TRORC REGIONAL PLAN - 2020

NN-JK-10

TWO RIVERS-OTTAUQUECHEE REGIONAL PLAN

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Two Rivers-Ottauquechee
REGIONAL COMMISSION

ADOPTED - July 15, 2020
EFFECTIVE - August 19, 2020

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JULY 2020

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INTRODUCTION

1

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A. TRORC

The Two Rivers-Ottauquechee Regional Commission (TRORC) is a compact of thirty municipalities in east-central Vermont. It was founded in 1970 by the acts of its constituent towns and is a political subdivision of state government. TRORC's programs are governed by representatives appointed by the selectboard from each of its member towns. TRORC exists to advocate for the needs of its members and to help bridge the opportunities and concerns that exist between towns and the State. TRORC's primary purposes are to provide technical services to town officials, to act as a resource for local governments, and to conduct regional planning and development activities.

B. The Region

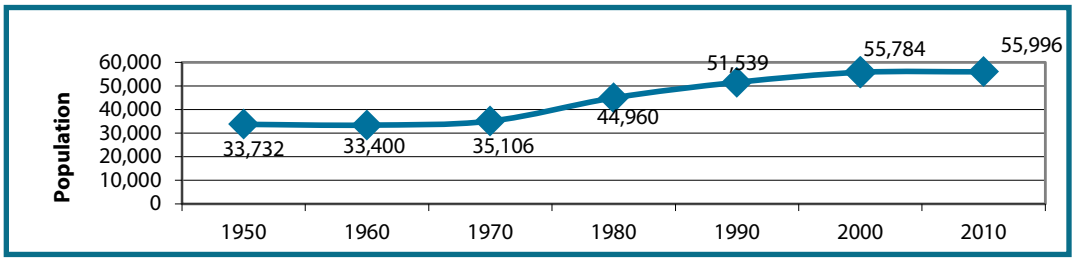
This section provides a historic perspective on demographic factors within the Region. The data presented is intended to provide the framework necessary for analysis of future development goals.

Population

Population and rate of growth are major influences on the overall development of the Region. Increases or decreases in population relate directly to the design and capacity of this Region's infrastructure. The density and overall distribution pattern of population and population movements within the Region affect the type of public facilities necessary to provide an adequate level of service. Public investments can be more effectively prioritized and implemented when population characteristics and trends are understood.

The population of the Region in 2010 was 55,996, and in 2000 it was 55,784; this means the Region grew by 0.38% or 212 people between 2000 and 2010. However, this is a much slower growth rate for the Region than in decades past (see Figure 1-1). While just over half of the Region's towns saw a population increase, the other half saw population decreases (see Figure 1-2). During the same decade, Vermont's overall population

Figure 1-1: Two Rivers-Ottauquechee (TRO) Region Population, 1950-2010



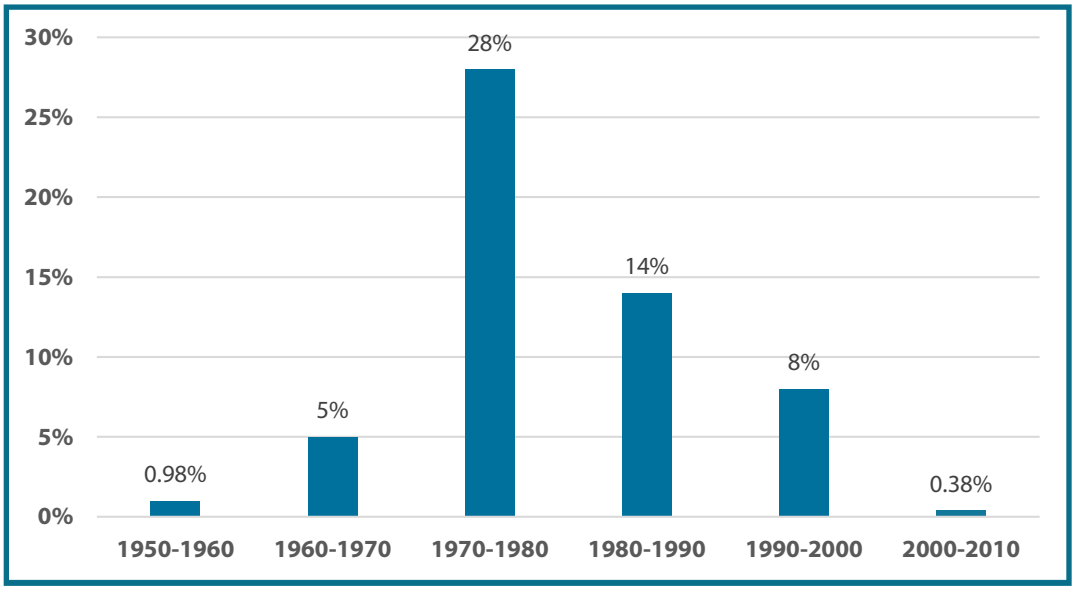
Source: U.S. Census

increased by 2.6%, or by 16,123 people, to a total of 625,741. The towns experiencing the highest growth in the Region were not the towns nearest the economic and employment centers (White River Junction, VT, and Hanover and Lebanon, NH) but were some of the outlying towns as illustrated in Figure 1-3.

This may indicate that cost of land and housing affordability is pushing workers farther from the traditional centers of population and commerce to towns where affordable housing and land are available. Outlying towns (towns beyond the traditional centers of commerce) experienced a migration of younger families who sought to purchase homes or land for home construction. Some of the communities (Bethel, Royalton, Sharon, Stockbridge, Bradford, and Newbury) that experienced increases in population are close to major roads.

The State saw a slight increase in the size of the child-aged population over the decade, but the Region saw a slight decrease. In 2010, the population of persons aged 19 years and younger constituted roughly 20.7% of the state and regional populations, but the Region had a lower population of young adults (aged 20 to 24) than did the State, 5% for the Region and 7% for the State. The Region had a larger proportion of elderly persons (aged 65 years and over) than did the State, 16% for the Region and 15% for the State. The Region's growth was most driven by the in-migration of people aged 45 through 70 looking for a high quality of life, secure real estate investments, and changes in lifestyle.

Figure 1-2: Population in the TRO Region



Source: U.S. Census

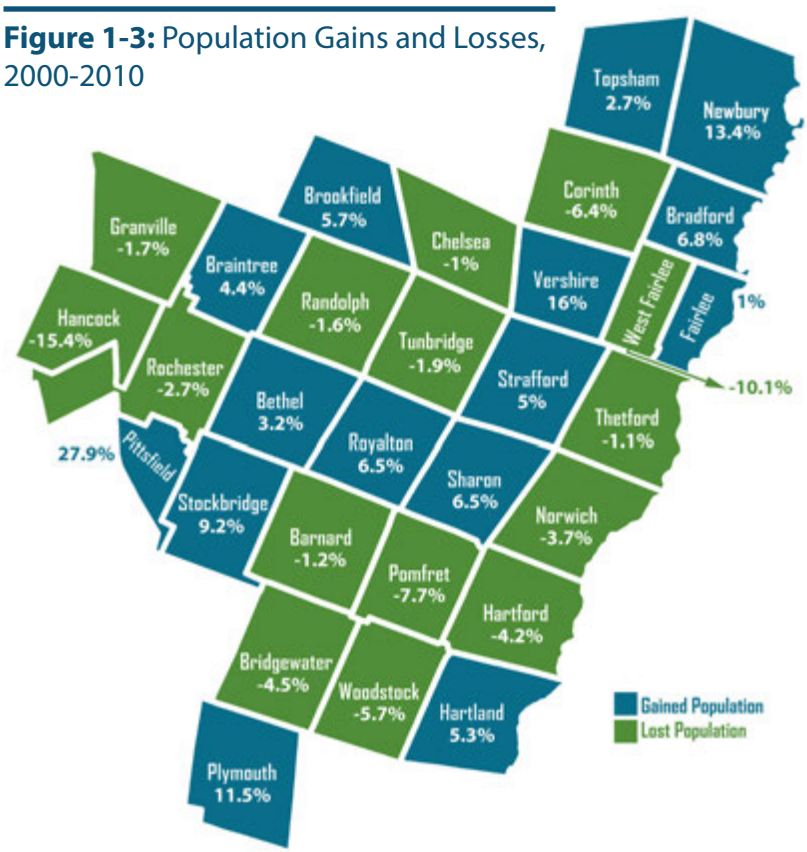
Future Population Projections

Future population projections are functions of two components: an estimate of natural changes in population that considers births and deaths, and estimates of migration. In 2013, the Vermont Department of Aging and Independent Living contracted with the Vermont Agency of Commerce and Community Development to produce population projections for the State, counties, and municipalities in Vermont that were based on the 2010 Census and would project growth to 2030. The projections were based on the assumption that economic conditions throughout Vermont would remain stable (see Figure 1-4).

Sharon, Vershire, and Thetford had the three highest rates of growth over the past sixty years (see Figure 1-3).

Looking at the towns that experienced moderate or slow growth over the past sixty years, the town of Stockbridge is projected to be the fastest growing town from 2020 to 2030. Vershire, Bethel, Plymouth, Pittsfield, Royalton, and Sharon are projected to grow faster than the regional, county, and state averages; the remaining towns will experience growth near the regional and state averages. Finally, the projections indicate that seven towns (Chelsea, Granville, Hancock, Randolph, Thetford, West Fairlee, and Woodstock) will lose population as they approach 2030.

Figure 1-3: Population Gains and Losses, 2000-2010



Source: U.S. Census

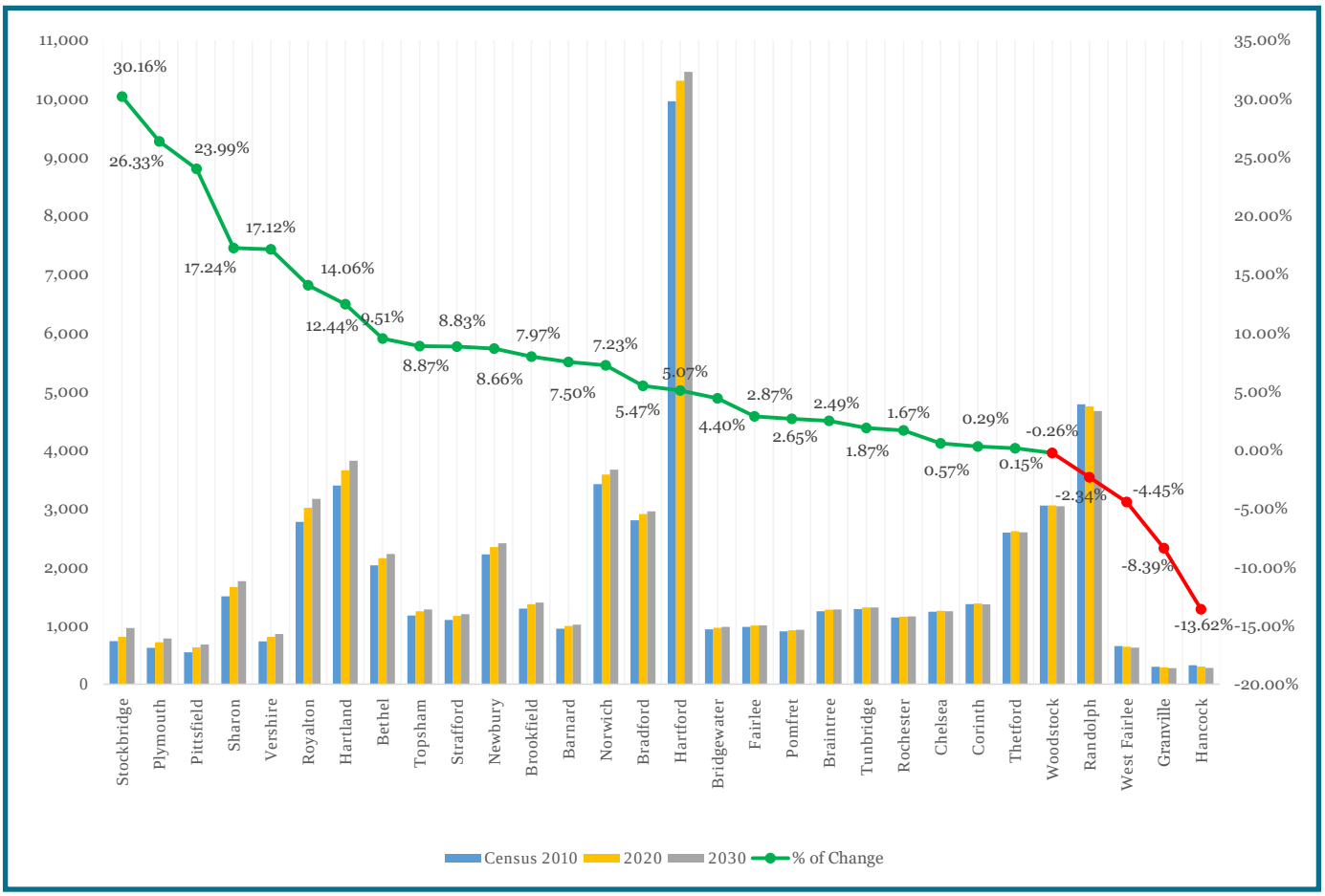
Brief History of the Region: 1760 to Present

The dominant land use pattern we see in the Region today began with European settlement in the 1760s, following the end of the French and Indian War. Immigration into the Region came largely from southern New England and continued into the early 1800s. With the opening of private turnpikes, military roads, and bridges, young people seeking new opportunities in farming flowed into the Connecticut River Valley towns. In the early 1800s, the Region's population reached an all-time high.

While transportation improvements were being advanced in the Region, others were being made outside the Region. The resulting transportation system enabled locally grown produce and raw materials to reach outside markets.

With the improvements to transportation to the west, including the famous Erie Canal, Vermont's farmers lost some of their goods market to New York and Ohio. Additionally, improved access to other areas set the stage for westward migration out of the Region, a movement that continued into the early part of the twentieth century. Much has been written about the drift of the Region's farmers to the west. Not all of the Region's residents chose to leave the area, however. Many sought an enterprise in sheep farming, which put to use the rocky uplands and also resulted in loss

Figure 1-4: TRO Region Population Projections



Source: VT Department of Aging and Independent Living; analysis by VT Agency of Commerce and Community Development, 2013

of soil on hillsides and the lowest levels of forest in our history. The sheep industry flourished, with Orange and Windsor counties being two of the leading production areas in the 1850s. The sheep era brought in the woolen industry. This was the first major move of employment toward non-agricultural pursuits. The number of mills increased dramatically. Factories began to emerge, as most towns in the Region give evidence to today, with dams and mills situated on major rivers.

As in the earlier years, transportation improvements were major factors in regional change, setting off the decline in the sheep industry. Improved access to growing competition in the west, combined with comparatively higher annual costs for sheep farming in the Region, made Vermont less competitive. Concurrently came the emergence of the railroad as an attractive alternative to the fragmented system of roads and trails. Low population and few industries along the rail lines limited the ability of the railroads to operate successfully at first. To be successful, railroads had to rely on additional traffic from out of state. Formed in the 1840s, the Central Vermont Railroad extended lines through the White River Valley to be followed shortly thereafter by the Connecticut and Passumpsic River line (currently the Boston and Maine) along the eastern side of

The sheep industry flourished, with Orange and Windsor counties being two of the leading production areas in the 1850s.

the Region. Following the development of these and other main lines throughout the Region and Vermont during the late 1870s, a number of short rail lines emerged. These included the White River Railroad, a twenty-mile line extending from Bethel to Rochester, the Woodstock Railroad, a fifteen-mile line extending from White River Junction to Woodstock, and the Montpelier and Wells River Railroad, extending from Wells River and New Hampshire to Montpelier. All of these lines reflected the need to transport goods, raw materials, and people to and from some of the interior communities located away from major rail centers and lines. By the middle of the next century these lines fell into financial decline, and they were eventually discontinued and liquidated.

Railroads need to be recognized as key factors for the development and maturity of the State's tourism and recreation business today, a vital and growing part of the Region's economy.

Railroads can be credited as a contributor to the economic development of the Region. Railroads need to be recognized as key factors for the development and maturity of the State's tourism and recreation business today, a vital and growing part of the Region's economy. The implications resulting from rail line development heavily influence the land use patterns and cultural values of our villages and countryside today. Also, it should come as no revelation that most of the Region's primary highways follow closely the course of existing or former railroad lines.

The Region saw a decline in population between 1860 and 1960. The die off of sheep and dairy farming, paired with cheaper and richer agricultural land out west, led to decline. During this time, the clear cut land slowly became reforested.

During the 1960s and 1970s, the Region entered into an evolution of yet another transportation network imposed upon the landscape—the superhighway. Interstates 91 and 89 were completed throughout the Region and Vermont, bypassing most of the Region's villages and tending to siphon off traffic from the older parallel truck roads such as Routes 5, 12, and 14, spelling economic hardships for some of the downtowns and villages.

The Region has thirteen Interchange Areas on I-91 and I-89. Some of these Interchange Areas have proven to be prime targets for roadside commercial development. Since land access to other points along the Interstates has been prohibited, land around the interchanges has become sought after and highly valuable. While not yet prevalent within this Region, the Interchange Area throughout Vermont is becoming somewhat of a center for certain uses historically kept to within the town center. These include retail shops in large complexes such as shopping centers, automobile service and sales, trucking terminals, and other non-residential vehicular oriented uses. For the Region, the core of the retail marketplace still remains within village centers and along roads leading to and from them. In some cases, such as in Bethel, Randolph, and Bradford, some downtown area merchants have felt that they have become an economic casualty of major road building and the development that has followed. Now the same source of funding that built or rebuilt major highways (the federal government) is being used to resuscitate these areas (through funding for sidewalks, bikeways, road improvements, historic preservation, parking areas, etc.).

The identity of the Region today is a composite of its landscape, people, institutions, and history. All these factors contribute to its character. The case has been made in numerous forums that Vermont, hence the Region, exhibits some of the finest landscapes and environments in the United States and elsewhere. The Region's rural character and traditions are heavily influenced by its pattern of development and the sense of community that comes from people living and

working here. When looked at over time, this pattern of settlement and its scale have worked for the sociological, psychological, and aesthetic benefit of the Region.

Oxen on Chelsea Street in South Royalton, 1915
Source: Royalton Historical Society

C. Plan Purpose and Design

The Two Rivers-Ottauquechee Regional Plan is a policy statement on growth and development of the Region. Its purpose is to give guidance to municipalities and other political subdivisions in the Region and the State of Vermont on appropriate development, improvement, and conservation of the Region's physical and human resources. In regulatory proceedings, the policies contained in this Plan are advisory unless stated as mandatory.

This Plan is an expression of regional values and a vision for growth and management for the next eight years. It is not a static or inflexible document. TRORC, with the involvement and participation of the public, will periodically review and update this Plan to reflect new conditions and needs.

In addition, the specific purposes of the Plan are as follows:

1. Analyze data about existing conditions within the Region;
2. Determine current and future land use needs for the citizens of the Region;
3. Determine areas most desirable and suitable for development while encouraging appropriate and efficient expenditures of public and private funds in the process of that development; and
4. Serve as the guide for the Region, towns, and individuals to use in meeting needs for land use development, through delineation of policies and specific implementation procedures.

Adoption of the Plan does not change the structure or role of local or state government. The Plan intends to strengthen local governments by providing information and guidance on growth management. It seeks to facilitate cooperation among these governments. Adoption of this Plan means that TRORC commits its staff and program resources to achieving the Region's goals and to fulfilling the Plan's program recommendations. Adoption of this Plan documents the support of the Region's towns for the principles contained within its chapters.

This Regional Plan replaces the Plan that was adopted July 26, 2017, and effective August 31, 2017. Much of the background information, goals, policies, and recommendations contained in this Plan are based upon the work reflected in the earlier version of the Regional Plan.

