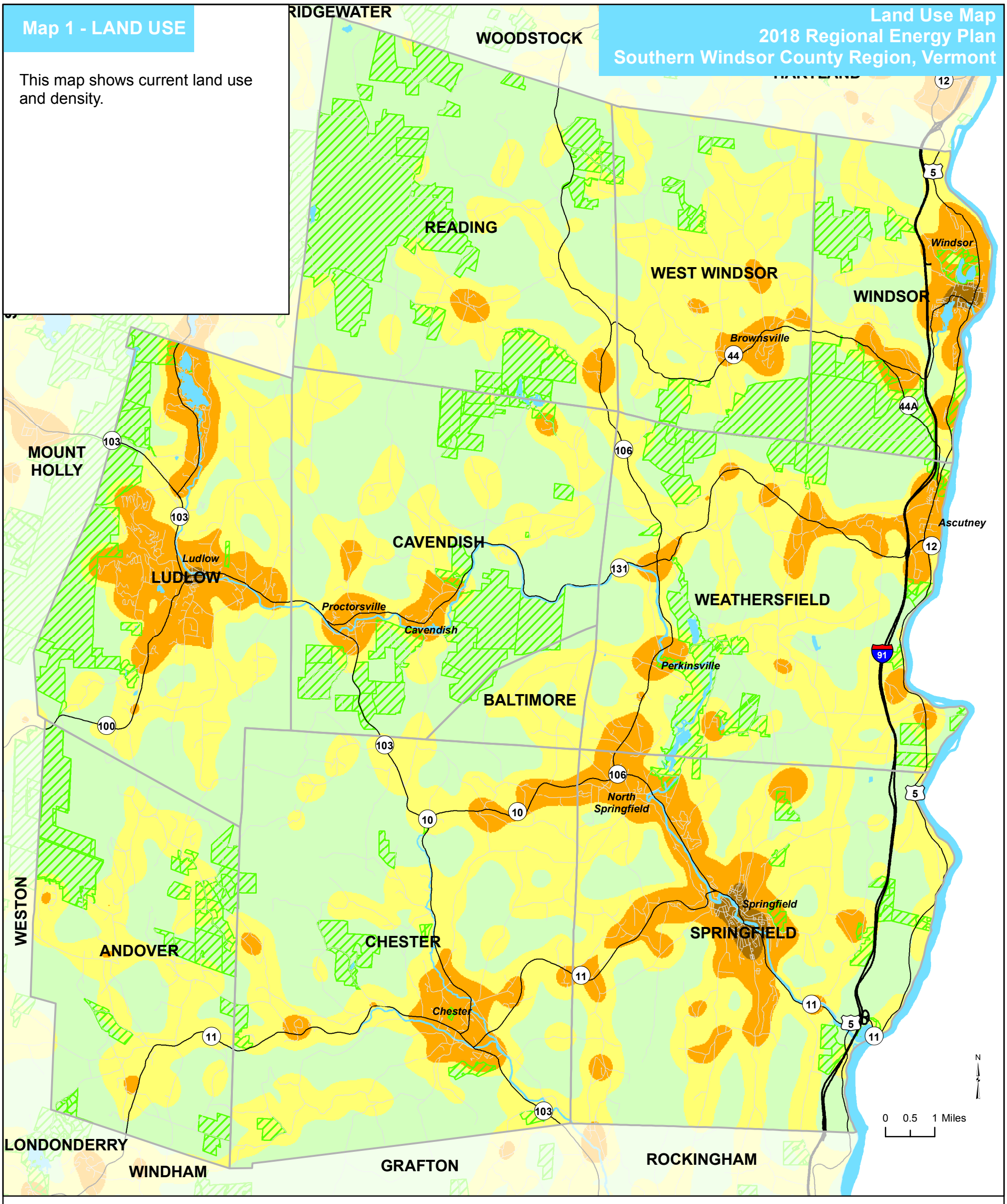
Map 1 - LAND USE

This map shows current land use and density.

Land Use Map
2018 Regional Energy Plan
Southern Windsor County Region, Vermont



HIGH RESIDENTIAL DENSITY
'Urban" area with at least 1 unit per acre. Also includes significant commercial and industrial uses.

MEDIUM RESIDENTIAL DENSITY
"Suburban" area with between 1 unit per acre and 1 unit per 10 acres. Also includes some commercial and industrial uses.

LOW RESIDENTIAL DENSITY
"Exurban" area with between 1 unit per 10 acres and 1 unit per 200 acres.

RURAL
"Rural" area with less than 1 unit per 200 acres.

Housing Density

- Undeveloped or Rural (less than 0.025 units per acre)
- Exurban (0.025 to 0.1 units per acre)
- Suburban (0.1 to 1 unit per acre)
- Urban (at least 1 unit per acre)
- Conserved Lands
- Interstate
- US & VT Highway; and Class 1 Town Hwy
- All other roads and ROW
- Major River
- Major Lakes and Ponds
- Town

Data sources: Housing Density (ACRPC 2013 using 2011 esite data), Conserved lands (Protected Lands Database) (VCGI and others 2016), Waterbodies (VHD 2008), Roads (VTrans 2015), Town Boundaries (VCGI 2012).

