○	101 - 500	○	501 - 2000		
○	501 - 2200	○	2001 - 37400		

Structures w/1ac buffer
3 Phase Power Lines
Substations

0 0.5 1 2 Miles

N

Solar
This map shows areas of potential electricity generation from solar energy. It includes areas with good access to solar radiation and also considers other conditions that may limit the feasibility of solar energy development. These limiting factors are referred to as constraints. Areas of prime solar potential exist where the natural conditions make development feasible and no constraints are present.

These maps are designed to initially identify areas and follow-up on-site work is required to verify the areas are feasible for projects. They are subject to revision and are NOT intended to green-light or fast-track projects.

DARK GREEN Prime: No Constraints within 1 mile 3 phase power
MEDUIM GREEN Prime: No Constraints no known or possible constraints present
LIGHT GREEN Constraints no known but at least one or more possible constraints
LIGHT GOLD: Constraints Present

Solar Energy Potential

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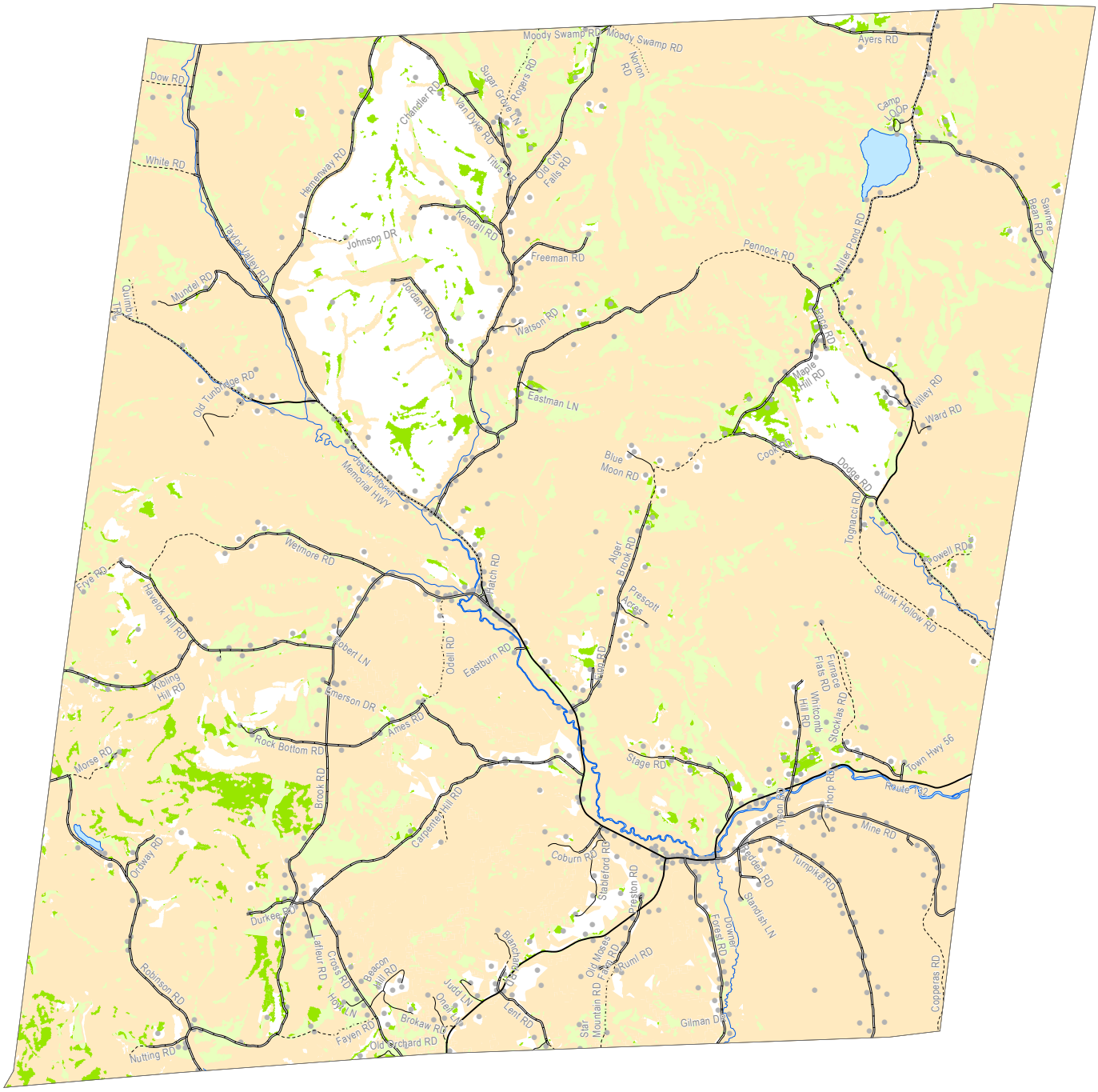