D. Legal Authority and Use of the Plan

TRORC is authorized pursuant to the provisions of the Vermont Municipal Planning and Development Act (24 VSA Chapter 117 §4345a). The Act sets forth the duties of TRORC, including the following:

1. Promote the mutual cooperation of

municipalities and advise towns on the development and conservation of town resources;

2. Advise towns with respect to public finance;
3. Provide technical assistance to towns in the preparation and maintenance of plans, bylaws, and related implementation activities;
4. Cooperate with planning, legislative, or executive authorities of neighboring states, regions, counties, or municipalities to promote coordination of planning;
5. Prepare a Regional Plan and amendments that are consistent with the goals established in §4302 and that are compatible with approved municipal and adjoining regional plans;
6. Develop strategies specifically designed to assist municipalities in managing growth and development;
7. Review proposed state capital expenditures for compatibility with the regional plans; and
8. Appear before district environmental commissions to aid them in making a determination as to conformance of proposed developments or subdivisions to the ten criteria set forth in Act 250 (10 VSA §6086).

The Act requires that TRORC prepare and adopt a Regional Plan (24 VSA §4348). Adoption of the Plan requires a 60 percent majority vote of the regional commissioners following at least two public hearings with notice. Any regional plan, including prior amendments, expires eight years from its effective date unless readopted or extended by the regional commission following a public hearing and a vote of regional commissioners.

All regional plans are required to be consistent with the goals of the Act (24 VSA §4302) and are to contain at a minimum certain elements (24 VSA §4348a) or sections dealing with land use, transportation, housing, economic development, energy, utilities and facilities, natural resources, flood resiliency, and implementation measures. Furthermore, any plan must address how it relates to the development trends, needs, plans, and regional plans of adjacent municipalities and regions.

This Plan is to be used by TRORC, municipal planning commissions, selectboards, state agencies, landowners, and citizens in a number of ways:

1. To provide a framework for planning and development initiatives at the local level;
2. To guide basic decisions for planning programs at TRORC;
3. To serve as a basis for evaluation and review of developments and subdivisions proposed under Act 250;
4. For Section 248 proceedings;
5. For state highway access permits; and
6. In federal projects.

The goals and policies of this Plan shall be reasonably and uniformly applied and shall not

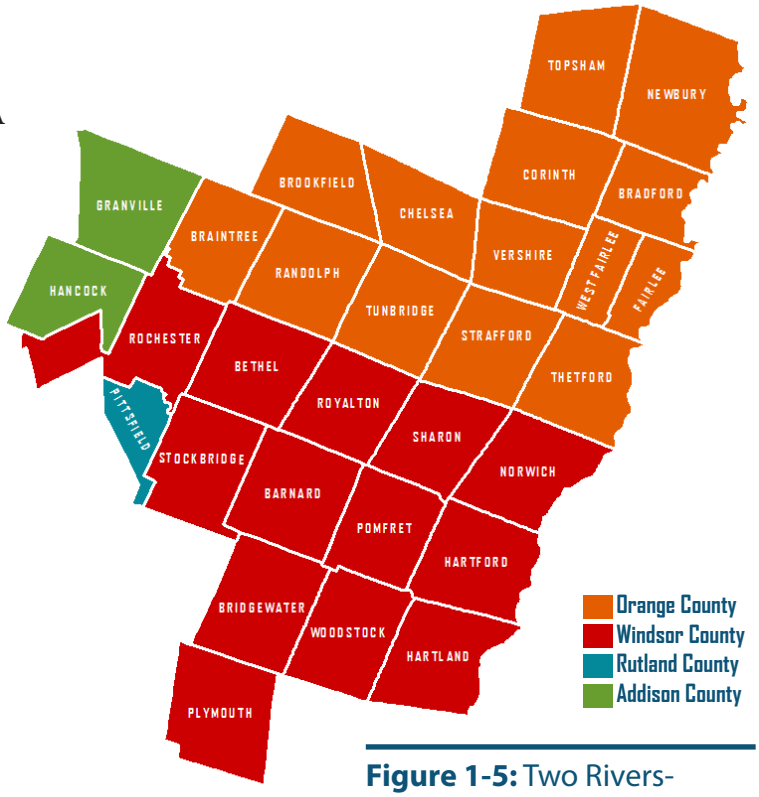


Figure 1-5: Two Rivers-Ottauquechee (TRO) Region

be contrary to the public interest. No specific goal in the Plan shall be construed or applied in isolation from the other goals of the Plan. Also, it should be recognized that there can be both redundancy and contradictions between goals. This does not reflect a failure to consider the full implications of each, but simply acknowledges the fact that the articulation of regional goals inevitably involves competing interests and compromise. Policies of the Plan and descriptions of future land use areas are generally *permissive*. For example, if the Plan states that warehouses are appropriate in an area, one can, but does not have to, build warehouses. Many policies simply encourage, but do not mandate, activities by using the word "should." Where this Plan intends to be *prescriptive*, creating a mandatory limitation, it strives to be very clear on what is required by using words such as "shall" or "must." All goals, policies, and recommendations of the Plan are clearly titled as such, while background materials lay the foundation for these but are not meant to be construed as policies. The Regional Plan does not create non-conformities like a zoning bylaw. Nor does it ever invalidate a local zoning bylaw. A proposed project with a valid local permit may fail to get an Act 250 permit due to a policy in the Regional Plan, just like a project with an Act 250 permit may fail to get a local permit. These are distinct processes with their own set of standards.

E. Ongoing Planning Activities

The basic assumption made in establishing the goals and policies of the Plan is that growth in the Region will continue. The reason for this is clear – the Region offers a quality of life that is unparalleled in many parts of the nation. Despite continued pressures from urbanized areas, central Vermont contains natural resources of high quality within easy access for most of New England's urban dwellers. Finally, the urbanization of the Lebanon, Hanover, and Hartford area, with its availability of goods and services, makes the Region a major market and population center in Vermont.

The Region offers a quality of life that is unparalleled in many parts of the nation.

Braintree Snowfall | *© First Light Studios*

As a result of this growth, the Plan will have to be refined on an ongoing basis, although the majority of policies contained in this Plan are directives for action and will continue to apply indefinitely. An example of a policy with timeless applicability is found in the Land Use chapter, regarding compact development patterns and maintenance of the rural character. Until all land development or redevelopment activity ceases, this policy will determine the suitability of proposed development. This is not to suggest however that the Plan is a fixed and unchangeable document. The Plan itself must be continually updated and revised to serve as a relevant and practical guide for the physical, economic, and social development of the Region.

This is a comprehensive plan for the Region, as specified by state statute. The effect of the Plan will not be limited to a specific agency, such as TRORC, or to a single topic area, such

Plan development so as to maintain the historic settlement pattern of compact village and urban centers separated by rural countryside.

~24 VSA § 4302

as land use. Given the scope of the Plan, many entities should be involved in achieving the Plan's goals and policies. The more detailed programmatic steps necessary to actualize policies are left for the agencies involved to determine. This was done for three principal reasons. First, agencies specializing in areas outside the traditional purview of TRORC have the appropriate technical personnel and resources to develop detailed implementation strategies. Second, because this Plan is not binding on the majority of organizations necessary for its implementation, the participation of many key organizations cannot be mandated or guaranteed. Third, financial resources and constraints of the various organizations will play a major role in determining the manner and extent of each organization's participation.

A final topic raised in each chapter of the Plan is funding for implementation. Rough priorities, times, and costs for all actions are in the implementation matrix. Additional funding for implementing Plan policies for all areas of the Plan is necessary.

Within each Plan section, additional activities necessary to complete that specific area of the Plan are identified. Such additional activities may include the collection of data on topics where information currently does not exist. In addition, short-term, long-term, and ongoing recommendations are discussed in relation to possible implementing agencies. Finally, a general monitoring methodology is proposed. In some instances, the activities identified can be accomplished by TRORC acting as a forum for addressing the identified needs and concerns or through providing technical assistance to agencies involved. In other instances, the ongoing planning activities identified require that agencies and organizations historically involved with addressing the issue be responsible for implementation and monitoring.

F. Use of the Plan in Regulatory Proceedings

Act 250

The Land Use and Development Act (10 VSA Chapter 151) establishes a review and approval process for all major subdivision and development projects in Vermont. The process enables various parties, including town selectboards and planning commissions, the State of Vermont, and TRORC, to participate in the review of projects and to provide testimony with regard to the project's effect on human and natural resources. Prior to granting approval, a district environmental commission, consisting of three members appointed by the Governor, must find that the proposed subdivision or development satisfies certain criteria or thresholds including water and air quality, erosion control, public services, wildlife habitats, aesthetics, public investments, and town and regional plans.

In all cases, the district commission is required to make findings that the proposed development is in conformance with the goals and policies of the Plan before such a development can move forward.

Act 250: The Land Use and Development Act establishes a review and approval process for all major subdivision and development projects in Vermont.

~10 VSA Chapter 151

While the intent of this Plan is to be coordinated and reasonably consistent with local plans and vice versa, situations may arise where relevant goals or policies of the Regional Plan and a town plan are in conflict. In Act 250 proceedings, the environmental court or district commission is faced with determining which plan or which portions of a local or Regional Plan apply. Projects defined or found by the district commission as having "substantial regional impact" must be in accord with the Regional Plan. The burden to demonstrate conformity by law rests with the applicant (10 VSA §6088a). The Regional Plan does not, nor could it, require that a town change its zoning. It is possible that the future land use areas in the Regional Plan would conflict with future land use areas in a Town Plan to the extent that the Town Plan would not be approved, but that would need quite a difference as the "compatible" test in statute is relatively benign and requires an almost opposite effect to be found incompatible. In no case can the Regional Plan invalidate or supersede a Town Plan or zoning.

Section 248

The Vermont Public Service Board has been granted judicial power to entertain proceedings and to determine facts upon which it may issue a Certificate of Public Good for new electrical or gas transmission or generation facilities in the State (30 VSA §248) as well as communication facilities. Under this section, no utility may commence construction of such facilities without first obtaining such a Certificate. Prior to granting the Certificate, the Board must find that the project meets specific criteria. One criterion establishes that the facility must be planned to not unduly interfere with the "orderly development of the Region" (30 VSA §248b). These criteria also require that the Board give due consideration to the recommendations of both municipal and regional planning commissions and related plans.

It is the intent of TRORC, where necessary or appropriate, to appear as a party in a proceeding affecting the Region and provide evidence concerning matters relevant to the Regional Plan. Furthermore, it is the intent of TRORC to coordinate its review of proposed facilities with local officials and to evaluate municipal plans, as necessary, for compatibility with this section.

TRORC intends, where necessary or appropriate, to appear as a party in a proceeding affecting the Region and provide evidence concerning matters relevant to the Regional Plan.

Since proposals under Section 248 are exempt from municipal zoning bylaws, it is important to reflect in municipal plans the interests of the municipality concerning electrical or gas transmission or generation facilities.

G. Developments of Regional Impact

Complete and objective analyses and deliberation on all elements of a particular development are required prior to concluding whether a development results in a substantial regional impact. In considering a development, TRORC shall evaluate the probable direct and indirect costs and benefits associated with the project and the existing and potential capacity of the Region to accommodate new growth. Information generally included in an applicant's Act 250 application should be relied upon as primary evidence in determining substantial regional impact. Additional data and analysis may be required to assist TRORC in making its determination.

This Plan includes eight criteria, developed by TRORC's Act 250 Committee, that qualify a development as resulting in substantial regional impact. These criteria are not exclusive but should be considered the principal indicators of regional impact. If a proposal under review affects more than the immediate area or municipality

where the project is to be located (through application of any or all of these criteria) it shall be concluded that a development of substantial regional impact exists. The specific criteria are outlined in Chapter 13: Plan Implementation.

H. Definitions of Goal, Policy, and Recommendation

Goal: A goal represents the state of affairs that this Plan is intended to achieve.

Policy: A policy is an expression of how to meet a goal.

Recommendation: A recommendation is a means by which to implement a policy, through an action by a person or group.

I. Structure of the Plan

The format of this Plan is intended to include all plan elements as required by law (24 VSA §4348a). The statute establishes that a regional plan is to include basic policies on land use, housing, transportation, and natural resources. Each chapter of the Plan focuses on a particular issue area of regional or statewide interest. Background issues, goals, policies, and recommendations are contained in each chapter. The final chapter of the Plan discusses the various means and methods available to TRORC to implement these goals and policies. In addition, the Plan states TRORC's determination of:

1. Whether the Plan contains the elements as required by law;
2. Whether the Plan is compatible with plans of adjoining regions; and,
3. Whether the Plan meets the goals of VSA chapter 117 § 4302 and § 4382.

J. Plan Amendment

As stated above, the Plan is a dynamic document and represents a process just as much as it does a product. The nature of growth and change in the Region will require this Plan to be re-evaluated, as necessary. As member towns in the Region refine their plans and as new data or trends are identified, it will be necessary for TRORC to incorporate relevant goals and policies into its planning process. Furthermore, it should be emphasized that while TRORC is legally responsible for the preparation and adoption of the Plan, any individual or organization may request that TRORC modify or amend the Plan.

Pittsfield Town Office | © John Knox

Placey Farm, Newbury | © John Knox

HEALTHY COMMUNITIES

2

Healthy Living *| Sources left to right: © Denise E Photography; © Julia Pivovarova; © TRORC*

A. Introduction

Public health is the idea that promotes and protects the health of people and the communities where they live, learn, work, and play.[1] How a community is designed has a direct effect on the health of its citizens. Land development patterns, zoning ordinances, and land use classifications impact walkability, access to services, and transportation options. Zoning and land use regulations can encourage healthy behaviors.

In many respects, the concepts for healthier communities are already prevalent in Vermont's land use planning and therefore are already included throughout the TRORC Regional Plan. Many Town Plans in the Region already include goals, policies, and recommendations that support healthy places as well. For example, Woodstock's Town Plan includes a suggested action to reduce greenhouse gases by implementing an anti-idling policy for all vehicles, thus improving the air quality for its residents.

The American Planning Association has determined, however, that including a specific chapter explicitly focused on public health ensures that a greater emphasis is placed on health throughout other plan elements. TRORC has worked with public health partners to develop a template for Town Plans on this important subject.

Communities where residents feel connected to neighbors, have a sense of belonging, have safe options for walking and being active, and have easy access to services, healthy foods, the natural environment, and affordable housing are communities where people enjoy greater health and well-being.

B. Community Design, the Built Environment, and Land Use

What Does It All Have To Do With Public Health?

Community design can and should accommodate a range of lifestyles, age groups, and working conditions. Land use choices influence the underlying determinants of community and environmental health, such as obesity, heart disease, mental health, social isolation, nutrition, and air quality. Developing coherent strategies that integrate health considerations is critical.

A community's capacity to provide affordable and appropriate housing, supportive community features and services, and adequate mobility options for people of all ages and abilities is rooted in its local zoning codes and related land use policies.

~American Association of Retired Persons

The built environment includes all of the physical parts of where we live and work (e.g., homes, buildings, streets, open spaces, and infrastructure). For example, the built environment influences a person's level of physical activity: Inaccessible or nonexistent sidewalks and bicycle or walking paths contribute to sedentary habits. The TRO Region is relatively rural, so this idea of Complete Streets may not be feasible for all of our communities. By planning for and creating a healthy environment where walking and biking on back country roads is the most available form of exercise, then we can increase the physical and mental health of our residents.

Healthy land use patterns can be achieved by encouraging infill; focusing mixed-use developments in established downtowns and village centers; avoiding sprawl; and encouraging land use patterns that promote walking, bicycling, and transit use.

Population Shifts

The proportion of Vermont's population that is 60 and older is growing more rapidly than other components of the population. The U.S. Census Bureau estimates that more than 29 percent of Vermont's population will be 60 and older by the year 2030, an increase of 40 percent from 2012.

Orange and Windsor Counties are home to almost 85,000 people. Of these people, almost 36,000 (42%) are over age 50; more than 21,000 (24%) are over 60; almost 7,800 (9%) are over 70; and nearly 2,700 (3%) are over 80.

Healthy lifestyles have a greater influence than genetic factors on avoiding age-related decline in physical and mental health and on the well-being of persons over 65.[2] In addition, well-being can be promoted through sustainable aging in place, which involves helping older residents remain in their community while also addressing the long-term economic, social, and health needs of both current and future generations at every age.

Age-friendly environments cultivate well-being and participation in community life as people age.[3] They provide services and support that enable recovery or that compensate for the loss of function with the goal that individuals can keep on doing the things that are essential to them.

Adopting the policies and recommendations within this chapter would allow residents a level of independence and an opportunity to engage in community life. However, for persons of all ages, particularly the elderly, mobility and access to appropriate housing and essential goods and services is extremely important.

The State of Vermont has placed an emphasis on independent living for both seniors and the disabled. Creating a support network which allows seniors to age in place rather than enter into institutional facilities will allow the Region to cope with its rapidly expanding senior population. Independent living is a more attractive option for seniors and the disabled, and it is also more cost effective than institutionalizing people within the medical system.

Many towns within the TRO Region are rural and do not have the appropriate infrastructure or an adequate range of available services to support aging in place. Many seniors over the age of 65 have some form of functional limitation.[4] Additionally, elders who age in place are often isolated in their homes.

One concept in particular that has been gaining traction across the nation, as well as in our Region is the "community health care coordinator."

As care coordinators, community health workers (CHW) help individuals with health conditions to navigate the health-care system. They liaise between the target population and a variety of health, human, and social services organizations. They may support individuals by providing information on health and community resources, coordinating transportation, and making appointments and delivering appointment reminders.

Additionally, they may work with individuals to develop a care management plan and use other tools to track their progress over time (e.g., food and exercise logs). Interventions such as this help save costs and may prevent more serious health problems.

Towns in the Region that currently have some level of a community health coordinator (or community nurse) are Sharon, Thetford, Hartland, Bradford, and the greater Woodstock area (via the Ottauquechee Health Foundation/ Mt. Ascutney Hospital).

Designing housing to accommodate a range of functional ability over time ("universal design") is another important way to assist in keeping the elderly and disabled in their own homes.

On the flip-side, a closer look at age cohorts does reveal that our Region is gaining residents, particularly in the 30-34 range. Since some of our schools are losing students at a fairly rapid rate, and employers are struggling to fill jobs, this is most certainly the age group we need to attract. As we continue to support our long-time Vermonters who wish to stay here, we must also put in place things that make families feel welcome and safe: great town centers, affordable housing, a great place to raise children, and a place that makes families feel welcome and safe.

Great news! We're gaining in a much-needed age cohort; now let's give them healthy, happy, and affordable places to stay and raise their children.

Growth in Obesity Rates

Obesity has reached epidemic proportions in Vermont and across the United Sates. In 2015, a quarter of Vermont adults (20 and older) reported being obese, while an additional 35 percent were overweight. The rate of obesity in Vermont is significantly lower than the U.S. overall (29%), while the rate of overweight is similar (35% in Vermont vs. 36% throughout the U.S.). Among adults 20 and older in Vermont, the rates of overweight and obesity remain statistically unchanged since 2011.

However, in 2017, 12 percent of students were obese and 10 percent were overweight—a significant decrease from 16 percent in 2013.[5] One in eight Vermont youth in grades 9 to 12 are considered obese. Additionally, one in seven Vermont youth in grades 9 to 12 are overweight and at risk of becoming obese. While obesity affects people from all backgrounds, lower income Vermonters are disproportionately affected.

Obesity-related conditions cost billions of dollars each year and are the cause of an estimated 300,000 premature deaths in the United States. Some of the health effects associated with obesity include high blood pressure, diabetes, heart disease, and joint problems.

Research shows that one of the most effective ways to prevent obesity and improve outcomes for those who are overweight is to create opportunities for healthy eating for everyone in the community.

Goals and Recommendations: **Community Design, the Built Environment, and Land Use**

Goals

1. The impact of our built environment on health is understood.
2. Communities are intentionally designed to promote physical and mental health.

Recommendations

1. TRORC should work with Vermont legislators to create a public health element in 24 VSA § 4382.
2. TRORC should organize and host a regional public health summit.