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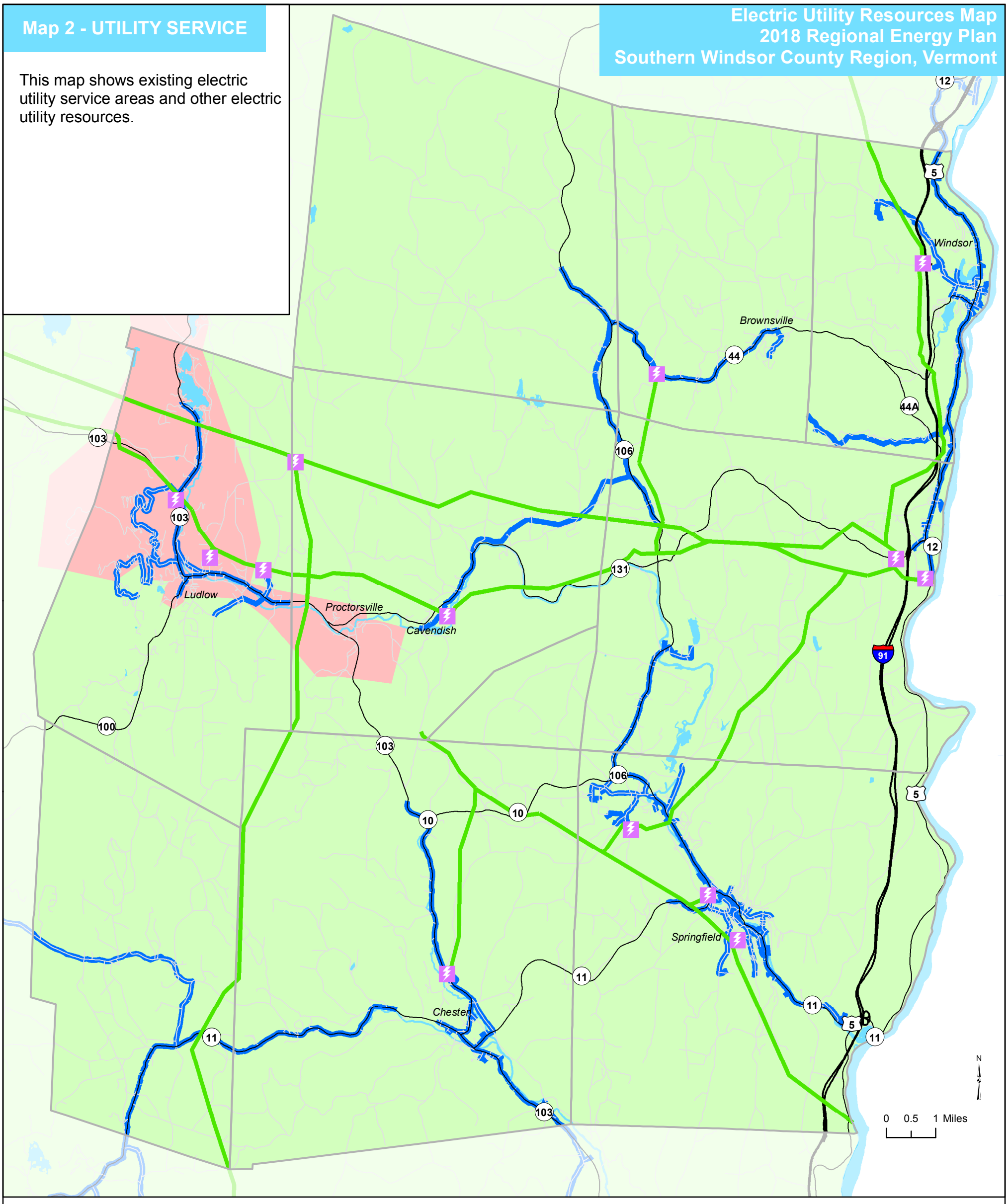
Electric Utility Resources Map
2018 Regional Energy Plan
Southern Windsor County Region, Vermont

Map 2 - UTILITY SERVICE

This map shows existing electric utility service areas and other electric utility resources.



LE
GMP

ELECTRIC UTILITY SERVICE AREAS
Green Mountain Power and Ludlow Electric Light Dept

ELECTRIC TRANSMISSION LINE

THREE PHASE ELECTRIC DISTRIBUTION LINE

- Substation
- Green Mountain Power
- Ludlow Electric Light Department (Municipal)
- Three Phase Electricity Distribution Lines
- Electric Transmission Line
- Interstate
- US & VT Highway; and Class 1 Town Hwy
- All other roads and ROW
- Major River
- Major Lakes and Ponds
- Town

For up to date mapping of three phase electric distribution see www.greenmountainpower.com/innovative/solar_capital/3-phase-service-in-vermont/

For information about the distribution circuit rating for new distributed generation (DG) interconnections see the GMP Online Solar Planning Map http://arcg.is/2b1a2MU
All connections in the Region are currently good.

Data sources: Electric Utility Service Areas (VCGI 2015), Substations (BCRC 2015 and SWCRPC 2017), Three Phase Electricity Lines (BCRC 2015 and Town/RPC 2018), Transmission Lines (RPC 2016), Waterbodies (VHD 2008), Roads (VTrans 2015), Town Boundaries (VCGI 2012).