Substations
3 Phase Power Lines
Structures w/1ac buffer

Solar Potential
No Constraint 1m from 3phase
No Constraint
Possible Constraints

Constraints

N

0 0.5 1 2 Miles

Known Constraints
Vernal Pools (confirmed)
DEC River Corridors
FEMA Floodways
State-significant Natural Communities and Rare, Threatened, and Endangered Species
Wilderness Areas, including National Wilderness Areas
Class 1 and Class 2 Wetlands (VSWI and advisory layers)

Possible Constraints
Vernal Pools (unconfirmed)
Agricultural Soils (VT Agriculturally Important Soil Units)
FEMA Special Flood Hazard Areas
Protected Lands
Act 250 Agricultural Soil Mitigation areas
Deer Wintering Areas
Hydric Soils
VT Conservation Design Layers
Connectivity Forest Blocks - Highest Priority
Interior Forest Blocks - Highest Priority
Physical Land Division Forest Blocks - Highest Priority
Riparian Areas - Highest Priority
In 2024 Priority Interior Forest Block were added.

Wind
This map shows areas of potential electricity generation from wind energy. It includes areas with good access to wind and also considers other conditions that may limit the feasibility of wind energy development. These limiting factors are referred to as constraints. Areas of prime wind potential exist where the natural conditions make development feasible and no constraints are present.

These maps are designed to initially identify areas and follow-up on-site work is required to verify the areas are feasible for projects. They are subject to revision and are NOT intended to green-light or fast-track projects.

DARK GREEN Prime: No Constraints within 1 mile 3 phase power
MEDUIM GREEN Prime: No Constraints no known or possible constraints present
LIGHT GREEN Constraints no known but at least one or more possible constraints
LIGHT GOLD: Constraints Present