C. What Makes a Healthy Community?

Healthy Food Access and Security

Food insecurity is the inability to access enough food to meet basic needs due to financial constraints and other factors.[6] In Vermont, 13.2 percent of households were food insecure in 2013. As a result, the number of people that participate in governmental food programs such as the Supplemental Nutrition Assistance Program (SNAP) has increased.[7] The *Vermont Farm to Plate: 10-Year Strategic Plan for Vermont's Food System* has done one of the country's most in-depth looks at a food system, with a specific chapter on food security and access. Part of food access is access to healthy foods, or food that is high in fiber, natural vitamins, and fructose to name a few. Healthy foods are believed to reduce many ailments and are generally free from preservatives and artificial ingredients.[8]

Lack of transportation to a grocery store presents a serious problem for many people in the Region. According to the U.S. Census, approximately 2 percent of households in Orange and Windsor Counties have no vehicle. While this percentage may seem low, when we look at the total population, we must consider that many households without cars are not necessarily close to needed services, including grocery stores. Public transit is also lacking in many of our towns.

There are several community food security programs throughout the State that can aid in reducing the number of food insecure

households. Gleaning programs, or the act of retrieving left over food at farms, is one such way. There is a professional gleaning program set up in the Upper Valley, part of the Vermont Gleaning Collective.

Farm to school programs have been a successful venture in Vermont that connects farmers with schools to provide fresh, healthy foods while also educating the students on where food comes from. Providing healthier meals at school is essential to food insecure students that may not be able to afford this food at home. Other programs such as community gardens, regional food hubs, farmers markets that accept Electronic Benefit Transfer (EBT) food stamps, and new farms for new Americans are efforts being conducted by the Vermont Farm to Plate organization. Communities in the TRO Region have the ability to plan for these types of healthy food access by identifying ideal locations for community gardens or farmers markets and connecting community organizations together to fight food insecurity and increase access to healthy foods.

Food access is not simply a health issue but also a community development and equity issue. For this reason, access to healthy, affordable, and culturally appropriate food is a key component not only in a healthy, sustainable local food system, but also in a healthy, sustainable community.

~American Planning Association

Policies and Recommendations: **Healthy Food Access and Security**

Policies

1. Increase access to healthy foods.
2. Support the Vermont Farm to School Network.

Recommendations

1. Municipalities should connect with the Vermont Farm to Plate and Farm to School networks to see how they can best promote the consumption of locally grown foods by their residents.
2. TRORC and/or the State should create mapping resources, showing:
    a. Locality of grocers, convenience stores (if healthy food options are offered), farmers markets, farms, agricultural institutions, community gardens, food banks, and food pantries.
    b. Transportation routes and types to food retail and food shelves.
    c. Location of low-income census tracts.
3. Municipalities should develop incentives such as local tax breaks for small or convenience store owners to stock healthy and local options.
4. Municipalities should promote and expand farmers markets and community gardens by identifying ideal locations for such activities and letting potential organizers know of these locations.
5. TRORC and municipalities should educate state and local policymakers on connections between food access and nutrition.
6. Municipalities should support the preservation of large, contiguous blocks of productive agricultural land.
7. Municipalities should work jointly with other jurisdictions to preserve agricultural land.
8. TRORC should conduct a food system analysis for the Region.

Healthy Homes

Housing is the best known predictor of health. Lead exposure can lead to significant abnormalities in cognitive development; asbestos and radon exposure can increase the chance of developing lung cancer; uncontrolled moisture, mold, pests, and other triggers cause or exacerbate asthma and other respiratory dysfunction; inadequate heat can lead to use of inappropriate heating sources, potentially resulting in fires or carbon monoxide poisoning; and poorly maintained stairwells and other structures can cause injuries. Not surprisingly, many health-related hazards are disproportionately found in low-income housing. Vermont has one of the oldest housing stocks in the country, with most homes built in 1939 or earlier. In Windsor and Orange Counties, most homes align with state trends in that most were built in 1939 or earlier according to the 2016 American Community Survey. There are partnerships and programs available to mitigate some of these issues.

On average we spend 90 percent of our time indoors; therefore, existing homes offer significant opportunity to protect public health and reduce health disparities especially for those who are particularly vulnerable and who spend more time in the home, such as children and the elderly.

Health outcomes can be improved by making physical changes to a home. But creating a healthy home only goes so far to promote health and health equity. Healthy homes must also be affordable.

Housing affordability is addressed in detail in the Homes in the Region chapter; but it bears repeating here: for the health of our schools, towns, and our economy as a whole, we must put policies in place that encourage young families and the elderly to live and thrive here. Affordable housing provides low-income and moderate-income residents and households on fixed incomes the opportunity to redirect some of their resources to healthy food and health care.

The addition of housing units to existing neighborhoods—through attached housing, accessory units, or conversion to multifamily dwellings—creates opportunities for communities to slowly increase density on land served by existing infrastructure without radically changing the landscape, while providing needed housing for a variety of residents.

Policy and Recommendations: **Healthy Homes**

Policy

1. Prioritize the development and maintenance of high-quality affordable housing.

Recommendations

1. The Vermont Department of Health should provide community assessment, testing sites, and remediation programs for housing-related illnesses (high blood lead levels, respiratory conditions, and skin disease).
2. The Vermont State Housing Authority and other housing entities should educate policymakers on the relationship of poor housing conditions to health outcomes.
3. TRORC will advocate for project approval processes that reflect the Housing Resources chapter's housing-needs allocation for all income levels.
4. TRORC and municipalities should participate in health impact assessments of proposed housing developments.
5. Municipalities should support efforts to structure community design, housing, and health care to meet the needs of seniors and those with disabilities.
6. Municipalities should work with local housing authorities to create a variety of housing types and maintenance options.
7. The State and housing organizations should promote healthy home renovation and construction.

Environmental Health and Justice

Safe air, land, and water are fundamental to a healthy community environment. An environment free of hazards such as secondhand smoke, carbon monoxide, allergens, lead, and toxic chemicals helps prevent disease and other health problems. Implementing and enforcing environmental standards and regulations, monitoring pollution levels and human exposures, building environments that support healthy lifestyles, and considering the risks of pollution in decision making can improve health and quality of life. Many of these environmental issues that have an adverse health affect can only be solved through good public policy and the advancement of programs.

Research conducted by the American Public Health Organization (APHA) and Centers for Disease Control (CDC) suggests that the term "environmental health" isn't familiar to most people. Relatively speaking, the term means how the environment affects public health.[9] This ties in with environmental justice issues. All people deserve healthy environments, and where you live should not determine whether you are healthy or sick.

By burning fossil fuels, we are adding to the risks associated with climate change that increase the number of heat waves, deadly storms, and the spread of infectious diseases. If we reduce our emissions into the atmosphere, a cascading effect will occur that will slow down these major public health crises.

Policies and Recommendations: **Environmental Health and Justice***

Policies

1. Minimize the risks to human health and the environment posed by hazardous sites.
2. Improve air and water quality and reduce air and water pollution.
3. Promote compact, mixed-use development.

Recommendations

1. TRORC will advocate for implementation of the State's greenhouse gas reduction plans.
2. TRORC and municipalities should participate in the review of environmental impact reports.
3. TRORC and municipalities should advocate for and participate in health impact assessments.
4. Municipalities should prioritize the reuse and remediation of brownfields.
5. Municipalities should require new development and significant additions to existing development to provide adequate tree canopy to improve or maintain environmental health.
6. TRORC and municipalities will continue to advocate for plentiful, high-quality drinking water.
7. The State and municipalities must protect the water quality of rivers, streams, lakes, and wetlands.

**While this section offers specific recommendations to improve environmental quality, many recommendations throughout this chapter have the ability to improve our overall environmental quality.*

Healthy Natural Environment

Natural environments contain the components that enable life as we know it. Enhancing the functionality of natural environments can mitigate the negative health impacts associated with development that affects our water and air. More information on clean water and air can be found in the Natural Resources chapter of this Plan. Climate action and more greenspace are possible solutions to creating a healthier natural environment.

Climate Action

Climate change is defined as a "long-term change in climate conditions, such as temperature, precipitation, extreme water events, snow cover, and sea level rise." There are several mitigation

efforts that Vermont and its municipalities can take on, such as increasing energy efficiency (as seen in the Energy chapter) through our buildings and our transportation methods. In Vermont, an increase in extreme weather events, such as flooding, can increase risks for vulnerable populations, such as the elderly. Hotter summers can lead to increases in heat-related stress in seniors and children.

There is one epidemic that is plaguing Vermonters, and that is the prevalence of Lyme disease. Vermont is well-known for its expansive outdoor recreational opportunities that span all seasons. With an active lifestyle comes some risks for disease. Vermont is number two in the country for the most diagnosed cases of Lyme disease, which is passed to humans from blacklegged ticks, more commonly known as deer ticks. Ticks are becoming more prevalent in Vermont due to milder winters, increased precipitation, and an increase in wildlife. The state's large number of white-tailed deer and deer mice has led to this increase in diagnoses. The Centers for Disease Control and Prevention (CDC) has labeled this an epidemic in Vermont. Much of this epidemic is due to a lack of effective early diagnosis and treatment, even with 1,093 confirmed cases in 2017. There are many preventative measures people can take to avoid contracting Lyme disease when they go on a hike, such as wearing long socks and pants, bug spray, and checking for ticks upon returning home. Lyme disease may become harder to treat in the coming decades due to antibiotic resistance of the Lyme disease bacteria.

Other common tick borne diseases that are not as prevalent as Lyme disease include anaplasmosis, babesiosis, borrelia miyamotoi, echrlichiosis, powassan virus, and tularemia. While 99 percent of these diseases are transmitted through the blacklegged tick (deer tick), these diseases can be transmitted through the dog tick, woodchuck tick, and the lone star tick in Vermont. More information on these diseases and prevention can be found on the Vermont Department of Health website.

Green Infrastructure

Providing residents with parks and greenspace not only beautify communities but can also increase the well-being of people. Healthy by Nature is a movement about the physical and mental health benefits of green infrastructure and states that spending more time in nature improves human health, that human health depends on healthy ecosystems, and that parks or other conserved natural areas contribute to vibrant and healthy communities. Studies also show that people who connect with nature often feel less isolated and can form connections with neighbors.

In a practical sense, green infrastructure can mitigate climate change effects by preserving ecological functions, such as carbon sequestration and water storage.

Goals, Policy, and Recommendations: **Healthy Natural Environment**

Goals

1. Increase in access to public green space.
2. The number of confirmed Lyme and other tick borne disease cases in Vermont is decreased.

Policy

1. Support climate change mitigation efforts.

Recommendations

1. TRORC should work with municipalities to distribute information on Lyme disease and prevention.
2. TRORC should work with municipalities on climate change mitigation strategies.

Active Living

As the built environment has become increasingly car-centric, levels of physical activity have correspondingly declined. Reduced physical activity has resulted in population weight gains. To counter these trends, it is necessary to make communities more conducive to physical activity once again, particularly walking and cycling.

Designing our communities to be safe and walkable and in a way that provides access to essential goods and services is important for people and the environment.

Designing our communities to be safe and walkable in a way that provides access to essential goods and services is extremely important for all ages, as well as the environment. Getting outside may be difficult for those who don't partake in or can't afford winter activities such as skiing; that is why access to indoor recreational facilities is so important. However, these facilities may be unaffordable for lower-income individuals and access to them may prove difficult for the elderly. The recreation section in the Utilities chapter of this Plan has more discussion on those facilities.

Locating services near housing and transportation options allows seniors, and those without reliable transportation, to live more independently. Sprawling, dispersed services and shopping not only are costly to governments and residents, but they also detract from residents' quality of life. As communities are redesigned to allow seniors to age in place, it is important to ensure that drop-off and pick-up locations are safe, from providing adequate lighting around neighborhoods, to maintaining or installing sidewalks, to installing ramps and handrails where previously there were only stairs.

Parks and recreation facilities provide opportunities for physical activity and can help people of all ages lead a more active lifestyle. Some lower-income communities tend to have less access to quality parks and recreation facilities. Making recreational facilities accessible in all communities is a critical strategy for increasing physical activity and preventing obesity.

Active Transportation

Active transportation refers to any form of human-powered transportation such as walking, cycling, using a wheelchair, in-line skating, or skateboarding. There are many ways to engage in active transportation, whether it is walking to the bus stop or cycling to school or work.

Increasing transit access is a key strategy to creating healthy communities. It promotes physical activity through daily exercise, reduces air pollution by encouraging alternatives to automobile use, and connects residents to needed services such as jobs, housing, education, healthy food, recreational opportunities, and medical facilities.

By encouraging active transportation, a community can reduce the number of collisions by providing safe conditions for pedestrians and cyclists. The Vermont Agency of Transportation has developed a bike comfort map for all state routes; this displays the difficulty level for different sections of roads based on biking experience. As a result of this project, TRORC has developed a similar map for all secondary and connector roads in the Region.

Communities can ensure that all residents have the opportunity for safe, active transportation by supporting and implementing the Complete Streets law that was passed by the Vermont Legislature in 2011. See the Transportation chapter for more details.

The implementation of bicycle and pedestrian trails has been demonstrated to promote a healthy lifestyle. Biking and hiking trails can promote increased activity and can be created with smaller amounts of land than large parks. They can often be created from "leftover" or unwanted land. Many back roads afford safe

spaces for walking and biking as well that do not necessarily warrant a Complete Streets concept.

When designing for active living, older people and those with disabilities must be involved in assessing a community's strengths and deficiencies. They should play a role in suggesting changes and in implementing and monitoring improvements. These residents can speak to their own experience of the community's positive characteristics and barriers.

People who live in walkable, mixed-used communities are more than twice as likely to be physically active 30 minutes or more each day, compared to those who live in communities oriented to motor vehicles.

~ChangeLab Solutions

Policies and Recommendations: **Active Living and Transportation**

Policies

1. Create a balanced and equitable transportation system that provides for the safety and mobility of pedestrians, bicyclists, strollers, and wheelchairs.
2. Incorporate active transportation design features into new development projects.

Recommendations

1. The State and/or TRORC should map neighborhoods and advocate for connectivity to essential services, walkable routes, recreation opportunities, and transportation options.
2. TRORC and municipalities should plan for bike-friendly state highways to connect village centers.
3. Municipalities should conduct walkability and bikability assessments.
4. TRORC should work with local jurisdictions to adopt bike and pedestrian master plans.
5. The State and TRORC will educate decision makers on links between safe streets and health.
6. TRORC will collaborate with local agencies and communities to implement Safe Routes to Schools programs and Vermont's Complete Streets program.
7. Municipalities should promote joint use of park and recreation facilities between communities.
8. Municipalities should promote existing trails.

Social Inclusion

Social inclusion represents a vision for a "society for all" in which every individual has rights, responsibilities, and an active role to play. Creating spaces for people young, old, and with varying degrees of abilities is imperative to helping create healthy communities.

Opportunities to participate in and make a positive contribution to community and society—no matter a person's age or abilities—are integral to dignity. Maintaining contact with family and friends, participating in cultural and community activities, and using skills all contribute to social inclusion. Involving people of all ages at all levels of service planning and delivery benefits the individuals involved as well as the community as a whole.

Age discrimination, sometimes alongside other forms of discrimination, can contribute to the social isolation of older people. The risk is greater for people living alone and the very elderly, and it can be increased by bereavement, loss of work, or poor health. Such isolation can contribute to the incidence of mental illness, particularly depression.

Many people with disabilities unnecessarily experience life quite differently. They may not have a sense of place or belonging in the

community and may not have access to activities they prefer or desire. In 2015, about a quarter (23%) of Vermont adults reported that they are disabled, similar to the amount (22%) among U.S. adults overall. Disability increases as age increases.

Social inclusion may also go a long way toward attracting and keeping a younger population who feel that they are welcome and heard.

Policies and Recommendations: **Social Inclusion**

Policies

1. Promote increased, accessible use of public space, walkable and accessible neighborhoods, and mixed-use development.
2. Increase affordable and reliable transit options to essential services and recreational and social opportunities.
3. Improve parks, recreation facilities, and open spaces for accessibility and community mingling.

Recommendations

1. Municipalities should map public gathering spaces and indicate their levels of accessibility.
2. Public health professionals should educate decision makers on the link between social support and health.
3. Municipalities should consider accessibility when developing public spaces or recreational opportunities.
4. TRORC will provide training for neighborhood residents to participate in boards and commissions.

Substance Misuse Prevention

Preventing substance use disorders and related problems (e.g., mental illness) in children, adolescents, and young adults is critical to Americans' behavioral and physical health. Behaviors and symptoms that signal the development of a behavioral disorder often manifest two to four years before a disorder is present.

According to the 2014 SAMHSA (Substance Abuse and Mental Health Services Administration) National Survey on Drug Use and Health, an estimated 25.2 percent (66.9 million) of Americans aged 12 or older were current users of a tobacco product. About two-thirds (66.6%) of people aged 12 or older reported that they drank alcohol in the past 12 months, with 6.4 percent meeting criteria for an alcohol use disorder. Also among Americans aged 12 or older, the use of illicit drugs has increased over the last decade from 8.3 percent of the population using illicit drugs in the past month in 2002 to 10.2 percent (27 million people) in 2014. Of those, 7.1 million people met criteria for an illicit drug use disorder in the past year. The misuse of prescription drugs is second only to marijuana as the nation's most common drug problem after alcohol and tobacco, leading to troubling increases in opioid overdoses in the past decade.

What has proven most effective in reducing rates of underage drinking and tobacco use in the last 20 years is using approaches that address the availability of substances and the cultural norms that surround them. Universal prevention approaches include the use of "environmental prevention strategies," which are tailored to local community characteristics and address the root causes of risky behaviors by creating environments that make it easier to act in healthy ways. These strategies are also more universal in nature, meaning that they don't target specific groups of at-risk youth and thus can benefit everyone—including people who are in recovery from misusing substances.

Some of these strategies include working with law enforcement to enforce existing underage drinking laws, parent education to promote clear expectations around substance use for children, and limiting where and when tobacco and other adult-only products can be used, sold, and advertised. Reduced exposure to advertising and retail outlets results in reduced youth initiation and reduced temptations to relapse for those who have quit smoking and drinking.

Another important component for the decreased likelihood of initiating drug and alcohol use are youth mentoring programs. The supportive, healthy relationships formed between mentors and mentees are both immediate and long-term and contribute to a host of benefits for mentors and mentees.

All of these approaches lead to a community where the norm is healthy behavior and makes this choice easier for all members of the community, especially young people. Successful implementation of these strategies involves many sectors of the community, including law enforcement, local officials (including town planners), businesses, faith-based organizations, schools, and residents, including parents and youth.

Policies and Recommendations: **Substance Misuse Prevention**

Policies

1. Reduce concentrated exposure to alcohol, drugs, and tobacco.
2. Provide opportunities for recreation and community involvement.

Recommendations

1. With the help of public health professionals, municipalities should assess the types of problems within their community.
2. Municipalities should raise awareness of the nature and seriousness of health issues.
3. Municipalities should assess the community's readiness for prevention.
4. Municipalities should review current programs already in place.
5. Municipalities should convene community organizations who serve youth and local leaders to capture ideas and resources to help implement and sustain research-based programs.
6. Municipalities should provide plenty of healthy recreational opportunities for youth and overall community participation.

Health-Care Facilities

Health-care facilities are essential in the prevention, treatment, and management of illness, and in the preservation of mental and physical well-being. Additionally, they provide benefits to our Region by providing jobs and supporting local economies. From a regional standpoint, the availability of quality health care to our citizens is of significant importance.

Gifford Medical Center in Randolph and the White River Junction branch of the Veteran's Affairs Medical Center are the largest medical facilities located in the TRO Region. For more major medical issues, residents in our Region use Dartmouth-Hitchcock Medical Center in Lebanon, NH, which includes a cancer center and a children's hospital. The majority of our Region's medical needs are covered by smaller health clinics, which are part of a larger network. These facilities allow local residents, including those on low or fixed incomes, direct access to day-to-day primary and family care services without requiring extensive travel. The local nature of our Region's health clinics allows residents to create long-term relationships with their medical practitioners, a concept that is consistent with the concepts of primary care.