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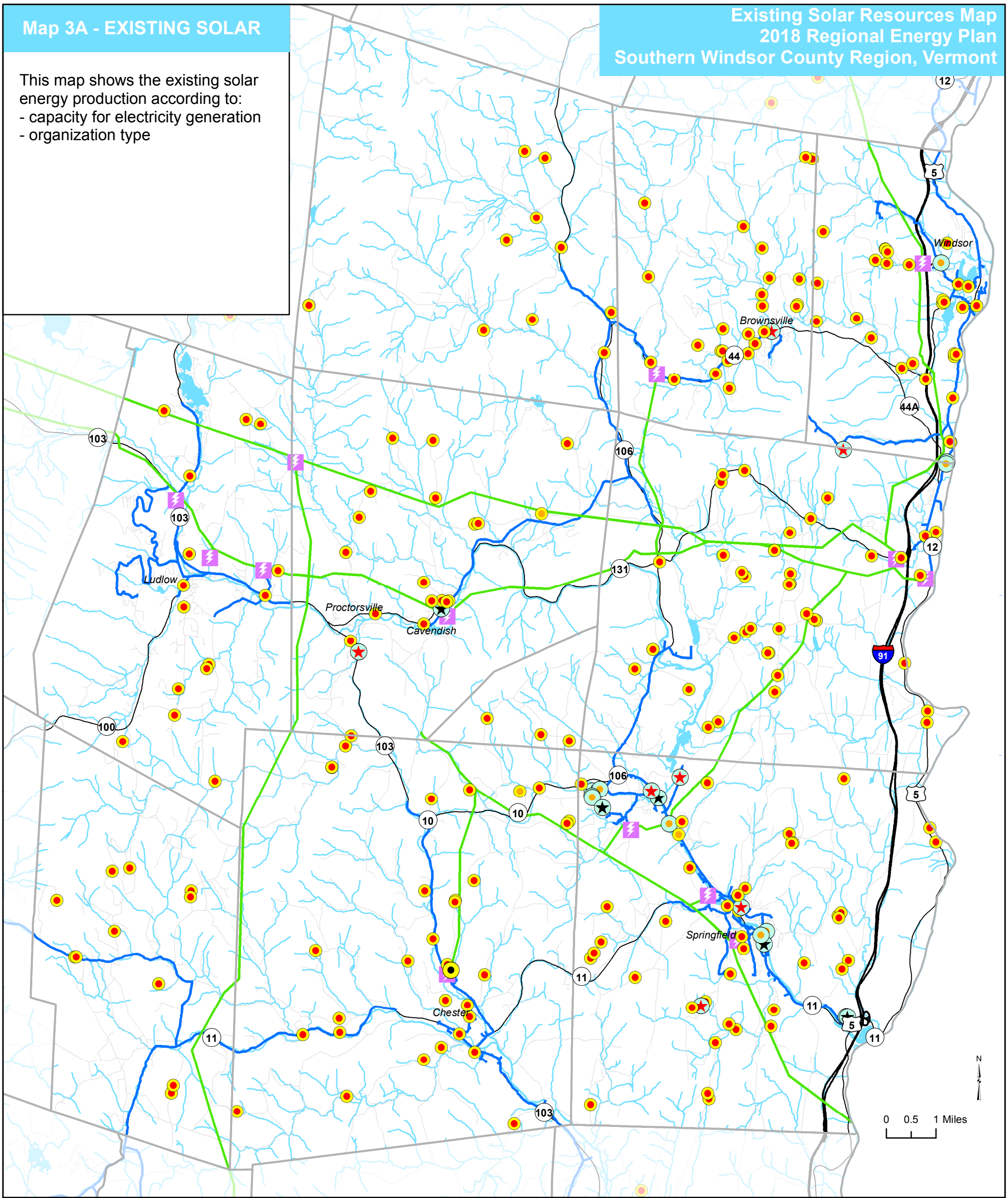
Map 3A - EXISTING SOLAR

This map shows the existing solar energy production according to:
- capacity for electricity generation
- organization type

Existing Solar Resources Map
2018 Regional Energy Plan
Southern Windsor County Region, Vermont



Existing solar energy generation sites

- Business, Institution or Municipality with a capacity of 150kW or more
- Business, Institution or Municipality with a capacity of 15kW or less
- Business, Institution or Municipality with a capacity of 15.1kW - 150KW
- Residential, Capacity of 150kW or more
- Residential, Capacity of 15kW or less
- Residential, Capacity of over 15kW but less than 150kW
- Substation
- Electric Transmission Line
- Three Phase Electricity Distribution Lines
- Interstate
- US & VT Highway; and Class 1 Town Hwy
- All other roads and ROW
- Streams
- Major Lakes and Ponds
- Town

The Vermont Public Service Board divides applications for a Certificate of Public Good by net metering system capacity:
- 15kW or less
- Over 15kW but less than 150kW
- 150kW or more

Data sources:
Solar Facilities (Vermont Energy Dashboard. Sites listed on Atlas on 02/03/2017), Three Phase Electricity Lines (BCRC 2015 and Town/ RPC 2018), Transmission Lines (RPC 2016), Substations (RPC 2017), Waterbodies (VHD 2008), Roads (VTrans 2015), Town Boundaries (VCGI 2012).

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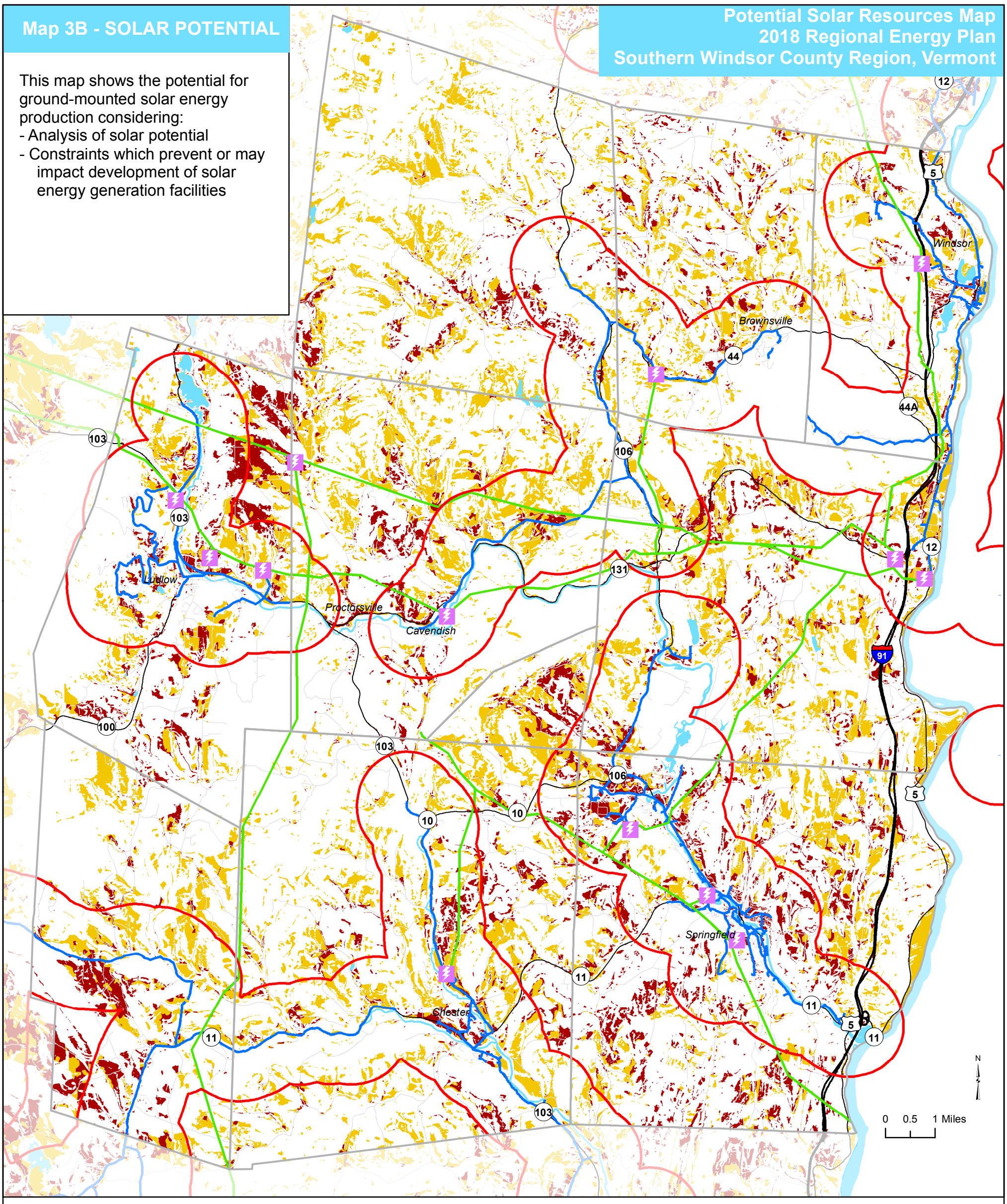
Map 3B - SOLAR POTENTIAL