Wind Energy Potential

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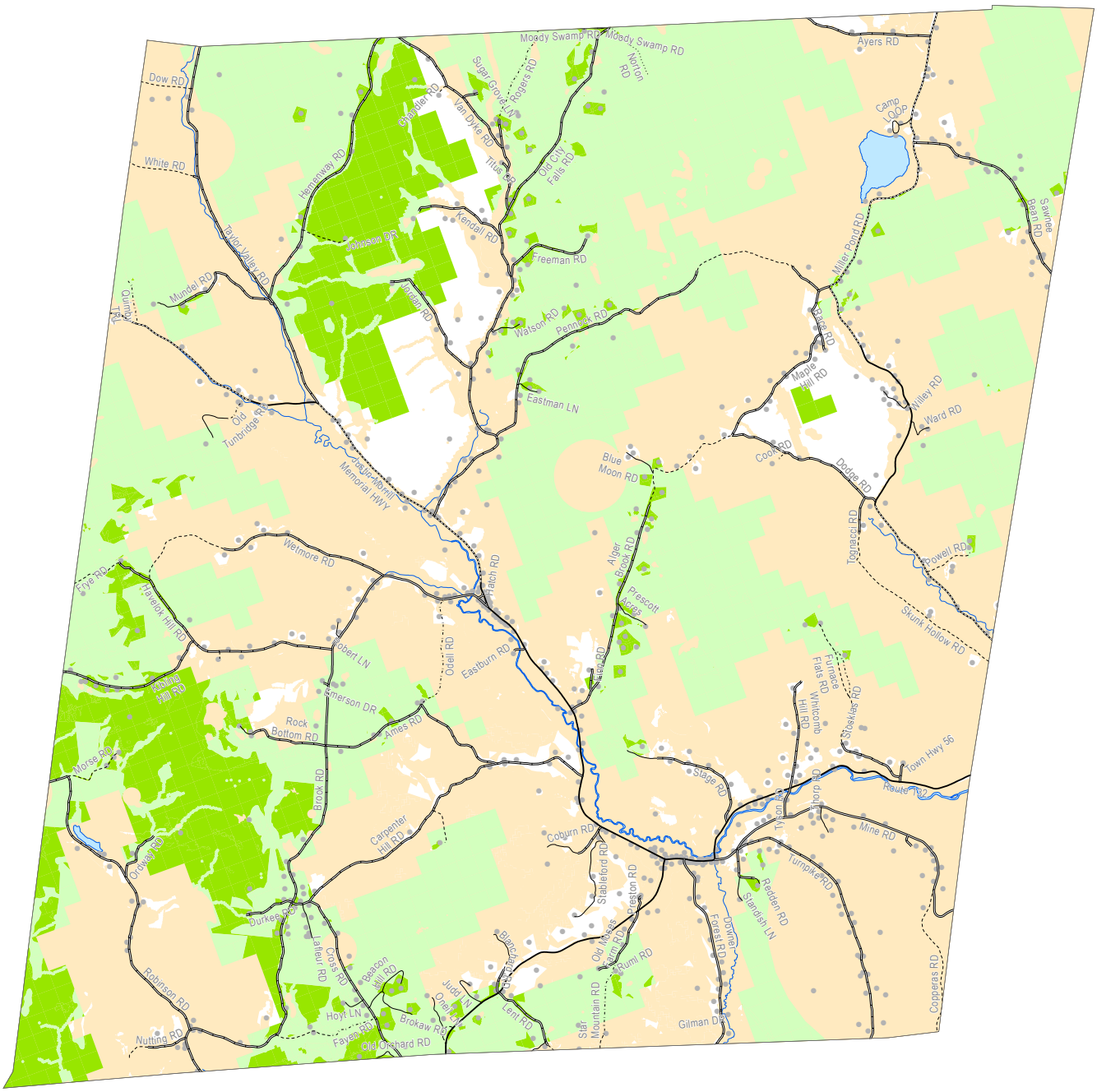

Substations
3 Phase Power Lines
Structures w/1ac buffer

Wind Potential	Constraints
No Constraint 1m from 3phase	
No Constraint	
Possible Constraints	

N

0 0.5 1 2 Miles

Known Constraints
Vernal Pools (confirmed)
DEC River Corridors
FEMA Floodways
State-significant Natural Communities and Rare, Threatened, and Endangered Species
Wilderness Areas, including National Wilderness Areas
Class 1 and Class 2 Wetlands (VSWI and advisory layers)

Possible Constraints
Vernal Pools (unconfirmed)
Agricultural Soils (VT Agriculturally Important Soil Units)
FEMA Special Flood Hazard Areas
Protected Lands
Act 250 Agricultural Soil Mitigation areas
Deer Wintering Areas
Hydric Soils
VT Conservation Design Layers
Connectivity Forest Blocks - Highest Priority
Interior Forest Blocks - Highest Priority
Physical Land Division Forest Blocks - Highest Priority
Riparian Areas - Highest Priority
In 2024 Priority Interior Forest Block were added.

Hydroelectric
Methodology: This map shows areas of resource potential for renewable energy generation from hydroelectric facilities. Sites identified are existing dams that could be developed for hydroelectric generation as well as active hydroelectric facilities. Information on existing hydroelectric facilities was obtained from the Vermont Dam Inventory and data on potential hydroelectric sites was obtained from a study conducted by Community Hydro in 2007.