Medical services are available to lower income residents in several locations in the Region. Gifford Medical Center in Randolph and the Good Neighbor Health Clinic in White River Junction can provide free primary medical care to nearby residents whose household incomes are below the poverty level.

As the elderly (citizens age 65 or older) become less comfortable with the tasks involved in managing their own home, they often turn to some sort of elder housing. If health is an issue and some form of constant care is required, seniors will need to enter a nursing home or a residential care facility. Data shows that there are limited options in the surrounding area for all levels of care, but full-time residential care is particularly scarce. Elderly residents in need of full-time care are often forced to move away from their community, and many are unaffordable. This is a statewide problem, not just a regional issue.

The expansion of existing or development of new medical or elder care facilities has the potential to conflict with existing and future land use patterns. The most appropriate locations for these facilities are within community centers (villages and downtowns), because they are often walkable and have existing services and access to business-class Internet.

In locations outside of designated growth areas, new facilities are less desirable because they have a broader impact. In rural areas, these facilities may require the extension of existing water and wastewater systems, can negatively impact natural resources, and can create conditions that encourage sprawl and strip development.

The percentage of our Region's population that is over 60 years of age is growing.

The percentage of our Region's population that is over 60 years of age is growing, which creates new challenges for our Region. The number of people with chronic illnesses (generally incurable illnesses or conditions that require ongoing medical attention and affect a person's daily life) is on the rise nationally. Four out of five Americans over the age of 50 suffer from at least one chronic condition, often including high blood pressure, diabetes, or mental illness. When chronic illnesses are coupled with age, some form of elder care service becomes necessary.

Given the need for additional medical facilities that specialize in elderly care, efforts to encourage their growth and development at sustainable levels is in the interests of the Region. Municipalities can support their growth by allowing for these facilities in their villages and downtowns, and by creating regulatory structures that balance issues like historic preservation with the public value these facilities provide.

Medical and elderly care facilities have the potential for economic benefits by providing workers with a livable wage and acting as stimulators of the local economy. The priority for future investments in the health of our Region should focus on care facilities and services for the elderly and other vulnerable populations. The first step in making these investments is to determine where they would be most practical.

TRORC can provide support for the development of new facilities by reviewing any potential projects before they are submitted to the District Environmental Commission in order to reduce the possibility that a permit will be denied, delayed, or heavily conditioned. Priority of support should be given to developments that will increase the availability of elderly care opportunities, provided that any proposed development is consistent with the policies contained within this Plan.

Goals, Policies, and Recommendations: **Health-Care Facilities**

Goals

1. Health care coordinators are prioritized in all towns.
2. The availability of medical and elderly care services in the Region is enhanced.
3. Residents have access to all levels of health care, regardless of wealth or income status.

Policies

1. Medical and elderly or other care facilities are encouraged when located within or immediately adjacent to designated growth areas provided they do not have an undue adverse impact on traffic or the character of the area.
2. TRORC will support efforts at the state and local levels to develop additional elderly care services and facilities.

Recommendations

1. TRORC should identify areas of the Region where medical or elderly care facilities would be beneficial.
2. TRORC should review local zoning and subdivision regulations to ensure that they do not have the effect of prohibiting health-care or elderly or other vulnerable populations care facilities from appropriate areas and should assist with revisions as needed.

Healthy Communities Endnotes

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South Royalton Village | © John Knox

LAND USE

3

West Fairlee | © John Knox

A. Background Issues

For almost two decades the TRO Region has been in a post-growth period following a time of rapid economic growth and profound changes to its landscape, spanning 30 years (1970-2000). During that time, planning focused on mitigating the impacts of growth. While managing the impacts of uncontrolled growth remains an important part of the TRORC Regional Plan, the key issues that must be considered when planning for the Region's future have changed.

As the Region looks to the future, it will need to adapt land use policy to the changing business environment by supporting existing businesses, encouraging entrepreneurial development, investing in our existing downtowns, improving infrastructure (particularly within our villages and downtowns), and strengthening those things that make Vermont unique (such as the arts and our forest-related, agricultural, and other value-added products). The impact of broadband and online sales is changing the way we access entertainment, commute to work, buy goods, and even receive services. The generation of renewable energy and the coming electrification of our transportation and heat systems will engender new services and facilities.

With all of this change, we still hope to meet one of the fundamental guiding goals of state land use law, which is to further the traditional pattern of development so as to maintain the historic settlement pattern of compact village and urban centers separated by rural countryside. While this model is greatly responsible for sustaining Vermont's rural character, it has its challenges as this pattern was built when Vermont's countryside had an agrarian lifestyle where residents did not travel much and did not have cars and commute. For many, the luxury of having a home in a rural setting is why we choose to live here. But our choice to live in more rural areas means that we must use cars and trucks to get to work, access goods and services, and be part of our communities. When we plan for our future, we will need to consider where we

live and how it does, or does not, support our economy, reduce energy use, encourage a sense of community, and protect our natural resources.

As our Region's population ages, the appeal of owning a house in the country can change. For many, the cost and effort it takes to maintain a larger home or to travel to locations that offer goods and services can be a burden. We must recognize that, as we move forward, planning will need to provide a greater diversity of housing in areas that are affordable, walkable, and vibrant.

Our community cores and roads were built along, and sometimes in, streams, wetlands, and rivers because these are flat areas. This was practical in some ways, but ignored the fact that these are also areas prone to flooding, sometimes with disastrous results. As we have continued to build and create more impervious surfaces and the climate has shifted to one with more extreme rains, the specter of flooding now must be taken into account as we look at our compact centers and where they can safely grow.

Our forests are an important component of our Region. They represent a significant store of natural resources, are a driver for economic activity, and provide us with a backdrop that is distinctly rural. However, the landscape shift of open lands reverting to forest over the last century has ended, and we are now starting to lose forest again as a state, with 1,500 acres a year being converted to development or open land. We continue to fragment the forest we do have with subdivisions, reducing the natural functions of large, contiguous sections of forested land that are vital to many plant and animal species. In planning for the future, we need to consider the places where we have already impacted forest integrity beyond repair and the places where good forests remain.

These background issues have been considered as part of the development of this Plan. We continue to strive to move planning forward, to adapt to changes in the Region, and to support our communities while remaining consistent with Vermont's land use goals.

Goals and Policies: **Overall Land Use**

Goals

The land use goals within this section represent the foundation of the planning and development for the Region. These goals are intended to be applied throughout the Region.

1. Development patterns and their related transportation systems promote public health and reduce energy use and greenhouse gas emissions.
2. Energy-efficient and affordable housing choices are expanded.
3. Land use planning and regulation maintains our quality of life, environment, and economy.
4. Intensive development occurs only where adequate public services and facilities are currently available or planned.
5. The health of residents is improved by investing in clean water, soil, and air and safe and walkable neighborhoods.
6. The patterns of development in the TRO Region remain consistent and compatible with the goals of VSA Title 24, Chapter 117, §4302.

Goals and policies continued on next page

Goals and Policies: **Overall Land Use**

Policies

The land use policies apply throughout the Region. Subsequent sections on individual types of land use areas have policies specific to each of them.

1. Any public investment in public and private housing for the elderly, disabled, and low- or moderate-income families shall be directed into Regional Centers, Town Centers, and Village Settlements, or areas within one mile of these along state highways and transit routes, and away from unsettled rural areas where no services exist.
2. Principal retail establishments must be located only in Regional Growth Areas to minimize the blighting effects of sprawl and strip development along major highways, to protect the vitality of our villages and downtowns, and to maintain rural character.
3. Development of federal or state governmental offices distant from and outside Regional Growth Areas contributes to increased traffic, scattered development, and costly public services. Such a pattern of development is incompatible with the goals and policies of this Plan.

B. Future Land Use Areas

For the purposes of this Plan, seven types and four subtypes of Future Land Use Areas have been established and identified. These Areas have characteristics that identify them within the Region. They are designed to accommodate future growth based on the capacity of infrastructure and suitable land without threatening critical resources or creating sprawl. These Areas are:

- Regional Growth Areas
  - Regional Center
  - Town Centers
  - Village Settlements
  - Hamlet Areas
- Industrial Areas
- Mixed-Use Areas
- Quechee Gorge Tourist Area
- Interchange Areas
- Rural Areas
- Forest-Based Resource Areas

The Region's Land Use Areas are depicted on Map 4, the Future Land Use Areas map that is included in this Plan. The Regional Center, Town Centers, Village Settlements, Forest-Based Resource Areas, Mixed-Use Areas, Industrial Areas, and Interchange Areas are identified by boundaries. Hamlet Areas are identified by center points; when making land use decisions using the policies in this Plan, Hamlet Areas must include the locally recognized extent of the hamlet as it is designated in the appropriate Town Plan. Rural Areas are the remaining lands in the Region.

Regional Growth Areas

Growth throughout the Region must be balanced with a respect for the traditional patterns of development that make our Region distinct (these patterns are supported by Vermont's planning goals) and the need to adapt to an ever-changing world. To sustain both rural and more developed core areas, major growth or investments must be channeled into existing settlement centers or development immediately adjacent to such centers.

Regional Growth Areas represent areas of concentrated mixed use at varying scales and with differing mixes of uses. These areas are either served by public facilities (such as sewer, water, and public transit) or are potential locations for future infrastructure investments that will encourage growth and vitality. Depending on their scale and location, these areas generally include a diverse mix of services, businesses, and housing opportunities for our citizens.

Acknowledging that Regional Growth Areas range from urban to rural, the Regional Plan differentiates these areas into the four subtypes mentioned above and detailed below.

State Growth Centers, Neighborhood Development Areas, Downtown Designation, and Village Center Designation

In 1997, Vermont enacted the Historic Downtown Development Act (24 VSA Chapter 76A) to recognize local efforts to revitalize traditional villages and downtowns. Under the law, towns may apply to the Vermont Downtown Development Board for state designations as a downtown, village center, neighborhood development area, or growth center. If designated, commercial property owners in downtowns and villages are eligible for state tax credits for rehabilitation of historic structures, facade improvements, and building code improvements; if the tax credits cannot be used by the property owner, they may be sold to banks. In addition to tax credits, state designated villages and downtowns receive priority consideration in Vermont's Municipal Planning Grant Program and the federal funding programs guided by Vermont's HUD (U.S. Department of Housing and Urban Development) Consolidated Plan, including the Vermont Community Development Program.

It is the intent of TRORC to preserve and encourage development of the Region's downtowns and village centers; to encourage investment in housing, historic preservation, and transportation (including parking facilities); and to reflect traditional settlement patterns. Furthermore, TRORC believes that dynamic planning programs focused on downtowns and villages will strengthen the vitality of our community centers and protect the rural landscape.

Thetford | © John Knox

Regional Center

Regional Centers are a region's largest urban areas, where development is highly concentrated with a diverse mix of uses. They are areas where public sewer and water utilities exist, transportation infrastructure is capable of handling significant volumes of commuting and commercial traffic, a public transportation system provides options, and there are intermodal opportunities present. In order to achieve the level of density appropriate for a Regional Center, buildings are often multi-story, with mixed uses – particularly in the core of the area. People use Regional Centers for their variety of employment and business opportunities, governmental and judicial functions, hospitals, schools, and cultural and civic activities. White River Junction is the only Regional Center in our Region. Our only State Designated Growth Centers and a Designated Downtown are included in this land use area.

White River Junction | *© Kevin Geiger*

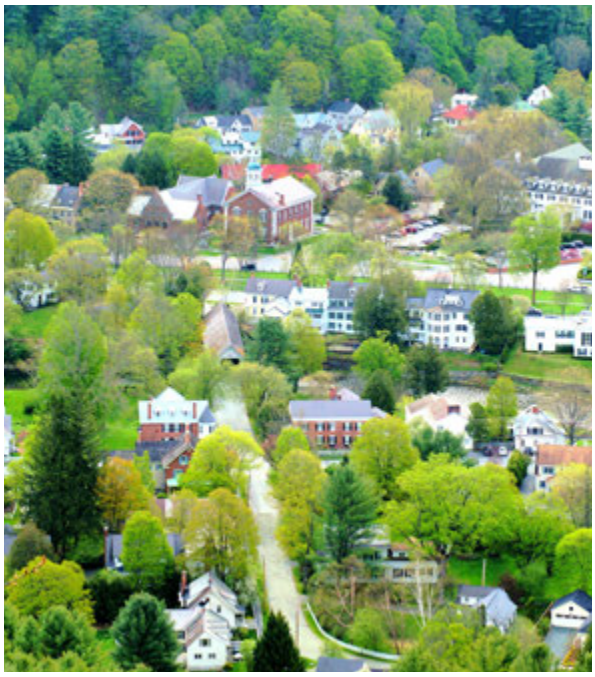
Policies: **Regional Centers**

Policies

1. Regional Centers should support a mixture of single family, two-family, and multi-family housing and should have the highest densities in the Region.
2. Commercial land uses, services, offices, wholesale business, industry, transport facilities, and community facilities and programs that serve regional needs and markets shall be located in Regional Centers.
3. Intense growth in Regional Centers is appropriate when a complete complement of public services such as water, sewer, and highways are available. To accommodate additional development, continued maintenance or expansion of such facilities must occur.
4. Local capital planning programs and public investment strategies must encourage renovation of existing buildings and in-filling within Regional Centers.
5. Retail establishments that provide goods and services to a regional clientele must be located within or immediately adjacent to Regional Centers and Town Centers to ensure that the vitality of these economic centers is maintained.
6. Adaptive use of larger homes (including those of historic and architectural significance) for differing, more economical uses, such as offices and multi-unit housing, is consistent with this Plan. See the Historic Resources section for more information.
7. In historic districts or areas with a concentration of buildings with architectural or industrial significance, new development must be compatible with the existing character of the district or historic buildings but should not replicate the historic features exactly.
8. In areas containing structures and buildings of architectural or engineering significance, new development must be planned to be reasonably compatible with existing development and to not unduly impact the general and special character of the area.
9. Major developments like large governmental, medical, and commercial buildings must be located in Regional Centers where utilities, facilities, and populations are concentrated.
10. Highway investments within Regional Centers must include multi-modal transportation, pedestrian circulation, traffic calming, and streetscaping.

Town Centers

Town Centers are less urban than Regional Centers but also contain a concentrated mix of uses at a high level of density. They are those areas where central public utilities for water and sewer are available and where there exists a central location for commercial activities, schools, and cultural and civic activities for the town and the surrounding communities. In our Region, Designated Downtowns, Designated Villages, and a Designated Growth Center are included in this land use area. Town Centers are found in Bethel, Bradford, Chelsea, Fairlee, Norwich, Randolph, Rochester, South Royalton, Wells River, Wilder, and Woodstock.



Woodstock Village from Mt. Tom | © *John Knox*

Policies: **Town Centers**

Policies

1. Town Centers shall support a mixture of single-family, two-family, and multi-family structures at the highest densities possible given existing sewer and water capacity and community character.
2. Commercial uses (including principal retail establishments), services, offices, wholesale business, industry, transport facilities, and community facilities and services are appropriate to locate in these areas.
3. Intense growth is appropriate in Town Centers when a complete complement of public services such as water, sewer, and highways is available. To accommodate additional development, continued maintenance or expansion of such facilities must occur.
4. Local capital planning programs and public investment strategies must encourage renovation of existing buildings and in-filling within Town Centers.
5. Principal retail establishments must be located in Regional Growth Areas to minimize the blighting effects of sprawl and strip development along major highways, to protect the vitality of our villages and downtowns, and to maintain rural character.
6. Conversion of larger older homes (particularly those with historic merit) to newer, more economical uses, such as offices and multi-unit housing, is consistent with this Plan. See the Historic Resources section for more information.
7. New development shall be planned to be reasonably compatible with existing development, preserve buildings of historic, architectural, or engineering significance, and not unduly impact the character of the area.
8. Postal facilities and similar governmental offices should be located where other public services are available or planned.
9. Highway investments within Town Centers must give significant consideration to multi-modal transportation, and include pedestrian circulation, traffic calming, and streetscaping.

Village Settlements

Village Settlements are the most common Regional Growth Areas in the TRO Region. Village Settlements normally consist of a mix of uses at medium to high densities. Density in Village Settlements varies based on the availability of municipal water and sewer. Those Village Settlements that do not have water or sewer are prime candidates for future infrastructure investments. Unlike Regional Centers and Town Centers, Village Settlements are not regional markets or trade centers and typically serve a local clientele. The Region's Village Settlements are core areas in Barnard, Braintree, Bridgewater, East Corinth, East Randolph, East Thetford, East Topsham, Granville, Hancock, Hartford Village, Hartland Four Corners, Hartland Three Corners, Newbury, North Hartland, Pittsfield, Plymouth Union (Plymouth), Pond Village (Brookfield), Post Mills (Thetford), Quechee, Randolph Center, Royalton Village, Sharon, South Pomfret, South Strafford, South Woodstock, Stockbridge, Strafford, Taftsville, Thetford Center, Thetford Hill, Tunbridge, Tyson (Plymouth), Vershire, West Fairlee, and West Woodstock.

Bridgewater Center | © *John Knox*

Policies: **Village Settlements**

Policies

1. Village Settlements should support a mixture of single-family, two-family, and multi-family structures at the highest densities possible given existing sewer and water capacity. Village Settlements that have neither public water nor sewer should plan for the maximum densities that can be supported by the soils present, in order to avoid ground and surface water contamination while also keeping the area denser than surrounding rural areas.
2. Conversion of larger older homes (particularly those with historic merit) to newer, more economical uses, such as offices and multi-unit housing, is consistent with this Plan. See the Historic Resources section for more information.
3. Principal retail establishments, services, tourist businesses, lodging, public facilities, and business and industrial enterprises of a scale and design that fit the context of the area are appropriate for this area.
4. Local capital planning programs and public investment strategies must support renovation of existing buildings and in-filling within Village Settlement Areas.
5. New development must not place undue burdens on municipal or regional facilities, utilities, and services, including transportation systems.
6. New development shall be planned to be reasonably compatible with existing development, preserve buildings of historic, architectural, or engineering significance, and not unduly impact the character of the area.
7. Long-range planning for the provision of public services in these areas to accommodate future growth is encouraged.
8. Planned and existing services should be coordinated so that the future expansion of services can be more accurately evaluated.
9. Highway investments within Village Settlements must include pedestrian circulation, traffic calming, and streetscaping.

Hamlet Areas

Hamlet Areas were significantly more prevalent throughout the communities in the TRO Region in the past. Presently those Hamlets that remain consist of groupings of buildings that are generally residential in nature. Hamlets are significantly smaller in scale than Village Settlements. They historically have served as the location for single-family homes, with a few stores and businesses supported primarily by local residents. Hamlets are not regional markets or trade centers. These areas generally do not contain a community water supply or sewer system. Minor community facilities and services sometimes are located in these areas. Hamlet Areas in the Region are Bridgewater Center, Bridgewater Corners, Corinth, East Barnard, East Bethel, East Braintree, East Brookfield, East Granville, Gaysville (Stockbridge), Locust Creek, North Pomfret, North Thetford, North Tunbridge, Stockbridge Central School, Thetford Hill, Vershire, Vershire Center, Waits River (Topsham), West Braintree, West Bridgewater, West Brookfield, West Hartford, West Newbury, West Topsham, and areas immediately adjoining such areas.

Policies: **Hamlet Areas**

Policies

1. The density of development in Hamlet Areas must reflect the existing settlement patterns, physical land capability, and availability of utilities for expansion. Hamlet Areas should support primarily single- and two-family homes and residential-scale small business enterprises (including principal retail establishments) that fit the context of the immediate area and are meant primarily to serve local markets.
2. Major traffic thoroughfares through Hamlet Areas must be planned with traffic calming elements.
3. New buildings should maximize allowable density. Where unusual natural features, soil limitations, or special resources (including high value agriculture land) are identified, use of cluster development concepts is encouraged to protect such resources from unnecessary development.
4. Existing postal facilities, and similar governmental offices, must be retained in Hamlet Areas and not be relocated into Rural Areas.