Potential Solar Resources Map
2018 Regional Energy Plan
Southern Windsor County Region, Vermont

This map shows the potential for ground-mounted solar energy production considering:
- Analysis of solar potential
- Constraints which prevent or may impact development of solar energy generation facilities



PRIME SOLAR POTENTIAL/
No known constraints

SECONDARY SOLAR POTENTIAL/
Possible constraints

- Substation
- Electric Transmission Line
- Three Phase Electricity Distribution Lines
- Area within 1 mile of existing three phase electricity distribution lines
- Interstate
- US & VT Highway; and Class 1 Town Hwy
- All other roads and ROW
- Major River
- Major Lakes and Ponds
- Town

Solar potential for ground-mounted systems was calculated to consider the following conditions:
- slope direction
- slope steepness
- radiation values from ESRI solar analyst

For more info see http://vcgi.vermont.gov/opendata/act174

The Regional Energy Planning Standards are available at http://publicservice.vermont.gov/content/act-174-recommendations-and-determination-standards

Data sources: Prime and Secondary Solar Potential (VCGI 2017), Three Phase Electricity Lines (BCRC 2015 and Town/ RPC 2018), Buffer on Three Phase Lines (SWCRPC 2018), Transmission Lines (RPC 2016), Substations (RPC 2017), Waterbodies (VHD 2008), Roads (VTrans 2015), Town Boundaries (VCGI 2012).

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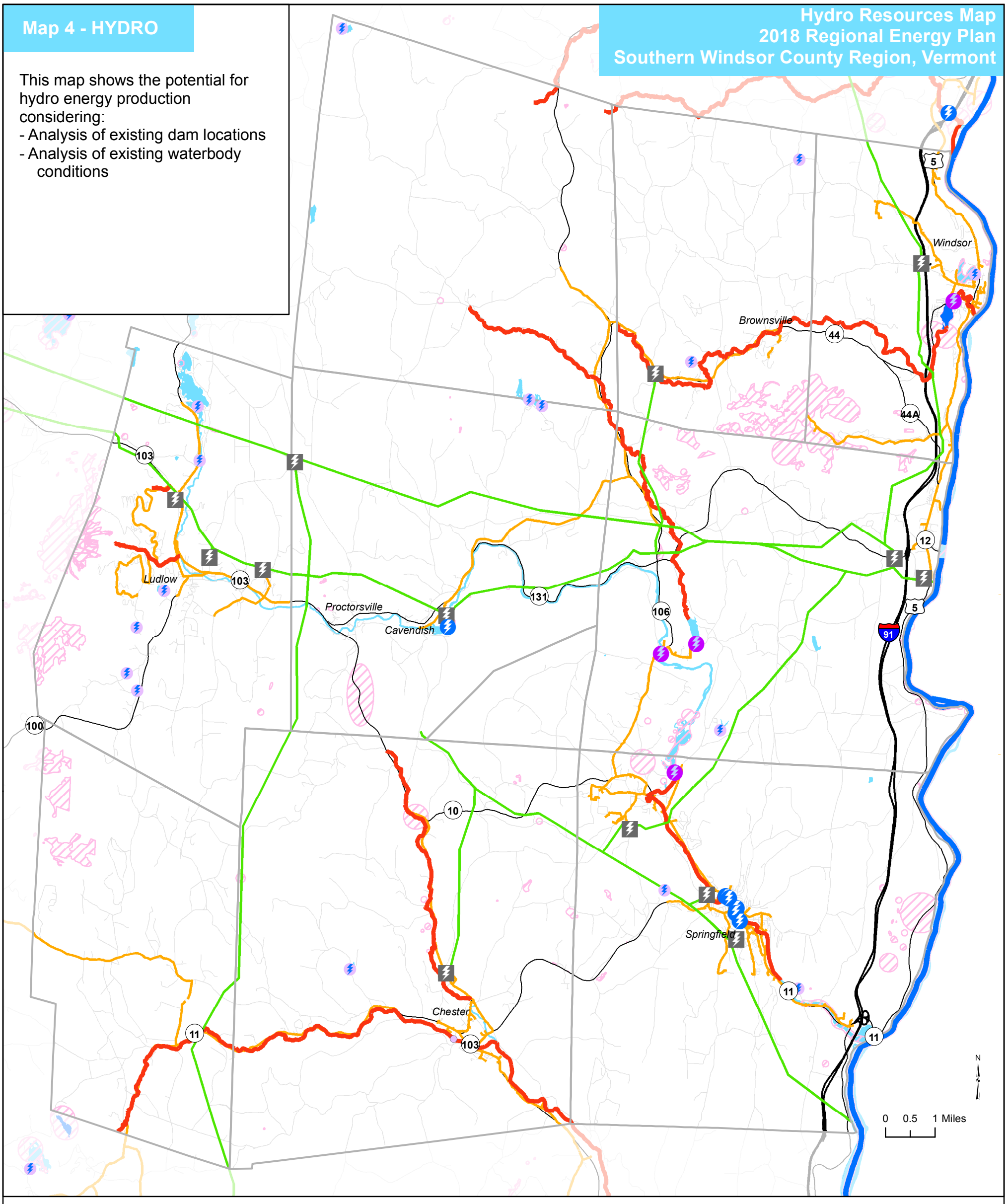
Hydro Resources Map
2018 Regional Energy Plan
Southern Windsor County Region, Vermont