HYDRO Energy Potential

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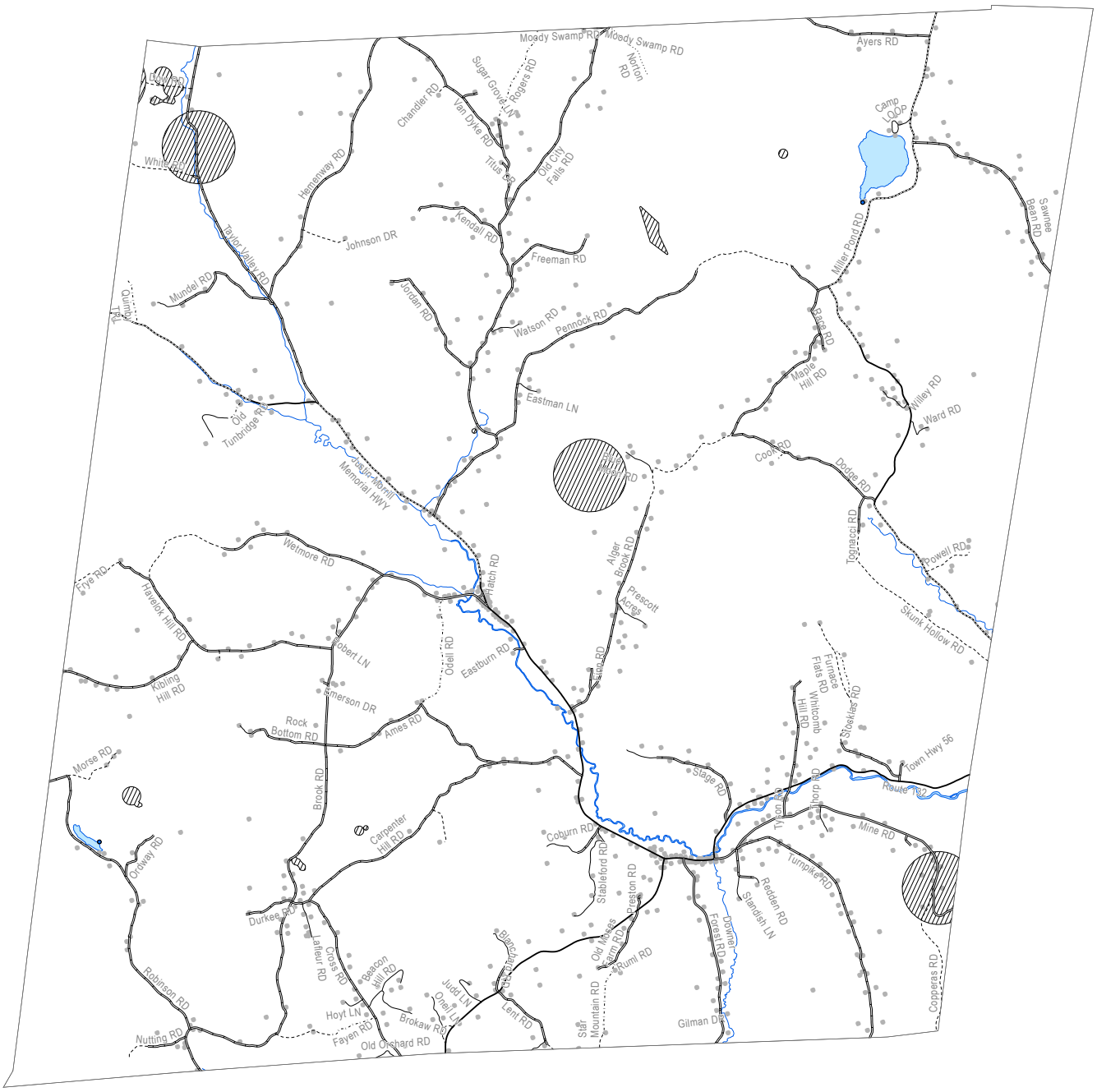

- Operational Hydroelectric Facilities
- Potential Hydroelectric Sites
  - < 50 kW Capacity
  - > 50 kW Capacity
  - High Hazard with < 50 kW Capacity
  - High Hazard with > 50 kW Capacity
- Stressed Waters
- Rare/Irreplaceable Natural Areas (RINAs)
- Substations
- 3 Phase Power Lines
- Structures w/1ac buffer

Hydroelectric Constraint Description
*** Rare and Irreplaceable Natural Areas (RINAs) are significant natural communities. They do not Include the following rank descriptions: uncommon to common breeder in VT, common to very common in VT, historic in VT, not applicable, unrankable, unrankable breeding population, and extirpated.**

0 0.5 1 2 Miles

N

Biomass
Methodology: This map shows areas of potential for woody biomass production and harvest. The map also illustrates other conditions that may limit the feasibility of extensive harvesting of wood for energy use. These limiting factors are referred to as constraints. The map does not show areas where other types of biomass, such as biomass from grasses or agricultural residue, could be grown/harvested.

BIOMASS Energy Potential

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Substations
3 Phase Power Lines
Structures w/1ac buffer
Woody BIOMASS

N

0 0.5 1 2 Miles