

APPENDIX



APPENDIX B - ENERGY RESOURCE MAPPING

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APPENDIX B - ENERGY RESOURCE MAPPING

Version 13 – 5/30/2017

The following is a list of the known constraints and possible constraints that have been included on the regional energy generation map in Appendix C (solar, wind, woody biomass, and hydroelectric). The energy generation maps are not intended to be used without the accompanying goals and policies of the NRPC contained in this plan. For more information about how the energy generation maps shall be used, please see Section V of the plan (see: Energy Resources Maps and the Public Service Board, Energy Generation Maps Methodology, and Northwest Regional Energy Generation Maps and Standards).

A. EXPLANATION OF CONSTRAINTS

The following is an explanation of known and possible constraints used by the NRPC to create the regional energy generation maps. This list of constraints shall also be considered by the NRPC during the review of generation project applications (Section 248) in the Northwest Region:

KNOWN CONSTRAINTS

Known constraints are considered high-priority resources and for this reason energy generation facilities shall not be located in areas where known constraints exist. For this planning initiative, known constraints have been removed from the base layer of each applicable type of resource (solar, wind, biomass, hydro).

POSSIBLE CONSTRAINTS

Possible Constraints are lower-priority resources. These resources often impact the siting process for generation facilities. New generation facilities shall not have an undue adverse impact upon possible constraints. Often, site-specific mitigation solutions are possible when possible constraints exist on a parcel. Therefore, possible constraints have been included in the area designated as “base” on the regional energy generation maps (solar, wind, biomass, hydro).

B. SOLAR GENERATION MAPS

STATE KNOWN CONSTRAINTS

- **Confirmed and Unconfirmed Vernal Pools:** There is a 600-foot buffer around confirmed or unconfirmed vernal pools. (Source: 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. (Source: VCGI)
- **River Corridors:** Only mapped River Corridors were mapped. Does not include 50 foot buffer for streams with a drainage area less than 2 square miles. (Source: VCGI)
- **National Wilderness Areas:** (Source: VCGI)
- **FEMA Floodways:** (Source: VCGI)
- **Class 1 and Class 2 Wetlands:** (Source: VCGI)

REGIONALLY IDENTIFIED CRITICAL RESOURCES (REGIONAL KNOWN CONSTRAINTS)

- **Designated Downtowns, Designated Growth Centers, and Designated Village Centers:** These areas the center of dense, traditional development in the region. This constraint does not apply to roof-mounted solar within such designated areas. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan. (Source: NRPC)

- **FEMA Flood Insurance Rate Map (FIRM) Special Flood Hazard Areas:** Special flood hazard areas as digitized by the NRPC were used—just 100-year flood plain (500-year floodplain not mapped). The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan. (*Source: NRPC*)
- **Ground and Surface Waters Drinking Protection Areas:** Buffered Source Protection Areas (SPAs) are designated by the Vermont Department of Environmental Conservation (DEC). SPA boundaries are approximate but are conservative enough to capture the areas most susceptible to contamination. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan. (*Source: Vermont Agency of Natural Resources [ANR]*)
- **Vermont Conservation Design Highest Priority Forest Blocks:** The lands and waters identified here are the areas of the state that are of highest priority for maintaining ecological integrity. Together, these lands comprise a connected landscape of large and intact forested habitat, healthy aquatic and riparian systems, and a full range of physical features (bedrock, soils, elevation, slope, and aspect) on which plant and animal natural communities depend. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan. (*Source: ANR*)
- **Public Water Sources:** A 200-foot buffer is used around public drinking water wellheads. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan. (*Source: ANR*)
- **National Natural Landmark – Chazy Fossil Reef:** The Chazy Fossil Reef in Isle La Motte has been designated a National Natural Landmark by the US Department of Interior. (*Source: NRPC*)
- **Municipal Conservation Land Use Areas:** Conservation Land Use Districts, as designated in municipal plans, that include strict language that strongly deters or prohibits development have been included as a regional known constraint. The inclusion of this resource as a regional constraint is consistent with the goals and policies of the Northwest Regional Plan. Specific municipal land use districts included are outlined in Section D.

STATE POSSIBLE CONSTRAINTS

- **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. (*Source: VCGI*)
- **Deer Wintering Areas:** Deer wintering habitat as identified by the Vermont Agency of Natural Resources. (*Source: VCGI*)
- **Hydric Soils:** Hydric soils as identified by the US Department of Agriculture. (*Source: VCGI*)
- **Agricultural Soils:** Local, statewide, and prime agricultural soils are considered. (*Source: VCGI*)
- **Act 250 Agricultural Soil Mitigation Areas:** Sites conserved as a condition of an Act 250 permit. (*Source: VCGI*)

REGIONALLY IDENTIFIED RESOURCES (REGIONAL POSSIBLE CONSTRAINTS)

- **Class 3 Wetlands:** Class 3 wetlands in the region have been identified have been included as a Regional Possible Constraint. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan (*Source: ANR*)
- **Municipal Conservation Land Use Areas:** Conservation Land Use Districts, as designated in municipal plans, that include strict language that deters, but does not prohibit development, have been included as a regional possible constraint. Specific municipal land use districts included are outlined in Section D.