Map 4 - HYDRO

This map shows the potential for hydro energy production considering:
- Analysis of existing dam locations
- Analysis of existing waterbody conditions



HYDRO POTENTIAL
Existing dams with hydro power generation potential

- Existing Hydro Sites
- Undeveloped hydro potential over 50 KW
- Undeveloped hydro potential less than 50KW
- Potential with penstock
- Substation
- Rare and Irreplaceable Natural Area
- Priority Lake, Pond, River or Stream
- Stressed Lake, Pond, River or Stream
- Electric Transmission Line
- Three Phase Electricity Distribution Lines
- Interstate
- US & VT Highway; and Class 1 Town Hwy
- All other roads and ROW
- Major River
- Major Lakes and Ponds
- Town

Potential hydro electric generation sites were identified by using existing dam location data for all of Vermont and then estimating electric production. Estimating is an inexact science, and estimates can vary widely between different studies. For more info see www.vtenergyatlas-info.com/hydro/methodology

The Vermont Priority Waters List was developed by Vermont DEC "for the purposes of identifying and tracking important water quality problems where the Vermont Water Quality Standards (VTWQS) are not met [...] This list is composed of several parts, each identifying a group of waters with unique water quality concerns that are either impaired or altered." (ANR 2013).

A stressed waterbody is one that "while these waters are in compliance with the Water Quality Standards, stressors are present that impede the water from attaining the highest water quality" (ANR 2014).

There are no outstanding resource waters or stormwater impaired watersheds in the Region.

Data sources: Existing and Potential Hydro Sites (VSJF 2010), Priority waterbodies (ANR 2012 and 2013), Stormwater Impaired Watersheds (ANR Unknown), Stressed waterbodies (ANR 2014), Outstanding Resource Waters (ANR 2010), Rare and Irreplaceable Natural Area (BCRC), Three Phase Electricity Lines (BCRC 2015 and Town/ RPC 2017), Transmission Lines (RPC 2016), Substation (BCRC 2015 & SWCRPC 2017), Waterbodies (VHD 2008), Roads (VTrans 2015), Town Boundaries (VCGI 2012).

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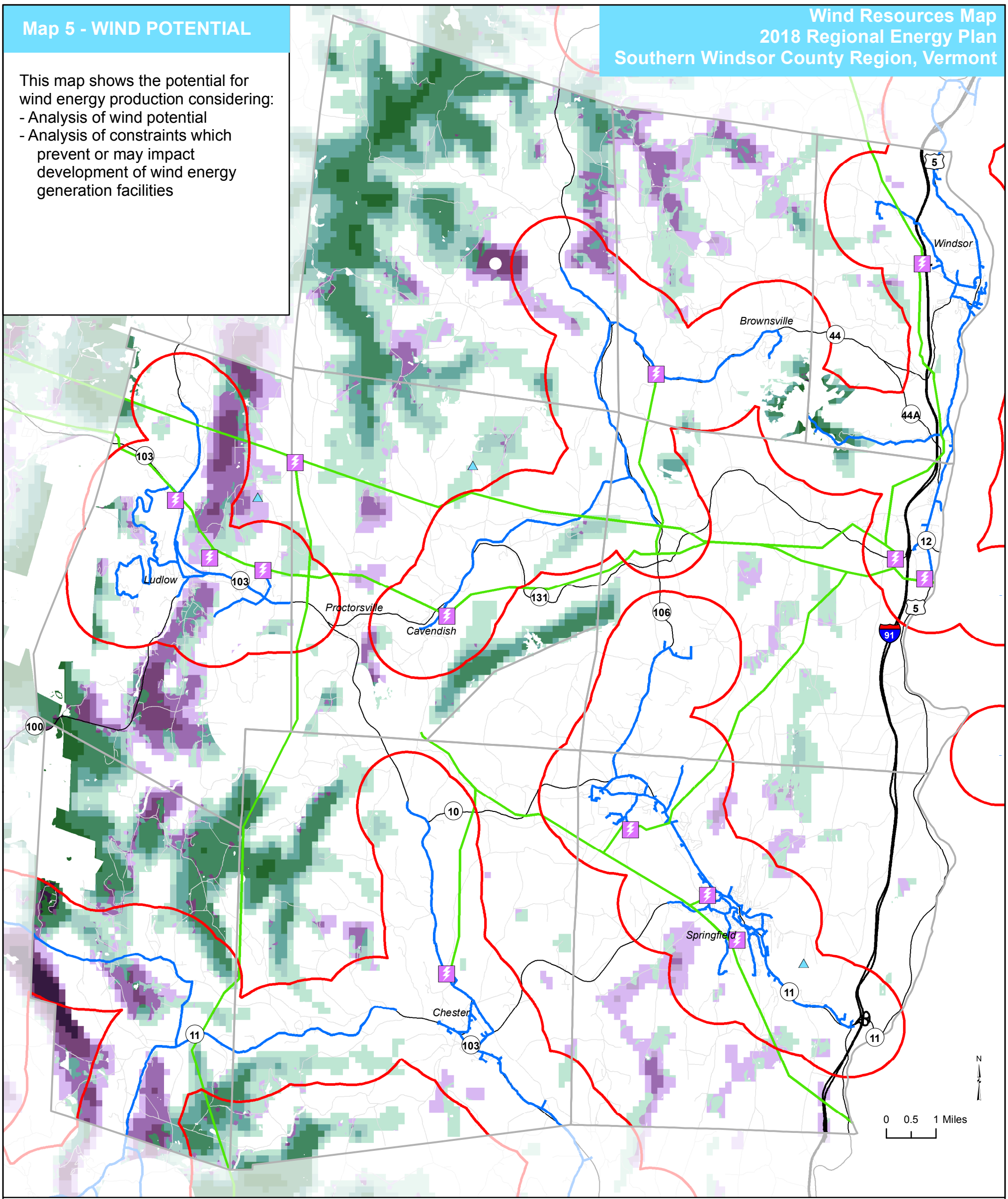
Map 5 - WIND POTENTIAL