West Brookfield | © *John Knox*

Industrial Areas

Industrial parks and districts are a way to encourage economic growth and high-wage businesses to locate in the Region without adversely affecting neighboring land uses. Industrial uses can produce off-site impacts, such as noise, that can be mitigated if these businesses are located in areas designated specifically for industrial development and job growth. Commonly, Industrial Areas are located where there is direct access to transportation via major roads and/or rail, three-phase power, and other municipal infrastructure. These areas may include other commercial uses, provided that those uses are not more appropriate within Regional Growth Areas. There are Industrial Areas identified in seven communities in the TRO Region.

Policies: **Industrial Areas**

Policies

1. Industrial development and uses are the primary use within an Industrial Area, provided that the scale and intensity of the development does not have an undue adverse impact on the surrounding area.
2. In addition to industrial development, commercial development (excluding principal retail establishments), services, and offices may be appropriate, provided these are not the dominant uses.
3. Traffic and pedestrian safety must be a strong consideration in the design of development within Industrial Areas, particularly those areas with a large trucking component.
4. Principal retail establishments shall not be located in Industrial Areas, but secondary retail may be.

Mixed-Use Areas

Given the regional need for increased housing and local needs for commercial establishments that are not best suited to core areas due to their impacts, low value, or large use of land, a Mixed-Use Area can supply needed space for such along state highways without creating sprawl.

Policies: **Mixed-Use Areas**

Policies

1. Light industrial development may be appropriate, provided that the scale and intensity of the development does not have an undue adverse impact on the surrounding area.
2. Multi-family housing at several units per acre or greater is appropriate in this area.
3. Commercial uses that include land-consumptive uses, lumberyards, repair services, service businesses, secondary retail, warehouses, kennels, and indoor recreation are appropriate in this area.
4. Principal retail shall not be permitted in this area.
5. Reasonable efforts shall be made to provide pedestrian connections between uses, interconnect parking lots, and limit access points onto the state highway.

Quechee Gorge Tourist Area

Quechee Gorge is a singular geological tourist destination in the Region of statewide significance. This land use area provides tourist services for travelers visiting this destination while maintaining the level of service on US 4, a major arterial on the Federal Highway system and the primary east-west route in the region. The Quechee Gorge Tourist Area includes privately owned properties as well as lands owned or controlled by the Army Corps of Engineers and the State of Vermont. The Quechee Gorge Tourist Area secondarily serves the local needs of the Quechee area in a manner that is not meant to supplant uses in existing village areas or to create regional destinations other than the Quechee Gorge itself.

Quechee Gorge Bridge | © *John Knox*

Policies: **Quechee Gorge Tourist Area**

Policies

1. Retail and commercial uses that serve the tourism focus of visitors to the Quechee Gorge Tourist Area or the needs of the local community are appropiate. For example, smaller mixed-use offices, hotels, restaurants, and shops selling gifts and other sundry items.
2. Residential uses such as multi-unit or mixed-use residential buildings and single-family units are appropriate.
3. Individual principal retail buildings must not be larger than 10,000 square feet in footprint, and single retail uses no larger than 4,000 square feet.
4. In order to maintain mobility, all new construction must use existing side streets or existing accesses onto US 4 for vehicular traffic, and new uses shall provide pedestrian interconnections to adjacent uses.

Interchange Areas

Lands that are in close proximity to interstate interchanges are viewed as prime areas for development by some due principally to their ease of public access and favorable site conditions. In this Region, interstate interchanges are located in the towns of Bradford, Fairlee, Hartford, Hartland, Newbury, Norwich, Sharon, Randolph, Royalton, and Thetford. However, not all of these interchanges are designated as Interchange Areas as land use areas in this Plan.

Despite the benefits of interstate travel and the fact that the interchanges are important transfer points for traffic entering and exiting the Region, there are potential pitfalls to developing these areas. Increased traffic congestion and safety issues resulting from interchange developments can unacceptably decrease the level of service of roadways. One example, the Quechee interchange (I-89, Exit 1), contains acres of developable land located within a mile of the intersection of two interstate highways. This places this interchange at a high degree of vulnerability. Local development decisions made without adequate regard to preserving mobility will degrade the functionality of the public investments. An illustration of this

consequence is on Interstate 89 at Exit 20, a strip of commercial development in nearby West Lebanon, NH, where access on and off the interstate for traveler services has been negatively impacted due to traffic and over development. Other typical problems associated with improper traffic management and development at interchanges include:

1. The creation of numerous curb cuts (new driveways) surrounding the interchange to access new development that are permitted incrementally on a case-by-case basis without due regard to an overall plan for the area;
2. The eventual existence of high traffic generators in the immediate vicinity, which cause degradation of roadway intersections, the need for signalization, lower travel speeds, and extensive queuing of vehicles;
3. Inadequate planning for pedestrian accesses between developments and loss of significant farm land or access to such land;
4. Erosion of cultural, social, and economic values of the traditional town center or village settlement due to a dislocation or redistribution of key uses into the area;
5. Fragmentation of land parcels in such a manner as to preclude future access or interior roads to properties more removed from the right-of-way; and
6. Unnecessary loss of scenic qualities resulting from land development.

Lands at interchanges in Bradford, Fairlee, Newbury, Norwich, Sharon, and Hartford (White River Junction) are considered part of an existing Regional Center, Mixed-Use Area, or Village Settlement and are therefore not identified as separate Interchange Areas in this Plan. Lands at interchanges in Bradford, Newbury, and Royalton (in part) are located within Industrial Areas. Lands at interchanges in Thetford and Hartland are in Rural Areas. The interchanges in Quechee, Randolph, and Royalton are physically separate from a Regional Growth Area, being in some cases two or three miles away. Because this Plan and state planning policy affirm Regional Growth Areas as the principal areas for service, retail, civic, and institutional uses, it is in the interest of the Region for these areas to continue to serve these vital functions. Conversely, Interchange Area development, with its different focus, should not be promoted to the detriment of Regional Growth Areas or the public investments made therein.

TRORC respects the right of municipalities to plan for growth in these areas. At the same time, TRORC believes that given the considerable public investment in the interstate highway system and Regional Growth Areas, and the significant public exposure to such areas, these interchanges also need to be evaluated from a regional perspective. Land around interchanges and along highways leading to them are powerful magnets for non-residential uses, which often competes with and erodes Regional Growth Areas; the proximity of large parking lots adjacent to high-volume highways is an attractive force to consumers and businesses.

Policies: **Interchange Areas - General**

Policies

The following policies apply to all designated Interchange Areas:

1. Land use activities and public or quasi-public investments planned for Interchange Areas that have the effect of eroding the socioeconomic vitality of downtowns are incompatible with this Plan. Land uses planned for Interchange Areas must be of a type, scale, and design that complement rather than compete with uses that exist in Regional Growth Areas. Unless otherwise noted in the following Interchange Specific Policies, appropriate uses include residential, highway-oriented lodging and service facilities, trucking terminals, light industrial, offices, truck-dependent manufacturing, and park-and-ride commuter lots. No use should impose a burden on the financial capacity of a town or the State to accommodate the growth caused by the project.
2. Development planned for Interchange Areas must be constructed to:
    a. Complement the design principles and standards reflected in this Plan;
    b. Promote the most appropriate land uses as determined through a locally sponsored planning process involving affected landowners, municipalities, and TRORC;
    c. Minimize visual impacts from roadways through screening and landscaping and maintain a high standard of scenic amenities for visually sensitive areas with due regard to impacts on neighboring land uses and highway users; and
    d. Encourage planned unit developments.
3. Master plans for each Interchange Area should be completed. Such Plans should be conducted locally as part of each local planning commission's ongoing planning program in cooperation with landowners, TRORC, and other affected parties. Work should focus on creating an integrated site plan and design plan that serves as a means of addressing the potential conflicts or problems noted above. Elements that the Plan should include are:
    a. Access management controls;
    b. Pedestrian amenities;
    c. Transit access;
    d. Parking;
    e. Energy efficiency;
    f. Utilities/public services;
    g. Outdoor lighting standards;
    h. Landscaping and screening;
    i. Signage; and
    j. Open space conservation.
4. Master Plans must serve as the foundation for the identification of the highest and best use of these areas and should provide a framework for future development. Incremental and uncoordinated development inconsistent with Master Plans for each of the Interchange Areas is discouraged.

Policies continued on next page

Policies: **Interchange Areas - General**

Policies

5. Development concepts that must be utilized for Interchange Areas include:
    a. A circulation system that is conducive to pedestrian, bicycle, and other non-vehicular travel modes;
    b. A density or lot coverage area that is higher than surrounding rural settlement areas;
    c. Use of planned unit development concepts, such as compact development that is offset by open space;
    d. A design that incorporates public spaces and promotes social interactions;
    e. A mixture of uses including non-residential and community facilities, and possibly residential;
    f. Central focal points or public spaces serving the entire area;
    g. A pattern and scale of development that complements traditional patterns and uses in Regional Growth Areas; and
    h. Provision for park-and-ride commuter parking lots, transit access, and travel information services.
6. Municipalities with Interchange Areas are encouraged to promote creation and adoption of an Official Map, per 24 VSA §4421, to provide a legal means of creating an interconnected network of streets, walkways, and other public facilities or amenities on land designated as interchange development areas. Concepts employed in Master Plans and the Official Map should employ traditional streetscape patterns and designs deemed compatible with existing Regional Growth Areas.
7. Principal retail establishments must be located in Regional Growth Areas to minimize the blighting effects of sprawl and strip development along major highways, to protect the vitality of our villages and downtowns, and to maintain rural character.

Interchange Area Policies - Specific

The characteristics of each of the three Interchange Areas designated in this Plan are not identical. While all of the Interchange Areas serve as transfer points between the interstate (limited-access roads) and state highways (connectors to villages and outlying countryside), the physical and economic landscapes for these areas is different. Some areas are largely undeveloped open spaces without public infrastructure, especially sewer or water. Other areas are situated at or near prominent vistas or scenic areas and are visually sensitive to certain types of development. Yet other interchanges are experiencing new commercial or industrial development on what is or was farmland. Some interchanges are relatively flat and have greater potential to accommodate appropriate development than others that are steep or have other physical development constraints such as aquifers and wetlands. Lastly, local community planning desires and attitudes suggest that not all land use goals and policies should be universally applied.

It is the finding of TRORC that in order for this Plan to address each Interchange Area specifically, supplemental policies have been developed for each of these interstate interchanges. The policies in each Interchange Area section apply specifically to the interchange indicated.

Quechee (Hartford) Interchange (I-89, Exit 1)

Exit 1 of Interstate 89 accesses U.S. Route 4 and connects travelers and commerce west to Woodstock, Killington, Rutland, and beyond, and east to White River Junction and Interstate 91. Route 4 is one of the few east/west highways spanning the narrower width of

the State and therefore carries steady volumes of traffic. This interchange is located 1.5 miles from municipal sewer and water service; the residential wastewater system located to the west in Quechee is a shared leachfield system. The on- and off-ramps for the northbound and southbound lanes are located 0.5 miles apart. There are two different scenarios present at either end, with the northbound interchange leaving few opportunities for development due to the close proximity of 30-percent slopes and the interstate.

The southbound interchange is a sprawling commercial area with access roads intersecting the on- and off-ramps.

White River Junction—the Regional Center, a Vermont Designated Downtown, and a Designated Growth Center — is located 3.5 miles to the east. Development at this interchange should be of a type that does not displace the development and investment that has occurred in the Regional Center or in Quechee Village. In order to mitigate against the impacts of strip development and sprawl, and to ensure the vitality of Hartford's Regional Center, Town Center, Village Center, and Hamlet Area, this interchange is not an appropriate location for principal retail establishments.

Policies: **Quechee Interchange**

Policies

1. Intensive development that increases traffic volumes must not be permitted on the open lands accessed by Stagecoach Road; it would degrade the operation and safety of Interstate 89 and U.S. Route 4.
2. Development around the southbound interchange must be planned based around access points that do not degrade the functionality of U.S. Route 4 or the I-89 on- and off-ramps.
3. The types of land development appropriate for this interchange include offices, light industrial, residential, appropriately scaled traveler-oriented uses, and other similar uses that are not intended to draw on regional populations.
4. Principal retail establishments must be located in Regional Growth Areas to minimize the blighting effects of sprawl and strip development along major highways, to protect the vitality of our villages and downtowns, and to maintain rural character.

Randolph Interchange (I-89, Exit 4)

The Exit 4 interchange on Interstate 89 is located in Randolph, 3 miles from the revitalized historic downtown and commercial district and 1 mile from historic Randolph Center, home of Vermont Technical College (VTC). Exit 4 accesses Route 66, a two-lane connector road that runs in an east/west direction between the Village of Randolph, Randolph Center, East Randolph, and Route 14. This area is predominately open land, including farmland and woodland. The interchange area is known for panoramic and distant scenic vistas, particularly the mountain views to the west. There are several structures at the interchange, including a gas station and convenience store, a fast-food restaurant, professional offices, an auto service repair garage, a state highway facility, an industrial/office complex, and several single-family residences.

Presently there is no existing municipal water supply provided to the area, although there are water supply systems on the western edge of the area (Fish Hill) and eastern edge near VTC. An existing sewer line passes through the area and conveys wastewater from VTC down Route 66 to the municipal treatment facility. Annual average daily traffic (AADT) on Route 66 is estimated to increase with or without new development in the area.

Since 1998 the Town of Randolph has explored opportunities for development at the Exit 4

Interchange. The Randolph Town Plan reflects many of these efforts, dividing the Interchange Area into four quadrants and incorporating design and use standards for each quadrant into its land use regulations. Key components include the following:

1. Provide space for the development of business parks with design guidelines to protect scenic values;
2. Provide open space for the conservation of wetlands, streams, steep slopes, other natural resources, and visual quality;
3. Limit or deny new curb cuts to maintain the carrying capacity of Route 66;
4. Provide space and opportunities for transitional/senior housing;
5. Provide for an improved park-and-ride commuter lot/Welcome Center; and
6. Consider land for an agricultural/cultural museum perhaps to be affiliated with other uses.

Further, the extensive study conducted by the community over the past 18 years determined that retail development at the interchange was unsuitable for a combination of reasons, including traffic impacts on Route 66, visual sensitivity, and conflicts with downtown businesses. Moreover, standalone retail development at any scale or size was found to be incompatible with the community's values. However, there was one exception. Accessory uses of a retail nature were found acceptable.

Policies: **Randolph Interchange**

Policies

1. The development of large-scale retail at the Randolph interchange—including shopping centers, malls, auto dealerships, and big-box stores—is inconsistent with this Plan.
2. Small-scale retail uses secondary or subordinate to primary uses and non-traditional to downtown Randolph or its village areas may be acceptable uses subject to in-depth review and evaluation by the Selectboard and Planning Commission.
3. Any project planned for the interchange must employ design and construction standards that will ensure that development does not unduly impair the scenic resources of the area.
4. New development should be sited in areas that are not highly scenic, visible, or environmentally sensitive.
5. Future development at the interchange that requires improvements to Route 66, including traffic signals, turning lanes, or roundabouts, must be carefully evaluated. These should only be authorized where it is determined such a privately funded investment will not unreasonably endanger or interfere with the function, efficiency, safety, or use of this route.
6. New development must coordinate with existing development on shared access or retrofit access point locations to improve safety.
7. The types of land development appropriate for this interchange include offices, light industrial, residential, appropriately scaled traveler-oriented uses, and other similar uses that are not intended to draw on regional populations.
8. Principal retail establishments must be located in Regional Growth Areas to minimize the blighting effects of sprawl and strip development along major highways, to protect the vitality of our villages and downtowns, and to maintain rural character.

Royalton Interchange (I-89, Exit 3)

Exit 3 on Interstate 89 in Royalton accesses Route 107, which runs in an east/west direction, connecting to Bethel and Stockbridge and Routes 100 and 14. Route 107 is classified as a minor arterial road. It is a heavily traveled road and forms part of a major transportation corridor between I-89 and Rutland and points west. Forecasts reveal that traffic volume will continue to grow over the next 20 years.

Following the completion of I-89 35 years ago, several parcels of land near the interchange area have been developed. Primarily these changes in land use have been from rural residential and agricultural uses to industrial or commercial uses, but still much of the area remains undeveloped, consisting of farm and forestland. Several areas contribute to highly scenic vistas, particularly from I-89 and Route 107. Due to its prominent location, it is likely that new development at Exit 3 will continue. Solid transportation planning, coupled with sound land use planning principles, can minimize land use and traffic conflicts that have plagued many other Interchange Areas.

In 1999, the Town of Royalton conducted an extensive planning project in which the Royalton Planning Commission found the following values to be important to the area:

1. Provide space for future business growth, but only when it doesn't detract from Royalton's two villages;
2. Promote new development when plans are carefully laid out for safe access onto Routes 14 and 107;
3. Protect sensitive resource and scenic areas and encourage good design for new projects; and
4. Preserve the carrying capacity of Route 107 as a minor arterial road.

Given these values and an analysis of development suitability, nine future land use designations were recommended and depicted on a map. These included areas for industry, service and office type uses, residences, agriculture, and limited development. Goals and recommendations were listed to help guide the community on the highest and best uses for each sub-area. TRORC accepts the findings and conclusions contained in the *Exit 3 Planning and Development Study* (September 2000), which has since been incorporated into the Royalton Town Plan, as the planning policies developed by the Town of Royalton for this area.

Policies: **Royalton Interchange**

Policies

1. The types of land development appropriate for this interchange include offices, light industrial, residential, appropriately scaled traveler-oriented uses, and other similar uses that are not intended to draw on regional populations.
2. Principal retail establishments must be located in Regional Growth Areas to minimize the blighting effects of sprawl and strip development along major highways, to protect the vitality of our villages and downtowns, and to maintain rural character.

Rural Areas

The vast majority of land in the Region lies outside any of the Regional Growth Areas identified in this Plan but is still not remote forest. These Rural Areas make up 51% of the Region and are where many of us live and most of our local food is grown, and they form the principal visual backdrop along most roads. While we each may have a picture in our minds of what "rural" is, for this plan "rural," and hence Rural Areas, means lands that consist of a low-density mixed pattern of land uses, primarily homes, interspersed with scattered small-scale businesses, resource-dependent or land-consumptive commercial operations, outdoor recreation, and natural resource uses. The land is predominantly covered by forest, active agricultural land, or fallow agricultural lands transitioning back to forest. Rural lands are largely remote and undeveloped, or developed enough to constitute an existing settlement.[1] Development within these Rural Areas has been largely constrained by on-site limitations, including soil composition, slope, and elevation; ease of access to highways; lot size minimums; and distance to community services.

Historically, a significant amount of the Region's growth over the past forty years has taken place in the Rural Areas, primarily in the form of scattered residential development that has crept up hillsides, out into fields, and deeper into forests. As residents locate their homes farther from Regional Growth Areas, commercial businesses that serve those populations seek to locate closer to them, moving out of or away from traditional business centers. This pattern of growth in the Region is our version of sprawl and places land development pressures on Rural Areas, particularly in those communities that are nearest to major highways and serve larger populations.

This development has brought new life back into many towns, but these land use changes have also gnawed away at rural landscapes despite local planning efforts and public investment strategies that give priority to new projects within defined growth areas. This incremental change is largely due to no regulation through Act 250 of small-scale subdivisions, low regulation of residential development in those towns with zoning, and a general desire for "development" at the local level, as this is seen as helping a town in terms of tax revenue or increased vitality. This in no way means that all residential development in Rural Areas is bad, but such development comes with costs, too. New homes increase a town's tax base but the residents may require better road maintenance. Building on what were once farm fields offers farmers needed income but impairs the future of local farming. Higher property values increase a town's grand list but may also drive up taxes on current residents.