OTHER MAP FEATURES

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

C. BIOMASS MAPS

STATE KNOWN CONSTRAINTS

- **Confirmed and Unconfirmed Vernal Pools:** There is a 600-foot buffer around confirmed or unconfirmed vernal pools. (*Source: 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. (*Source: VCGI*)
- **River Corridors:** Only mapped River Corridors were mapped. Does not include 50 foot buffer for streams with a drainage area less than 2 square miles. (*Source: VCGI*)
- **National Wilderness Areas:** (*Source: VCGI*)
- **FEMA Floodways:** (*Source: VCGI*)
- **Class 1 and Class 2 Wetlands:** (*Source: VCGI*)

REGIONALLY IDENTIFIED CRITICAL RESOURCES (REGIONAL KNOWN CONSTRAINTS)

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- **Ground and Surface Waters Drinking Protection Areas:** Buffered Source Protection Areas (SPAs) are designated by the Vermont Department of Environmental Conservation (DEC). SPA boundaries are approximate but are conservative enough to capture the areas most susceptible to contamination. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan. (*Source: Vermont Agency of Natural Resources [ANR]*)
- **Vermont Conservation Design Highest Priority Forest Blocks:** The lands and waters identified here are the areas of the state that are of highest priority for maintaining ecological integrity. Together, these lands comprise a connected landscape of large and intact forested habitat, healthy aquatic and riparian systems, and a full range of physical features (bedrock, soils, elevation, slope, and aspect) on which plant and animal natural communities depend. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan. (*Source: ANR*)
- **Public Water Sources:** A 200-foot buffer is used around public drinking water wellheads. The inclusion of this resource as a regional constraint is consistent with goals and policies of the Northwest Regional Plan. (*Source: ANR*)

- **National Natural Landmark – Chazy Fossil Reef:** The Chazy Fossil Reef in Isle La Motte has been designated a National Natural Landmark by the US Department of Interior. (*Source: NRPC*)
- **Municipal Conservation Land Use Areas:** Conservation Land Use Districts, as designated in municipal plans, that include strict language that strongly deters or prohibits development have been included as a regional known constraint. The inclusion of this resource as a regional constraint is consistent with the goals and policies of the Northwest Regional Plan. Specific municipal land use districts included are outlined in Section D.

STATE POSSIBLE CONSTRAINTS

- **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. (*Source: VCGI*)
- **Deer Wintering Areas:** Deer wintering habitat as identified by the Vermont Agency of Natural Resources. (*Source: VCGI*)
- **Hydric Soils:** Hydric soils as identified by the US Department of Agriculture. (*Source: VCGI*)
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- **Water Bodies:** Major water bodies (i.e., >1 square kilometer in surface area) are shown on maps as “Lakes/Ponds.” (*Source: VCGI*)

D. WIND GENERATION MAPS

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dedicated to conserving land or resources, and private parcels with conservation easements held by non profit organizations. (Source: VCGI)

- **Deer Wintering Areas:** Deer wintering habitat as identified by the Vermont Agency of Natural Resources. (Source: VCGI)
- **Hydric Soils:** Hydric soils as identified by the US Department of Agriculture. (Source: VCGI)
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OTHER MAP FEATURES

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

E. HYDRO GENERATION MAPS

KNOWN CONSTRAINTS

- None

REGIONALLY IDENTIFIED RESOURCES (REGIONAL POSSIBLE CONSTRAINTS)

- **National Scenic and Recreational Rivers:** Known constraint; Missisquoi and Trout Rivers. This constraint will only be incorporated into the Hydroelectric Resource Map. Dams occurring within an impacted area will be displayed as such on maps. (Source: Digitized by the BCRC from Upper Missisquoi and Trout Rivers, Wild and Scenic Study Management Plan)

POSSIBLE CONSTRAINTS

- **"303d" List of Stressed Waters:** Possible constraint. This constraint will only be incorporated into the Hydroelectric Resource Map. Dams occurring within an impacted area will be displayed as such on maps. (Source: ANR)
- **Impaired Water:** Possible constraint. This constraint will only be incorporated into the Hydroelectric Resource Map. Dams occurring within an impacted area will be displayed as such on maps. (Source: 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. (*Source: VCGI*)

OTHER MAP FEATURES

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

F. EXPLANATION OF MUNICIPAL CONSERVATION LAND USE AREAS

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

STRONGLY DETERS

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

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

DETERS

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

- Alburgh Town and Village – Conservation Land B
- Bakersfield – Conservation District
- Fairfax – Conservation District
- Fairfield – Conservation District
- Fletcher – Conservation District
- Highgate – Forest Reserve District

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

NEUTRAL

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

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

DEVELOPMENT MAY OCCUR

These conservation land use areas do not contain language that restricts development. These areas have not been included on the Regional Energy Generation maps. Municipal conservation land use areas that meet this description include:

- Franklin – Conservation District