Wind Resources Map
2018 Regional Energy Plan
Southern Windsor County Region, Vermont

This map shows the potential for wind energy production considering:
- Analysis of wind potential
- Analysis of constraints which prevent or may impact development of wind energy generation facilities



PRIME WIND POTENTIAL/
No known constraints

SECONDARY WIND POTENTIAL/
Possible constraints

Prime - Highest Potential Wind Speed
- 10.07 - 10.94 mph
- 10.94 - 12.10
- 12.10 - 13.82
- 13.82 - 16.46
- 16.46 - 25.70

Secondary - Highest Potential Wind Speed
- 10.07 - 11.45 mph
- 11.45 - 12.82
- 12.82 - 14.32
- 14.32 - 16.46
- 16.46 - 25.70

- Residential Wind Facility
- Substation
- Electric Transmission Line
- Three Phase Electricity Distribution Lines
- Area within 1 mile of existing three phase electricity distribution lines

Potential wind speeds were calculated using the TrueWind Solutions MesoMap wind mapping system. For more info see www.vtenergyatlas-info.com/wind/methodology

There are currently no commercial wind facilities in the Region.

The Regional Energy Planning Standards are available at http://publicservice.vermont.gov/content/act-174-recommendations-and-determination-standards

Data sources: Prime and Secondary Wind Potential (VCGI 2017), Wind Facilities (VT Energy Dashboard. Sites listed on Atlas on 02/03/2017), Three Phase Electricity Lines (BCRC 2015 & Town/ RPC 2018), Buffer on Three Phase Lines (SWCRPC 2018), Transmission Lines (RPC 2016), Substation (BCRC 2015 & SWCRPC 2017), Waterbodies (VHD 2008), Roads (VTrans 2015), Town Boundaries (VCGI 2012).

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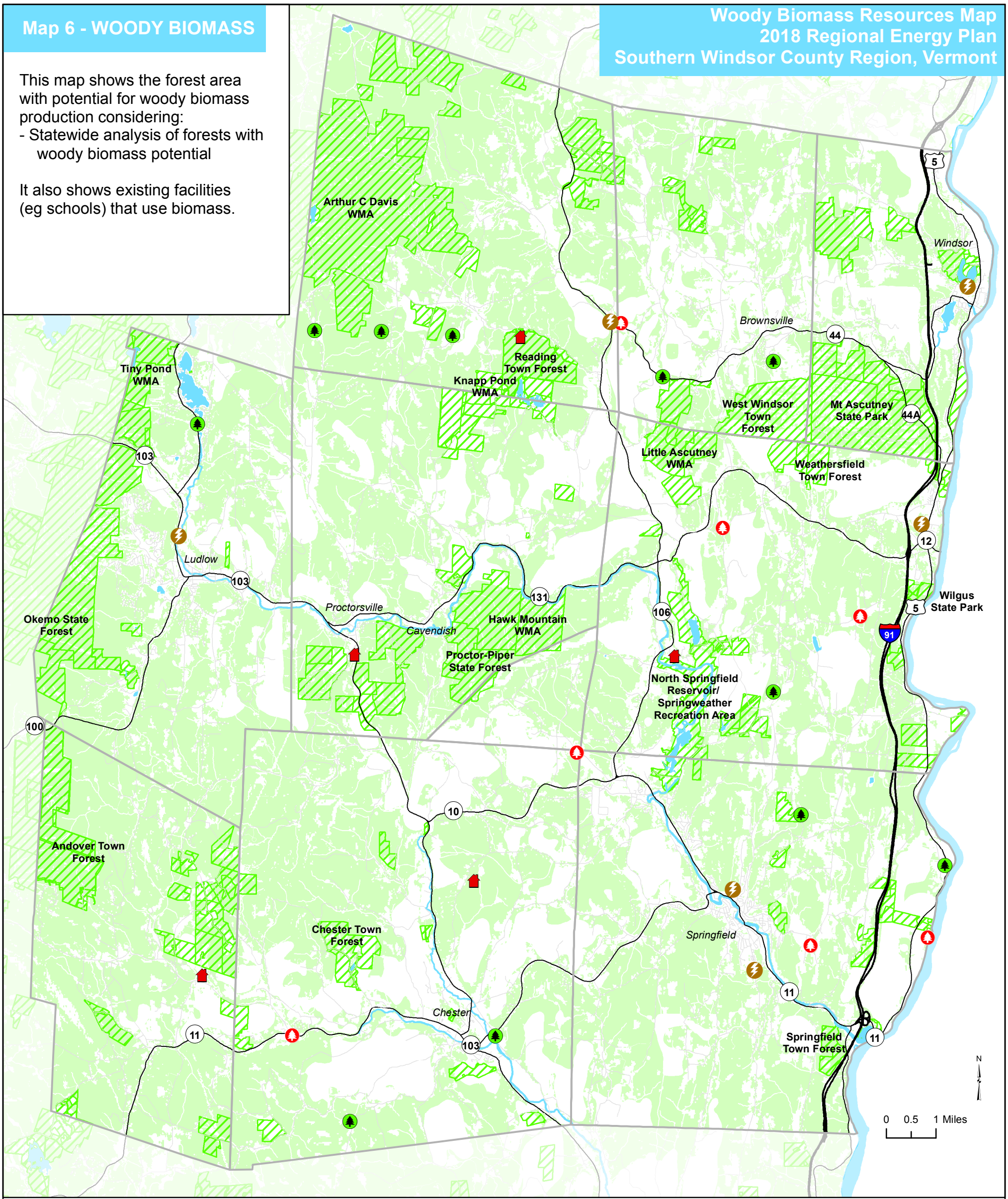
Map 6 - WOODY BIOMASS

This map shows the forest area with potential for woody biomass production considering:
- Statewide analysis of forests with woody biomass potential

It also shows existing facilities (eg schools) that use biomass.