It is in the interest of the Region and in conformance with our towns' plans that scattered development not continue unabated so that the present land use features within Rural Areas can be maintained and remain dominant. State planning goals, to which the Regional Plan must be consistent, direct plans to "maintain the historic settlement pattern of compact village and urban centers separated by rural countryside... (and that) intensive residential development shall be encouraged primarily in areas related to community centers and that strip development along highways should be discouraged." Rural Areas in the Region can provide substantial amounts of new opportunities both to reuse existing structures and to locate new homes, home occupations, and small businesses. These lands often

Resource-based commercial uses are such things as sawmills, quarries, and sandputs, outdoor recreation, nurseries, and agricultural product processing. These are dependent on resources at the site or coming from Rural Areas or Forest-Based Resource Areas and may include retail of products produced on site.

Land-consumptive commercial uses are commercial operations that rely on large amounts of indoor or outdoor storage as the dominant use of space, and include sales lots and warehouses.

may be the cheapest land to put an affordable home on. But there are tradeoffs and the overall effect of unplanned growth in certain locations and at a certain scale in Rural Areas is in the process of transforming the landscape from something recognizable as "rural" in Vermont into something that is not. Rural Areas are not simply suburbs waiting to be created; they are a valued land use to Vermonters in their own right, and can remain that way for a long time if we are careful in how we develop them.

Not all land within Rural Areas is similar, nor should it be treated the same when planning for development. Some land is steep, wet, prime agricultural soil, of special habitat value, adjacent to waterways, or subject to flooding, and should largely remain undeveloped for these reasons. However, these aspects are very site specific and are dealt with on a policy basis elsewhere in this Plan. This section of the Plan addresses those uses desired for Rural Areas in general and that complement the more developed parts of the Region.

One of the main land uses in the Rural Areas is agriculture, either in cropland or in pasture. These open lands are part of the aesthetic appeal of the Region, underlie an agrarian culture, and form the basis for a significant part of our economy. Forestry is another important use, though most larger forests are in the Forest-Based Resource Area. Agriculture and forestry and the land they depend on are addressed both in this chapter and in the Working Landscape chapter.

Regional land use policy elsewhere in this Plan focuses most business uses within or close to Regional Growth Areas. Rural Areas, however, can accommodate certain non-residential uses in ways that serve to maintain the vitality of more developed areas and that do not unduly compromise one of the principal objectives for these Areas—to retain rural character. For example, the Rural Areas are where many of the Region's homes are, so naturally many home occupations are found there as well. Home occupations are allowed by right in local regulations in Vermont anywhere homes are allowed and are a way for people to earn a living with minimal land use impact. They must use less of the building than the home uses and can have a variety of small commercial operations.

Home enterprises are typically larger operations that are still on a residential lot but are allowed in many town zoning bylaws with some limitations on the number of people that can work there and on impacts such as traffic. Contractor's yards are a common home enterprise. With appropriate review, Rural Areas can provide these land uses a good location.

Rural Areas have many older structures such as large farmhouses or barns that lend themselves to adaptive reuses that can both preserve these visual assets and provide employment. Inns, small industrial operations, and multi-family dwellings are examples of uses that can keep these structures from becoming obsolete while not creating a major visual change to the rural landscape.

While commercial enterprises in the Rural Areas are smaller and scattered, there are two somewhat intensive commercial uses that make sense to locate in Rural Areas. These are either based on resources found there or are land-consumptive commercial uses. Resource-based commercial uses provide economic benefits and jobs that support the rural landscape, and they are uses that would largely detract from developed Regional Growth Areas if located within them. Such uses have a traditional rural role in Rural Areas.

Commercial land-consumptive uses that are not

dependent on natural resources do not make the best use of the limited amount of land in Regional Growth Areas that have sewer and/or public water supply. Locating these immediately adjacent (within a quarter mile) to Regional Growth Areas along major roads can serve to protect the desired aspects of both rural and more urbanized areas.

Goals, Policies, and Recommendations: **Rural Areas**

Goals

1. Agriculture continues to form an important visual, economic, and cultural part of the landscape.
2. Rural lands provide a place for people's homes and small businesses.
3. Development is at a scale and type that conforms to historical patterns and does not detract from Regional Growth Areas.

Policies

1. Development shall be at a scale that is less dense than adjacent Regional Growth Areas.
2. Except along paved roads, development density greater than one principal structure per two acres is not appropriate to maintain rural character, but lot sizes are encouraged to be smaller than this in subdivisions so as to preserve a larger portion of the remaining lot as undeveloped and still meet overall density goals.
3. New freestanding, individual multi-unit residential buildings containing five units or less per structure are appropriate along Class 3 or better roads in order to stay in keeping with rural scale, but larger ones are not, excepting inns, outdoor recreation, and other lodging. However, a development may contain more than one such multi-unit building. Individual buildings with more than five residential units each are not appropriate in this Area. This unit limit does not apply to adaptive reuses, or to rooms in senior care facilities, outdoor recreation, or lodging establishments.
4. Adaptive reuses, such as small light industrial operations or multiple housing units, are encouraged in older existing large structures as towns desire, but care must be taken to not lead to development too intensive for the rural character.
5. Development of resource-based commercial uses is appropriate in these areas, with safeguards to protect neighbors from undue adverse impacts from noise, dust, and other nuisances (see also Section H in the Natural Resources chapter for more on extraction policies).
6. In Rural Areas that abut state highways and that are no greater than a quarter mile to Regional Growth Areas, land-consumptive uses may be appropriate, provided that they do not have an adverse impact on the character of the adjacent Regional Growth Area and that they mitigate the impacts of sprawl and strip development.
7. Projects subject to Act 250 must be planned and sited to satisfy the following:
    a. Utilize compact development design and locate new development or lots near or adjacent to existing road infrastructure and away from productive fields or forests to conserve the maximum feasible amount of usable farm, pasture land, or managed woodland;
    b. Locate non-agricultural buildings next to or within the forest edge (if any), instead of in open fields, to enable new construction to be screened by natural landscape features;
    c. Minimize buildings, utilities, or structures blocking or interrupting scenic vistas as viewed from a public highway;
    d. Take reasonable steps to protect historic features, wetlands, stream buffers, forest blocks, wildlife crossing areas, necessary wildlife habitat, and habitat connectors; and
    e. Give consideration to burying power and phone lines, if cost effective, when new roads are being constructed.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Rural Areas**

Policies (continued)

8. Use of planned unit developments or conservation subdivision design schemes is strongly encouraged as a means of providing rural development that concentrates development on part of a parcel in order to preserve larger lots that are more useful for farming, forestry, or wildlife habitat. Towns should consider incentives such as density bonuses.
9. Non-residential uses, including small service businesses, small professional offices, and inns are acceptable land uses for Rural Areas provided that such uses are located near existing transportation infrastructure; planned at a residential scale and form; are not primary or dominant uses in an area; would not unduly conflict with existing or planned residential, forestry, or agricultural uses; and do not unduly affect rural character.
10. TRORC supports the right of a resident to use a minor portion of a dwelling unit for a home occupation, which is customary in Rural Areas, provided it does not create a nuisance or have an undue adverse effect on the values noted in this Plan as being important to sustaining the character of Rural Areas.
11. Major retail enterprises or service centers that draw principally on regional market shares (including factory outlets, large grocery stores, fast-food establishments, and shopping malls) shall not be permitted in Rural Areas.
13. Development shall be designed to take reasonable steps to minimize accesses onto public roads, and projects that would create traffic demands that require the paving of rural gravel roads are not appropriate in Rural Areas.

Recommendations

1. TRORC will work with towns and developers to site housing in Rural Areas to meet housing needs. (See also the Housing chapter.)
2. TRORC will work to ensure that agriculture in these areas remains an important part of our economy. (See also the Working Landscape chapter.)
3. TRORC will work with towns, state and federal agencies, and conservation organizations to conserve important forest and agricultural lands.
4. TRORC will work with member towns on Town Plans and bylaws to address development in the Rural Areas so that it meets state planning goals and the desires of towns.

Forest-Based Resource Areas

The lands within the Forest-Based Resource Areas—primarily large blocks of unfragmented forest that are needed to sustain a forestry industry and areas that contain critical wildlife habitat and allow safe wildlife movement—provide the Region with important services that cannot be replaced on other lands. Land with these characteristics is shrinking in both the State and the Region. The health of many natural communities and wildlife depend on these large, uninterrupted areas of forestland, commonly referred to as "forest blocks," and these must be connected to each other through wildlife corridors.

The main threats to such areas and their functions are fragmentation and parcelization. Forest fragmentation is the division or conversion of forest blocks through the clearing of land, building of structures, and other activities associated with development (excluding recreational trails). Even the seemingly simple act of installing roads affects wildlife movement and increases invasive plants and pests. Development that causes forest fragmentation creates barriers which limit species movement over the landscape, interrupts ecological processes, and impacts genetic diversity. Parcelization, which is part of fragmentation, is the subdividing of forest parcels to smaller lots but does not necessarily

Table 3-1: Wildlife Present in Forest Patches

Undeveloped	500 - 2,500 acre blocks	100 - 500 acre blocks	20 - 100 acre blocks	1 - 20 acre blocks
Raccoon	Raccoon	Raccoon	Raccoon	Raccoon
Small rodent	Small rodent	Small rodent	Small rodent	Small rodent
Squirrel	Squirrel	Squirrel	Squirrel	Squirrel
Red fox	Red fox	Red fox	Red fox	Red fox
Songbirds	Songbirds	Songbirds	Songbirds	Songbirds
Skunk	Skunk	Skunk	Skunk	Skunk
Amphibians	Amphibians	Most Amphibians	Most Amphibians	Most Amphibians
Reptiles	Reptiles	Reptiles	Most Reptiles	Most Reptiles
Hare	Hare	Hare	Hare	
Porcupine	Porcupine	Porcupine	Porcupine	
Beaver	Beaver	Beaver	Beaver	
Weasel	Weasel	Weasel	Weasel	
Mink	Mink	Mink		
Turkey	Turkey	Turkey		
Horned owl	Horned owl	Horned owl		
Barred owl	Barred owl	Barred owl		
Sharp-skinned hawk	Sharp-skinned hawk	Sharp-skinned hawk		
Cooper's hawk	Cooper's hawk	Cooper's hawk		
Broad-winged hawk	Broad-winged hawk	Broad-winged hawk		
Osprey	Osprey	Osprey		
Harrier	Harrier	Harrier		
Deer	Deer	Deer		
Wood frog	Wood frog	Wood frog		
Ring-neck snake	Ring-neck snake	Ring-neck snake		
Bald eagle	Bald eagle			
Goshawk	Goshawk			
Moose	Moose			
Red-tailed hawk	Red-tailed hawk			
Coyote				
Bobcat				
Black bear				
Fisher				

Source: Above and Beyond. Campoli, J., Humstone, E., & MacLean, A. 2002.

Vermont Foliage | © Judith A. Brown

involve further development. Parcelization makes continuing to manage forests for forestry or conservation more difficult or even impossible.

Both fragmentation and parcelization will impact the important functions we now enjoy from the large forest blocks in these areas, but unless lands are bought outright for conservation or have easements on them, some development is likely. How this development, from simple subdivision into lots to subsequent construction of roads and buildings, takes place is a matter of public concern, as it can negatively affect forestry and the many species that depend on such areas, as well as generate off-site impacts, such as increased flood flows. Further development in remote areas would also create increased costs for towns to maintain or upgrade minor Class 3 or 4 roads and would work against regional energy goals as such development is much more reliant on single-occupant vehicle trips.

Such landscapes need to be addressed at the regional level. An individual landowner might be able to conserve a wooded wetland for salamanders or a small forest for deer habitat, but this would not be enough to meet all the needs of that species within the area. A large timber owner might conserve a sizable forest, but that does not support an industry. Even efforts at the town scale (though very important) do not contain enough land for many species' needs, which can be several hundred acres per individual among the larger animals.

The best available data on where the priority interior forest blocks, as well as priority wildlife corridors, exist (see maps below) has been produced by the Vermont Conservation Design (VCD) joint project of the Vermont Department of Fish and Wildlife, Vermont Department of Forests, Parks and Recreation, and the Vermont Land Trust. Wildlife corridors are critical to connect the large blocks so that populations do not become inbred, species can move as climate shifts, and isolated incidents such as blowdowns or timber harvesting do not threaten overall species health. Several wildlife species need habitat areas exceeding one square mile for population health.[2] As noted in the report *Vermont Conservation Design: Maintaining and Enhancing an Ecologically Functional Landscape*, if these landscapes are conserved on a large scale, then "most of the species they contain . . . will also be conserved."[3] There are no doubt additional locally significant lands that are not large enough to show up in this data that are still important.

While the Region looks well forested from the air, there are places in the Region where forest blocks and wildlife corridors are tenuous, particularly in the area that stretches from Barnard to Sharon. However, as the maps below show, for nearly half of the Region's towns, the entire town outside of small developed areas along roads is either a forest block or a wildlife corridor block.

It is not a regional goal, and certainly not a town goal, to have nearly entire towns developed at a very low density. Consequently, the VCD map of these areas was used as a *starting point* when developing the Forest-Based Resource Areas

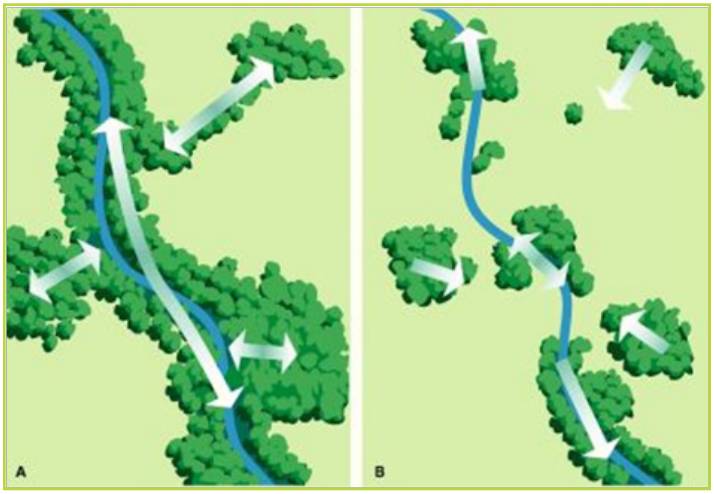
regional future land use area, and then it was modified based on town future land use maps, infrastructure, the amount of land that performs interior forest or habitat connector functions nearby, and adjacent conserved or public lands. This resulted in the final Forest-Based Resource Areas shown on the future land use map.

Allowing the lands in these Areas to remain largely undeveloped will maintain their ability to provide timber production, outdoor recreation, flood storage and aquifer recharge, scenic beauty, and wildlife habitat, and contribute to our economic well-being and quality of life. Allowing some careful development in them will create income for landowners and address other regional goals, such as outdoor recreation and housing. It is not the intent of this Plan to create true wilderness areas, and the policies in the Plan reflect that. However, much of the Region's land that once provided large-scale wildlife habitat can no longer do so due to existing development, and therefore the remaining lands in some towns are more likely the *minimum* needed to fulfill these functions rather than the optimal amount.

Figure 3-1 shows VCD Forest Blocks, where the dark green areas are highest priority bocks and the light green are priority blocks. Figure 3-2 shows VCD Connectivity Blocks, where the dark blue are highest priority blocks and light blue are priority blocks.

Chateauguay No Town (CNT)

A particularly large and coherent part of the Region that exemplifies the Forest-Based Resource Areas is what is known as the Chateauguay No Town (CNT) area. This is a remote upland wilderness area consisting of approximately 55,000 acres covering parts of the Towns of Barnard, Bridgewater, Stockbridge, and Killington. With limited exception, land parcels are large, ranging up to several thousand acres in size. Human settlement is sparse, year-round public access is practically non-existent for most of the area, and public services (such as electric or telephone) are very limited. Roads are relatively



Landscapes with (A) high and (B) low degrees of connectivity. Corridors are particularly important for wide-ranging species whose habitat needs are not accommodated by a single patch of suitable habitat.

narrow and steep and are not designed to sustain heavy vehicles or high volumes of traffic. The few inhabitants living here mostly provide their own power and lighting and maintain and plow their own roads. Much of the CNT is owned by timber companies or families interested in using the land for wood production and land is enrolled in Vermont's Land Use Value Appraisal Program.

In late 1997, the Chateauguay No Town Conservation Project was launched by the four towns the CNT is located in, "to foster, through locally sponsored conservation activities, the long-term commitment to stewardship of exceptional forest, wildlife, and recreational lands." Since then, a locally appointed committee, in cooperation with the Vermont Land Trust, the Conservation Fund, TRORC, Appalachian Trail Conference, and the Vermont Agency of Natural Resources, has been evaluating ways to voluntarily conserve this area, to protect critical habitats, to promote sustainable forestry, and to ensure recreational opportunities. To assist the CNT partners in the implementation of the project, both a local and a regional conservation

Figure 3-1: Highest Priority and Priority Interior Forest Blocks in the TRO Region

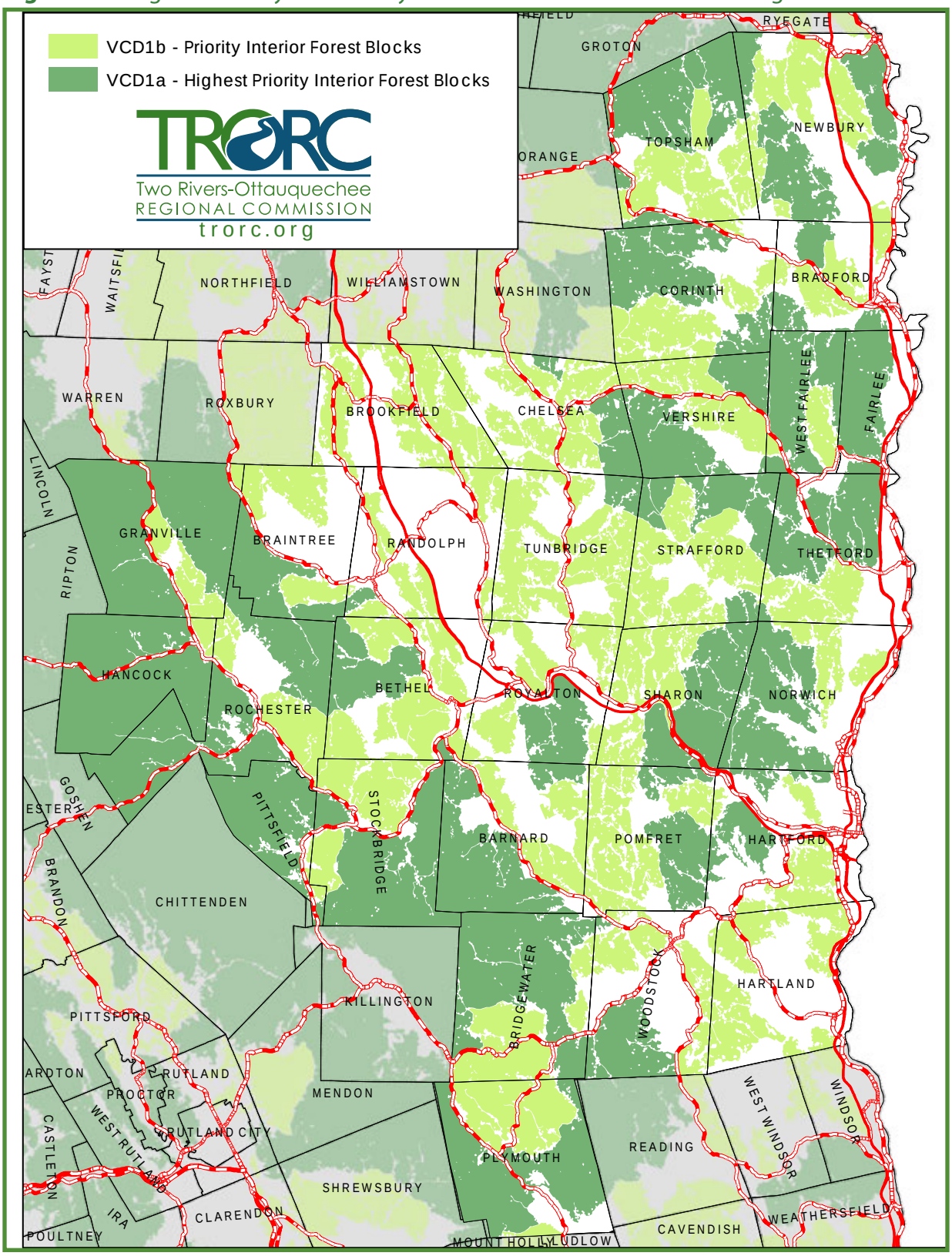


Figure 3-2: Highest Priority and Priority Connectivity Blocks in the TRO Region

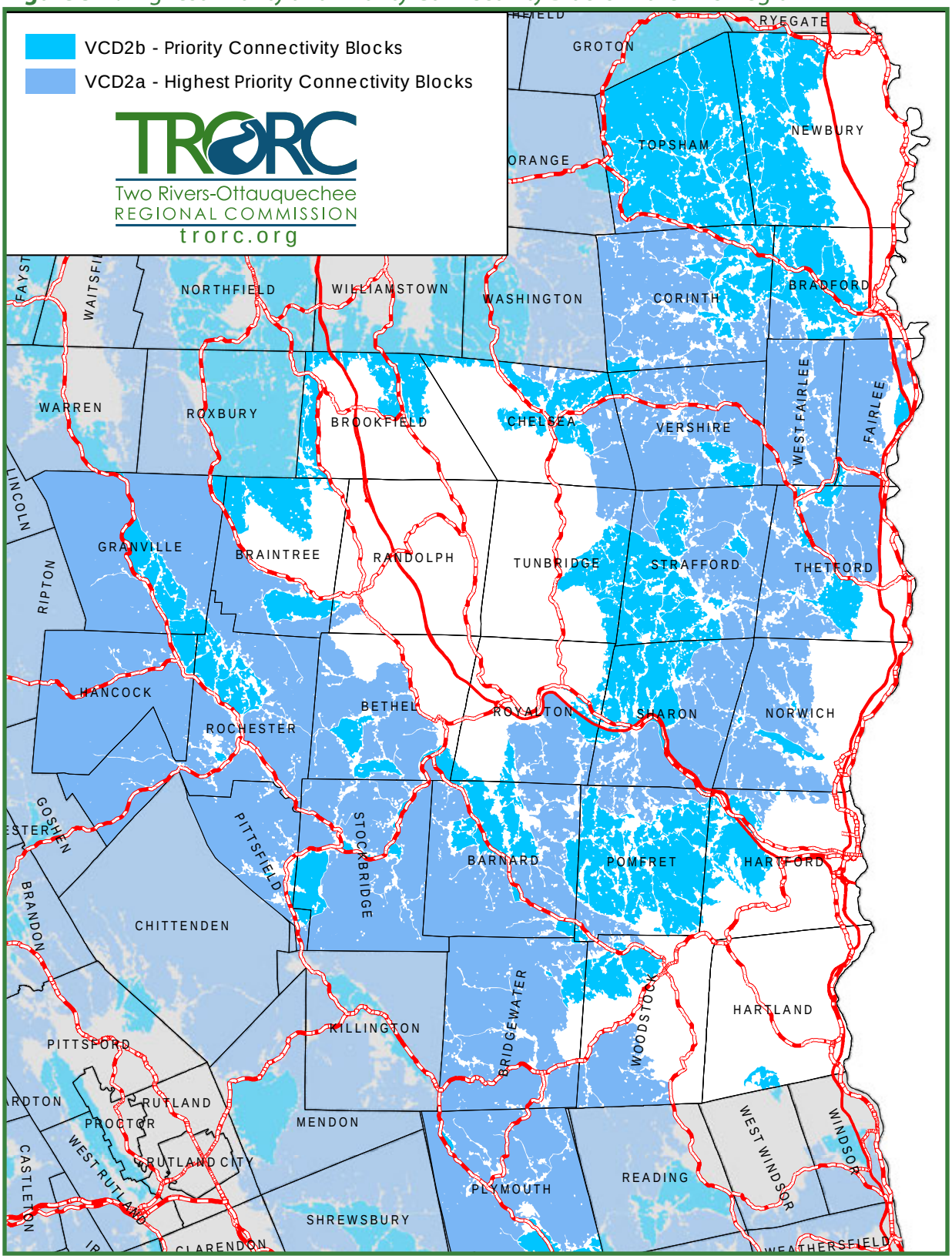
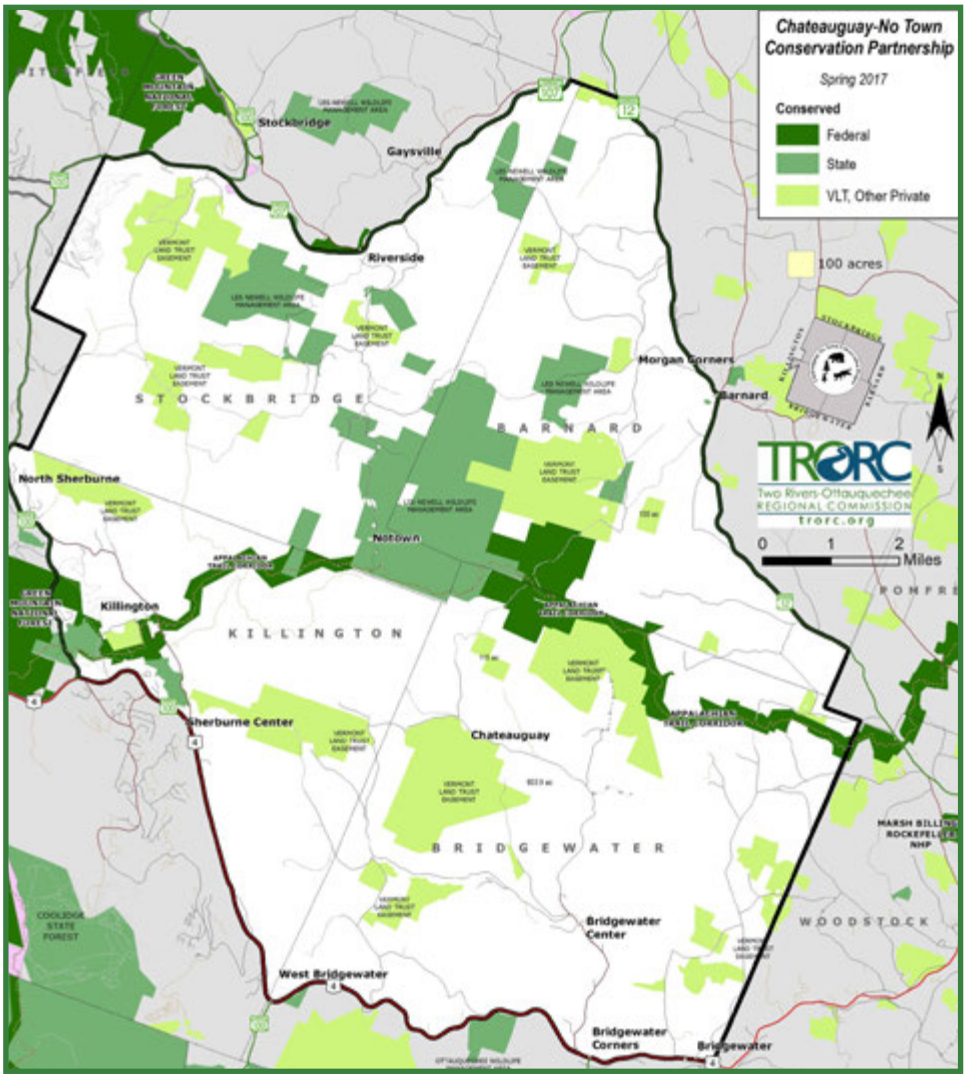


Figure 3-3: Chateauguay No Town (CNT) Conservation Area Map



fund have been established to provide financial resources to landowners interested in conservation of their property. Several landowners have agreed to work with the project on specific plans to voluntarily conserve their land.

Like much of the Forest-Based Resource Areas, in the CNT multiple recreational activities are present, especially seasonal hunting camps, snowmobiling, and hiking. The Appalachian Trail passes through the central section of the CNT. The CNT also contains the 7,988 acre Les Newell Wildlife Management Area and provides valuable habitats for wildlife, including black bear, moose, bobcat, and deer. The entire CNT has been identified by the Vermont Department of Fish and Wildlife as bear production habitat. The CNT serves as a critical link between the bear production areas south and north of US Route 4. The long-term stability of black bear depends on the retention of this area in a predominately undeveloped state.

Taylor Valley

The Taylor Valley area straddles parts of the towns of Vershire, Chelsea, Tunbridge, and Strafford. This area has large stretches of undeveloped land, wildlife habitat, unique flora and fauna, productive timber land, productive agricultural land, and extensive areas for hunting and other outdoor recreational opportunities. The privately organized Taylor Valley Conservation Project has identified a core area of 19,000 acres centered around the Taylor Valley for special conservation attention. Approximately 4,000 acres in the core area have been conserved through conservation easements, and landowners have committed to the conservation of an additional 1,700 acres in the core area. The greater Taylor Valley Area also includes extensive forestlands stretching from the Strafford-Tunbridge Road in a southerly direction to the Joseph Smith birthplace including over 1,000 acres protected by conservation easements held by the Upper Valley Land Trust and the Vermont Land Trust.

Brushwood Community Forest/West Fairlee Town Forest/Fairlee Town Forest

In 2009, Brushwood Community Forest was established on approximately 475 acres of relatively undeveloped forestland in the Towns of Fairlee and West Fairlee. With the help of the Trust for Public Land, an additional 580 acres was added in northern Fairlee that had been owned by the Town of Bradford. The 1,055 acre area is now owned by the Town of West Fairlee and protected from development through a conservation easement. It abuts the separate West Fairlee Town Forest and the large 1,500 acre Fairlee Town Forest. The lands in public ownership comprise just a small section of the greater 28,000-acre Brushwood Forest area that boasts an extensive trail network, vast undeveloped forestlands, wetlands, and wildlife habitat.

Coolidge State Forest (CSF)/Arthur Davis Wildlife Management Area

CSF encompasses 21,500 acres of land in Plymouth and Woodstock, and additional lands in Reading, Killington, Mendon, and Shrewsbury. The State Forest includes Coolidge State Park where campsites, hiking trails, and beautiful scenic views are abundant. CSF is the state's third largest State Forest and is managed by the Vermont State Parks' Department of Forests, Parks, and Recreation (FPR). It abuts the 7,788 acre Arthur Davis WMA found in Plymouth and Reading, which is managed by the Vermont Department of Fish and Wildlife.

Green Mountain National Forest (GMNF)

With over 400,000 acres, the GMNF is located within several TRORC towns, including Woodstock, Rochester, Hancock, Pittsfield, Stockbridge, Granville, Bridgewater, Pomfret, Hartford, and Norwich. The lands contain portions of the Long Trail, Appalachian Trail, and Robert Frost National Recreation Trail. These areas preserve the headwaters of the White River and provide significant outdoor recreation and forestry opportunities, as well as form part of the largest north-south wildlife corridor in the State.

Orange County Headwaters (OCH)

The OCH Project was started by landowners in the Towns of Washington and Corinth who had an interest in conservation. Through the Vermont Land Trust and the Upper Valley Land Trust, 31 OCH landowners have conserved 4,500 acres. Much of this land is forested.

Pine Mountain Wildlife Management Area (WMA)

Pine Mountain is one of the larger WMAs in the Region. It spans the towns of Topsham and Newbury as well as Groton and Ryegate (outside of the Region). It is 2,274 acres in size, 95 percent of which is forested. Managed by the Vermont Fish and Wildlife Department, the Pine Mountain WMA is home to white-tailed deer, black bear, moose, and many other mammals, birds, fish, and amphibians. The area is open for hiking, fishing, trapping, and hunting.

Other Lands

The Region has other smaller state and town owned lands, as well as privately owned lands that are protected through conservation easements held by land trusts, such as the Vermont Land Trust or Upper Valley Land Trust.

Goals, Policies, and Recommendations: **Forest-Based Resource Areas**

Goals

1. Healthy forests remain an important part of the Region's landscape and continue to provide their unique functions, including recreation, forest products, and wildlife habitat.
2. Upland forests serve to retain and cleanse water and have high-quality waters.
3. Forest blocks are connected so that species can move between them.

Policies

1. Land above 2,500 feet elevation shall be maintained predominantly in a natural wilderness state, except in cases of wind power and/or telecommunications projects endorsed by this Plan.
2. Acquisition of lands, or conservation easements on lands, by the Federal Government, the State of Vermont and nonprofits is encouraged between willing parties. Management plans prepared for conserved or acquired areas must recognize the concept of preservation as well as forest utilization.
3. Outdoor recreation and forestry uses are encouraged provided these uses do not unduly impact other significant resources of the site.
4. Timber production is encouraged in this land use area provided it is done in accordance with best management practices and managed and harvested in ways that keep soil erosion and sedimentation of streams to a minimum.
5. Motorized recreation must be limited to designated existing trail/road networks and new connections between trails and be compatible with any critical wildlife habitat and water quality protections. Retention of snowmobile trails, many of which go over private land and are part of the statewide VAST trail network, is a priority. Conservation plans developed for landowners in this land use area should reflect, where practicable, the desire to retain this network of trails and not close or cut off important trail routes.
6. New structures capable of being occupied year-round are not appropriate in interior (greater than 300 feet from the forest edge) parts of these areas, but noncommercial seasonal camps serving hunters, snowmobilers, and other outdoor recreational users are appropriate.
7. Any use deemed appropriate to elevations over 2,500 feet should be sensitive to slow vegetative recovery and severe soil limitations and must avoid erosion.
8. Subdivisions and other development subject to Act 250 on lots over 30 acres shall minimize impacts on forestry potential and habitat values of undeveloped areas by concentrating development at the forest edge near other development and roads; use small lot sizes and shapes so that at least 80 percent of the land remains in a large undeveloped tract; minimize clearing of forest; and avoid the creation of additional roads or power lines that would further future development into interior areas.
9. Large subdivisions of more than ten structures are inconsistent with this Plan.
10. Outdoor recreation is encouraged. Development of snowmobile, hiking, and cross-country ski trails and similar recreational facilities are appropriate uses subject to meeting acceptable management practices and applicable state law.
11. Formal designation of Class II groundwater areas and Class A1 and B1 surface waters by the State of Vermont is encouraged within the land use area.
12. No development in its built-out state shall create more than one acre of impervious surface.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Forest-Based Resource Areas**

Policies (continued)

13. New developments must take reasonable steps to avoid disruption or loss of major identified wildlife corridor crossings. Transportation enhancement projects should be pursued to mitigate vehicle conflicts with wildlife, including signage and education and awareness programs along road corridors that host significant numbers of wildlife crossings. In addition, initiatives should provide for improvements to the transportation infrastructure to reduce vehicle collisions and wildlife fatalities.
14. Upgrading or paving gravel roads, upgrading electric distribution lines, or extension of utilities is not appropriate in this area, except as needed to serve outside areas, unless the public is clearly benefited thereby and where it is determined not to compromise the land use goals and policies for this Area.

Recommendations

1. As habitat data is updated, TRORC will re-evaluate this land use area to ensure that its purposes are being met.
2. TRORC will work to ensure that the functions of these areas are economically valued so that both the towns containing them and their owners have incentives to leave them in a largely undeveloped state.
3. TRORC will work with state and federal agencies and conservation organizations to conserve these lands in ways that also support the local economy and bring value to landowners.
4. TRORC will work with member towns on Town Plans and bylaws that will address smaller development not subject to Act 250 so that it is done in ways that preserve the functions of these areas while allowing compatible development.

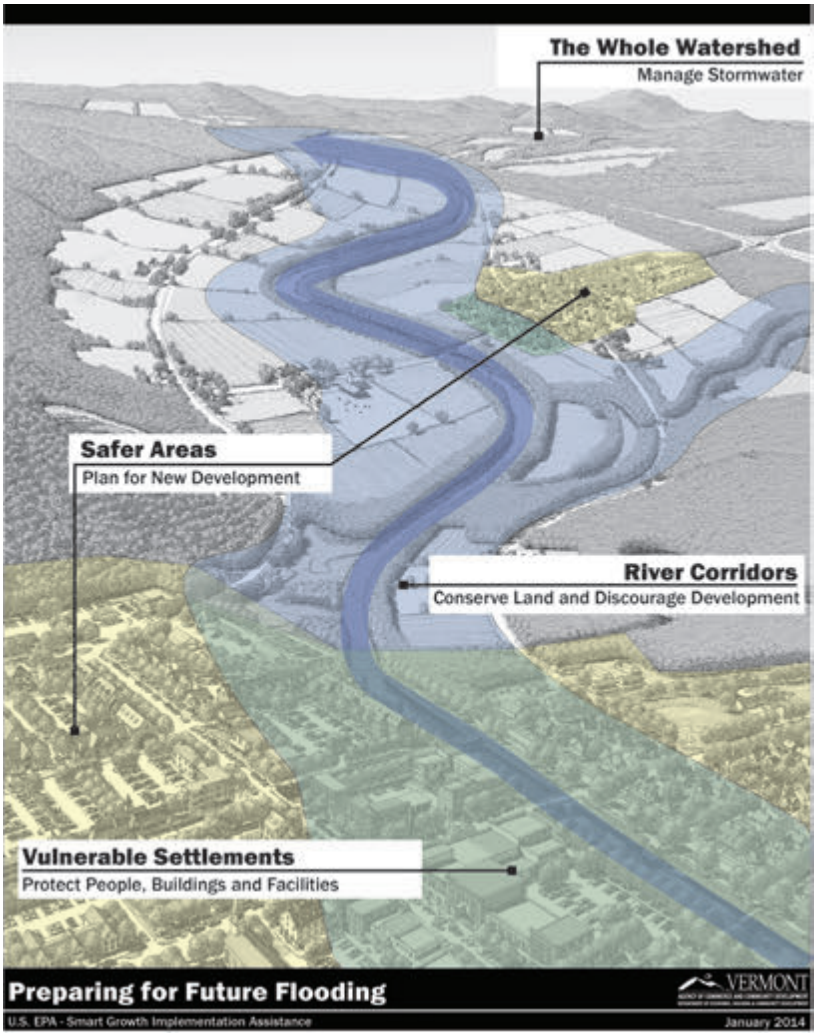
C. Flood Resilience

Types of Flooding

Generally speaking, there are two types of flooding that impact communities in the State of Vermont—flooding caused by inundation and flash flooding. Inundation flooding usually occurs slowly, but flood waters can cover a large area. It may take days or weeks for inundation floodwaters to subside from low areas, which may severely damage property. Inundation flooding takes place on flat and poorly drained land, typically along obvious floodplains. Ice or debris jams can also create inundation flooding as floodwaters back up behind such jams.

Flash flooding occurs when heavy precipitation falls on the land so quickly that the soil is unable to absorb it into the ground, leading to surface runoff. Runoff can be increased by saturated soil, extremely dry soil, frozen ground, and impervious surfaces. The quick-moving runoff collects in the lowest channel in an area, turning upland streams, small tributaries, and even dry ditches into roaring brooks. Flash flooding typically does not cover a large area, but the water moves at a very high velocity and the flooding manifests quickly, making flash floods particularly dangerous. Due to the velocity of the water, a flash flood can move boulders, trees, cars, or even houses.

Heavy storms can also cause fluvial channel erosion, in which the bank erodes and the channel migrates sideways and/or cuts deeper. Fast-moving water in a stream channel may undermine roads and structures and permanently change the channel itself, predisposing other roads and structures to future flooding damage. Flash floods can also mobilize large amounts of gravel and woody debris, depositing these in less steep areas as well as plugging culverts and leading to even greater damage. In Vermont and the Region, most flood-related damage is caused by flash flooding and fluvial erosion (erosion of stream banks). Flooding is the worst current natural threat to residents and infrastructure in the TRO Region and the State.[4]



Source: EPA

Significant flooding events have occurred in the TRO Region throughout recorded weather history. Due to the topography of the Region, it is likely that large-scale or widespread localized flooding has been occurring for hundreds or thousands of years. Please see Appendix D for a table outlining the flooding events that have occurred in the TRO Region over the past 100 years, beginning with the worst flooding event to hit the TRO Region and Vermont, the "Great Flood of 1927."