Woody Biomass Resources Map
2018 Regional Energy Plan
Southern Windsor County Region, Vermont



FOREST AREA WITH BIOMASS POTENTIAL
Areas identified with woody biomass potential

CONSERVED LANDS
Some of these lands may not be available for woody biomass energy production

- Existing Biomass Energy Sites
- Christmas Tree Farm
- Maple Sugar Producer
- Saw Mill with 2 or more employees
- Conserved Land
- Forest area with biomass potential (from VSJF)
- Interstate
- US & VT Highway; and Class 1 Town Hwy
- All other roads and ROW
- Major River
- Major Lakes and Ponds
- Town

Forest areas with biomass potential were calculated using a variety of data including forest inventory, forest growth and harvesting and then estimate the Net Available Low Grade (NALG) wood that can be sustainably harvested for thermal or electrical applications. For more info see www.vtenergyatlas-info.com/biomass/woody-biomass/methodology

Note: Biomass energy fuel can also come from other sources, for example cropland and grassland for biodiesel production.

Data sources: Woody Biomass Supply Estimates (VSJF 2010), Existing Biomass Energy Sites (Vermont Energy Dashboard, Sites listed on Atlas on 02/03/2017), Forest Producers (Christmas Tree Farms, Maple Sugar Producers and Saw Mills) (SWCRPC 2013), Conserved lands (Protected Lands Database) (VCGI and others 2016), Waterbodies (VHD 2008), Roads (VTrans 2015), Town Boundaries (VCGI 2012).

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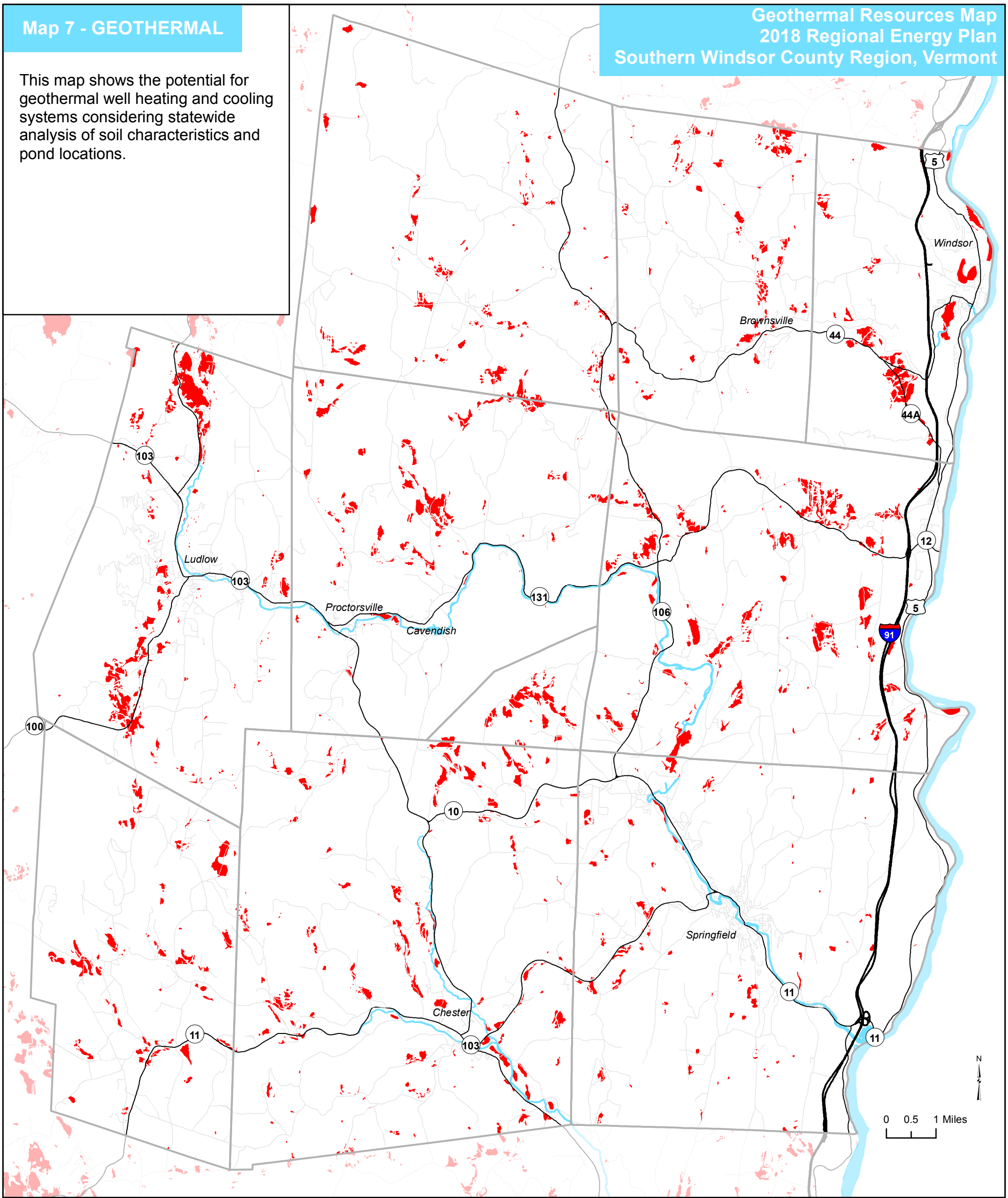
Map 7 - GEOTHERMAL

This map shows the potential for geothermal well heating and cooling systems considering statewide analysis of soil characteristics and pond locations.

Geothermal Resources Map
2018 Regional Energy Plan
Southern Windsor County Region, Vermont



GEOTHERMAL POTENTIAL
Areas identified with soils that have a high suitability for geothermal heating systems or a waterbody of sufficient size to support geothermal heating systems.

- Existing Geothermal Site
- Potential Geothermal Site
- Interstate
- US & VT Highway; and Class 1 Town Hwy
- All other roads and ROW
- Major River
- Other Major Lakes and Ponds
- Town

This map shows potential for closed loops with horizontal, vertical or pond systems. For horizontal or vertical systems "the ground heat source is gained through either a series of 'loop pipes' placed in vertically drilled holes or horizontal loops buried in soil" and potential was calculated using soil characteristics. For pond systems 'the ground heat source comes from a pond of at least 0.5 acres" and potential was calculated by selecting any pond over 0.5 acres.

This map does not show the potential for open loop systems which can "use well water as a heat exchange fluid that circulates directly through a ground source heat pump".

For more info see www.vtenergyatlas-info.com/geothermal/methodology

There are currently no known geothermal sites in the Region.

Data sources: Existing and Potential Geothermal Heating Sites (VSJF 2010),

Waterbodies (VHD 2008), Roads (VTrans 2015), Town Boundaries (VCGI 2012).

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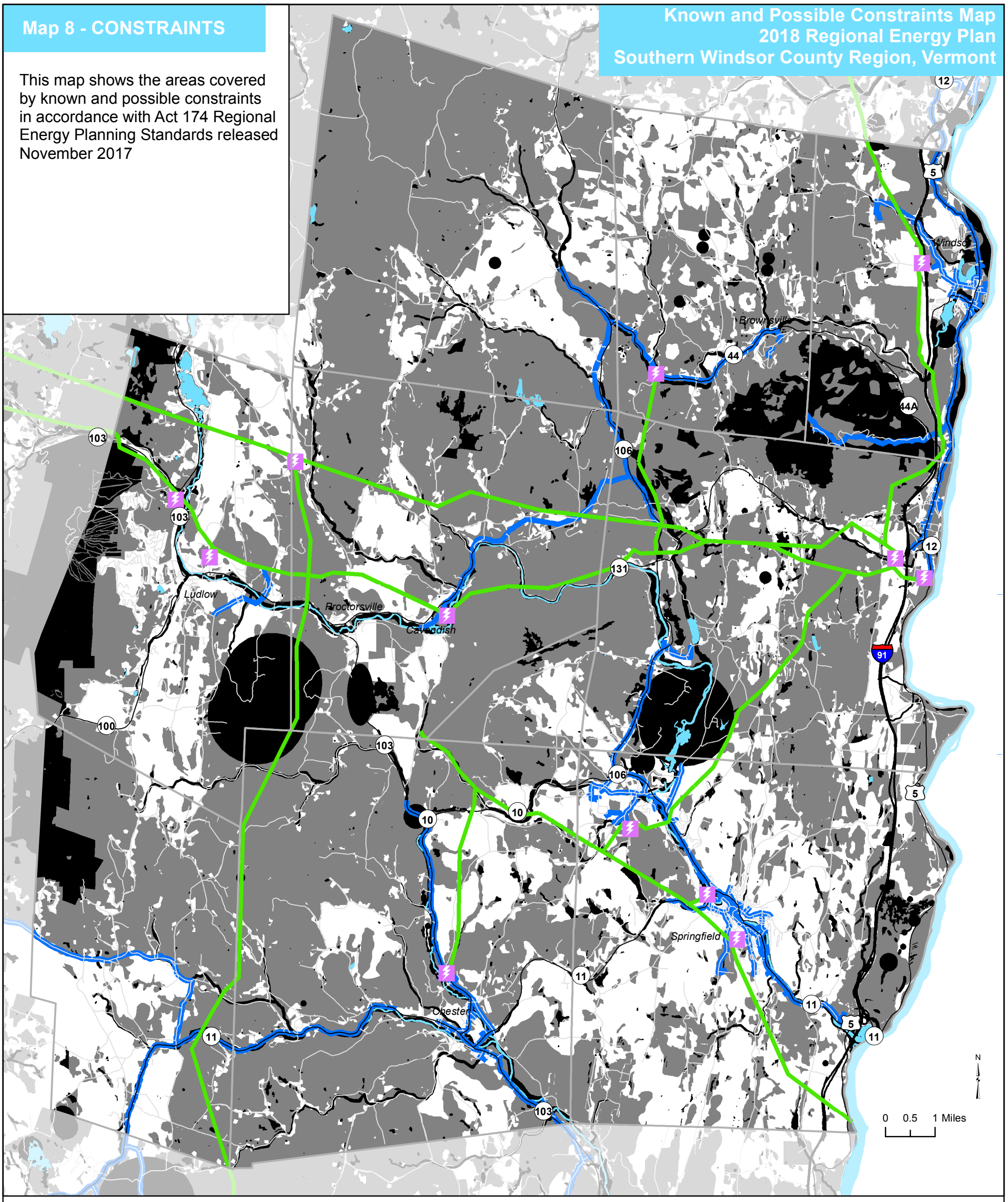
Map 8 - CONSTRAINTS

This map shows the areas covered by known and possible constraints in accordance with Act 174 Regional Energy Planning Standards released November 2017

Known and Possible Constraints Map
2018 Regional Energy Plan
Southern Windsor County Region, Vermont



KNOWN CONSTRAINTS
signal likely, though not absolute, unsuitability for development based on statewide or local regulations or designated critical resources.

POTENTIAL CONSTRAINTS
signal conditions that would likely require mitigation, and which may prove a site unsuitable after site-specific study, based on statewide or regional/ local policies that are currently adoped or in effect.

- Known Constraint
- Possible Constraint
- Substation
- Three Phase Electricity Distribution Lines
- Electric Transmission Line
- Interstate
- US & VT Highway; and Class 1 Town Hwy
- All other roads and ROW
- Major River
- Major Lakes and Ponds
- Town

In November 2017 the State defined the following as "known" constraints:
- Vernal pools
- DEC River Corridors
- FEMA Floodways
- State significant natural communities
- Rare, Threatened and Endangered Species
- National Wilderness Areas
- Class 1 and 2 Wetlands

The State defined the following as "possible" constraints:
- Agricultural soils
- FEMA Special Flood Hazard Areas
- Protect Lands (ie conserved lands)
- Act 250 Agricultural Soil Mitigation areas
- Deer wintering areas
- ANR's Vermont Conservation Design Highest Priority Forest Blocks
- Hydric Soils

Data sources: Known and Possible Constraints defined by the State (VCGI Act 174 v2), Substations (BCRC 2015 and SWCRPC 2016), Three Phase Electricity Lines (BCRC 2015), Transmission Lines (RPC 2016), Waterbodies (VHD 2008), Roads (VTrans 2015), Town Boundaries (VCGI 2012).

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