Causes of Flooding

Flooding in our Region is caused by a small number of distinctive types of weather and can be worsened by the conditions on the land (such as saturated or frozen soils) at the time the flooding occurs. By far the most common type of weather event to cause flooding in our Region is a severe thunderstorm. These storms are usually afternoon storms in the warmer months, but they can also be associated with hurricanes and tropical storms, which also occur during the summer and into the fall. By the time most hurricanes reach Vermont, they have been downgraded to tropical storms, but that is not to say they are less dangerous. The speed of the hurricane or tropical storm and pockets of varying severity within the storm system have an impact on the rainfall totals observed from town to town. For example, Tropical Storm Irene dropped over six inches in much of the White River Valley (and nine inches in Rochester, according to local reports), causing extensive flooding damage. However, the towns in the Region along the Connecticut River received only 3" to 5" and experienced minimal flood damage. Storm impacts can be greatly magnified by previous rains. Tropical Storm Floyd in 1999 was very similar to Irene, but it fell on dry ground and is hardly remembered.

Ice jams due to the combination of melting snow and rain leave our Region vulnerable to the impacts of flooding in the winter and early spring. Ice jams typically occur during the spring when river ice begins to break up and move downstream, but they may also occur during a thaw period in the winter months. These sheets of ice then "jam" as they become hung up on a narrow or shallow portion of the stream or river, creating a dam, and additional ice and water rapidly back up behind them. Once the "dam" breaks free, flash flooding may occur downstream. Ice jams in our Region typically cause minimal damage, but they can damage road infrastructure and flood homes and businesses. The mainstem and First and Third Branches of the White River, the Waits River, the Connecticut River, and several smaller brooks have all experienced ice jams.

"Resilience" means that an entity—a person, neighborhood, town, state, region or society— when faced with a particular situation or event, has the ability to effectively return to its previous state or adapt to change(s) resulting from the situation or event without undue strain.

Flooding is worsened by land uses that create hard surfaces, which lead to faster runoff, and by past stream modifications, such as straightened or dredged channels, which can create channel instability.

Implications of Climate Change and Flooding

According to a white paper produced by the Vermont Agency of Natural Resources (VT ANR)'s Climate Change Team, climate change will likely bring about conditions that exacerbate flooding in Vermont. The summer season is expected to lengthen overall, and the total precipitation is expected to increase in all seasons except the fall. The frequency of heavy precipitation events is likely to increase in all seasons, with the heaviest precipitation events occurring during the summer months. Perhaps more importantly, precipitation will likely occur in shorter, more intense bursts and, consequently, will produce precipitation that runs off the land more than it filters into it. An increase in extreme precipitation is already documented in the Northeastern U.S., especially after 1996. Precipitation models currently used in designing and building road infrastructure, informing policy decisions, and in regulating the location where structures

Climate change will likely bring about conditions that exacerbate flooding in Vermont.

~VT Agency of Natural Resources

Route 4 Before and After Tropical Storm Irene
| Source: USDA Farm Service, Google Earth

and facilities are built rely on historical data that is no longer accurate for current conditions and will only become less accurate as climate change continues.

Flood Damages

Floodwaters spilling over riverbanks have given us broad and fertile floodplains. Floods have carved our valleys and made our hills and mountains. Were it not for human infrastructure and settlement in the path of it, flooding would be a natural occurrence but not a hazard. However, we have built most of our towns and villages right next to the rivers that powered our mills, carried logs, provided water, and took away our waste. We built our roads along streams, as that was the easiest route, and often used gravel mined from the adjacent stream. When it seemed inconvenient to plow around meandering streams or to bridge rivers, we just moved the waterways aside. Erroneously thinking that rivers behaved like pipes, we straightened them thinking they would flood less, but that actually only increased their erosive force. Due to our actions, not nature's, flooding is the worst current natural threat to residents and infrastructure in the TRO Region.

Flooding in the Region causes immediate impacts such as eroded river banks, road closures, flooded structures, and crop damage. However, once the stress of the initial flooding impacts has subsided, the more long-term impacts begin to show, especially after major flooding events. One long-term impact is the effect of flooding on the Region's economy. Economically speaking, Tropical Storm Irene struck at a very inopportune time at the end of August 2011, when the year's crops were ready for harvest or would have been ready in a few weeks. Because many of the Region's farms and agricultural lands are located in the floodplain, crop damage was widespread. Approximately $2 million in vegetable crops alone were destroyed or left to decompose statewide. The economic impact for flood damage to farms statewide was estimated at $20 million (this estimate includes buildings and land, hay, corn, pasture, soybeans, vegetables, and fruit).

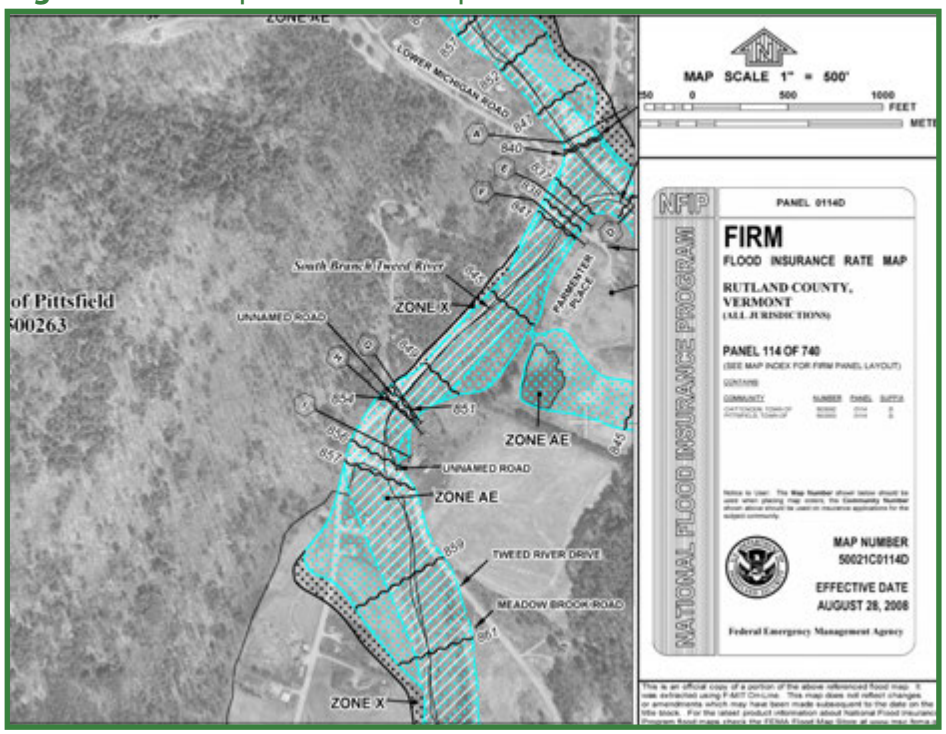
Vermont is a destination for travelers, especially in the fall foliage season. Due to the damaged road infrastructure after Irene travel was difficult. Finding an east-west route was especially difficult, as many of the major roads in the Region had been damaged at one section or another, including US 4, VT 100, VT 107, and VT125. With the fall season approaching, travel to areas not directly off the major highways was slow or impossible. Woodstock was among the most hard-hit areas in the State for room sales, reporting a drop of 68.4 percent in September 2011 and 20.4 percent in October 2011.

Flood Hazard and Fluvial Erosion Hazard Areas in the TRO Region

Flood Hazard Areas

There are two sets of official maps that can govern development in the floodplain in Vermont. Though they have limitations, these maps are the best current means of showing areas with higher flood risk. The first of these is the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRMs). Every town in our Region has these areas of flood risk mapped by FEMA. The FIRMs show the floodplain (the Special Flood Hazard Area or SFHA) that FEMA has calculated would be covered by water in a 1 percent chance annual inundation event, also referred to as the "100-year flood" or base flood. It is important to understand that the 1 percent chance flood was calculated with limited historical rainfall data on a relatively rough topographic scale. Many parts of the Region have had several "100-year" floods in the last 20 years and there is now evidence that extreme rainfall increased starting in the mid-1990s.

Figure 3-4: Example of a FIRM Map in Pittsfield



Most of the FIRMs used by the towns in the Region are outdated. Most towns have maps drawn up in the 1970s. Orange County's maps are largely still in paper form and are not able to be used with modern mapping programs. Windsor County's maps have been converted to digital format, but the underlying data, except along the Connecticut River, is also 30 to 40 years old. The outdated information on these FIRMs provides challenges for administering a town's flood hazard regulations. Some towns or areas of towns have extremely basic FIRMs with approximate A Zones (labeled "Zone A"). In these areas, the base flood elevation has not even been determined and the map is drawn at a rough scale. As a result, a map like this does not provide the elevation to which a structure must be raised, leading to more expense by landowners who must find out that information. Such maps also do not show where the "floodway" is. The floodway is an extremely risky part of the floodplain where the current is strong. Since special restrictions apply to floodways, not having these mapped is cumbersome for owners and towns as these areas must first be determined on a case by case basis. Lastly, no Special Flood Hazard Areas or floodways are mapped at all for smaller streams, leaving out these risky areas and creating a false sense of safety.

A significant portion of flood damage in Vermont occurs outside of the FEMA mapped areas along these smaller upland streams, as well as along road drainage systems that fail to convey the amount of water they are receiving. Since FEMA maps in the Region are concerned only with

inundation and also assume that river channels never move, they are poor at showing that these other areas along small streams or alongside channels are at risk from flash flooding and lateral erosion. This leads to these areas often not being recognized as flood-prone or to the risk being identified simply as high water. Property owners in such areas outside of SFHAs are not required to have flood insurance.

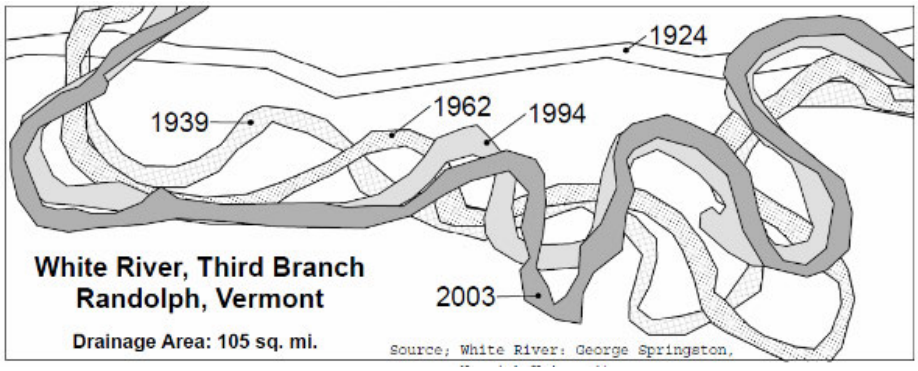
To remedy this lack of accurate risk information and to create a tool that would allow towns to regulate development in these additional areas with flood erosion risk (but that are not shown on FIRMs), VT ANR has developed the second kind of flood risk map we have: a "river corridor" map. Initial river corridor maps have been produced for the entire state, and the agency is refining these as additional data is available. Maps of river corridors depict where the lateral movement of the river and the associated erosion is more of a threat than inundation by floodwaters. Elevation or floodproofing alone is often not protective of structures in these areas, as erosion can undermine them.

It should be noted that some lands within developed areas or next to existing structures, though mapped as river corridors and potentially subject to erosion risk, may be removed from this area during permitting, as the channel's edge has already been reinforced so that erosion does not occur or will be repaired. In recognition of this, the river corridor maps already stop at state highways and railroads, as it is assumed that these will be protected from erosion or replaced post-disaster by the government. TRORC is working with VT ANR on having the maps in developed areas adjusted to reflect this reality.

Flood Hazard Regulations

In order to enable property owners to be eligible for federal flood insurance though the National Flood Insurance Program (NFIP), municipalities must adopt and enforce flood hazard area regulations either through their regular zoning bylaws or through a separate bylaw. A community's flood hazard regulations must apply to at least the Special Flood Hazard Areas (SFHA) identified by FEMA and contain certain minimum standards. The regulations deal with the permitting of new structures in the floodplain and place restrictions on other types of activities within the floodplain. They also specify land, area, and structural requirements to be adhered to within the SFHA. Paradoxically, using only the minimum required FEMA regulations can increase flood risk, as these allow the placement of fill in areas that could have stored flood waters, permit development to flood heights that are outdated and too low, and also fail to take erosion into account at all.

Municipalities can seek to reduce the threat of flood damage within their jurisdiction by not allowing new structures in the floodplain and through enacting stricter standards than the minimum required by the NFIP, such as elevating structures one to two feet above the base flood level and regulating development in river corridor areas as well. Lax enforcement of flood regulations can place people at risk of injury or death, place infrastructure and property at risk of damage or destruction, and can even create liability on the part of the community.



The White River's path through the years. | *Source: George Springston*

Home/Property Buyouts

Following the flood damage caused by the 2011 spring flooding and Tropical Storm Irene, a number of property owners in Vermont applied for property buyouts, which were funded by FEMA's Hazard Mitigation Grant Program (HMGP) and HUD's Community Development Block Grants for Disaster Recovery (CDBG-DR) administered through TRORC. Roughly 70 properties in the TRO Region, and 150 in the State, were involved in the buyout process. The towns in our Region with buyout properties include Bethel, Braintree, Bridgewater, Granville, Hartford, Pittsfield, Plymouth, Rochester, Royalton, Sharon, and Stockbridge. Most of these towns are located on the White River and its tributaries. Buyouts are an effective way to reduce a community's vulnerability to flooding and therefore improve the community's overall resilience to flooding. Homes are no longer potential objects that will wash downriver and clog a bridge, and buyout sites (once cleared) provide floodwaters more room to release energy. As a result, a number of communities in our Region have been made safer.

A home in Rochester that was bought out in the buyout program.

Lands That Help Prevent Flooding

Wetlands

Wetlands are a vital component for maintaining the ecological integrity of land and water, and they provide an array of functions and values that support environmental health and provide benefits to humans, including flood and stormwater control. Draining, filling, and development have resulted in the loss of more than 35 percent of Vermont's original wetland acreage, primarily due to agricultural and large-scale development projects, and this loss has increased flood risk.

The Vermont Wetlands Rules "identify and protect significant wetlands and the values and functions which they serve in such a manner that the goal of no net loss of such wetlands and their functions is achieved." Although only wetlands designated as "significant" are protected under the Wetlands Rules, the rules state, "Wetlands not designated as significant under these rules should be assumed to have public value, and therefore may merit protection under other statutory or regulatory authority."

In the Region, just over 1 percent of the land area has been identified by the State of Vermont as "significant" wetlands, eligible for state protection under the Vermont Wetlands Rules. However, there are a large number of smaller wetlands that may qualify for protection. Examples of larger wetlands that help to attenuate floodwaters and reduce flooding damage in the TRO Region include the Class 2 wetlands through the Killington Flats area and along Swamp Road in Newbury. However, there are a number of smaller wetlands in all of the towns that also provide flood mitigation, water quality benefits, and wildlife habitat.

TRORC recognizes the critical value of wetlands in relation to the health of the water, wildlife, and plant resources in the Region and to the ecosystem as a whole. TRORC supports and encourages communities to identify and inventory wetlands within the Region and to adopt mechanisms for their increased protection. This information can increase the effectiveness of the state and federal regulatory process. Towns and communities have the ability to adopt

mechanisms that provide stricter protections than are required by the State. For more on wetlands, please see the Natural Resources chapter.

Riparian Buffers and Lands Adjacent to Streams

Naturally vegetated riparian zones (vegetated buffer strips next to surface waters) are essential for healthy and resilient river corridors. Vegetated riparian buffers provide a number of "ecosystem services" including attenuating floodwaters; providing river bank support and stabilization; reducing flood and ice damage to adjacent lands and structures; and slowing surface water runoff.

Moving outside of the riparian buffer, lands adjacent to streams also provide benefits, especially during flooding events. Once water overtops the river or stream channel, these areas help slow the velocity of the water by allowing the water to expand laterally over the land area instead of moving down the river or stream channel. Because of their tendency to flood and the consequent deposition of nutrients on the land, these areas tend to be very productive agricultural lands. They also serve to collect ice or debris during floods, helping river or stream channels to stay clear. The importance of these lands was demonstrated during the flooding caused by Tropical Storm Irene, as the White River was able to dissipate along fields between towns, helping to attenuate some of the floodwater.

Upland Forests

Upland forests are distinguished by having a nearly continuous canopy cover of 60 percent or more. They also contain many small unnamed streams that make up the headwaters of a watershed. These headwater streams are the smallest yet most abundant streams draining the State of Vermont and the TRO Region. Therefore, the activities occurring in the headwaters can impact an entire watershed.

Healthy and well-managed upland forests reduce flooding by intercepting rainfall so that the force of rain is less erosive, increasing the infiltration and storage of rainwater into rich soils, and soaking up massive amounts of water during the growing season. The TRO Region is home to many different kinds of forested areas. For instance, the Region contains some of the vast unbroken forested ridgelines of the Green Mountain National Forest, as well as several large blocks of conserved forested areas, like the Chateauguay No Town Conservation Project, which stretches across the towns of Barnard, Bridgewater, Stockbridge, and Killington. These and other forested lands not only provide ecological, scenic, and economic benefits but also help mitigate flood damage.

Stormwater and Impervious Surfaces

Impervious surfaces prevent the infiltration of water into the soil. Man-made impervious surfaces include parking lots, rooftops, roads (even gravel roads), and severely compacted soils, all of which exacerbate flooding events by increasing the amount and velocity of stormwater runoff, especially in heavy rain events. The percentage of impervious surfaces can be reduced by limiting the number of rooftops and amount of pavement, by using permeable surfacing materials, by employing disconnection practices, and by implementing Low Impact Development (LID) principles. Low Impact Development refers to the process of designing and implementing practices at the site level to minimize the creation of stormwater and to replicate conditions present before the development of an area by managing stormwater runoff the way a healthy and intact environment would—by slowing it, spreading it, and/or sinking the runoff into the ground.

While widespread impervious surfaces are detrimental to water quality, and even as little as 10 percent impervious cover in a watershed can destabilize rivers, impervious surfaces in village centers and downtowns are the desired result of dense development and are important in the fabric of the Vermont landscape. It is critical to maintain the dense development of village centers and downtowns for their outright benefits

to their community. However, it is also important to understand the stormwater runoff issues that exist and the various ways to mitigate their effects.

The Site-Specific Nature of Flooding

The risk of flooding in Vermont varies site by site, to the point that even adjacent parcels may be impacted differently in a flooding event.

Generally speaking, floodways are extremely dangerous places and the Special Flood Hazard Area and river corridors are high risk, but each site presents specific issues and a unique set of circumstances. For example, on a site only in the Special Flood Hazard Area, the risk may be solely from inundation, so the specific elevation is a major factor in flood damage. On a site in the river corridor, the risk may be due to lateral erosion, so elevation is less important than whether you are sitting on bedrock. On other sites, the risk may be from both inundation flooding and erosion. The site-specific nature of flooding complicates assessing and planning for flood risks. It is important to understand the specific risks that are present at each site before attempting to mitigate flood damage on that site.

The late Gilbert White, considered the father of floodplain management in the United States, wrote, "Floods are 'acts of God,' but flood losses are largely acts of man." By this he meant that flooding is a hazard not simply because it rains hard, but that we have put things in the way that will suffer from that rain. Historically, Vermont town and village centers were established around water power, which created the densely developed village and town centers we value. Today, the desire to maintain and continue this settlement pattern still holds true—even if the downtown or village center is vulnerable to flood risks. As such, it is important to recognize that there are trade-offs between flood risk and having compact development. Keeping these areas of compact settlement as safe from flooding as possible, given their location, may require elevation and floodproofing efforts, but will largely depend upon natural flood storage and surface runoff retention in upstream areas.

Low Impact Development (LID) refers to the process of designing and implementing practices at the site-level to control stormwater. LID attempts to replicate the pre-development conditions at a site.

Low Impact Development | *Source: deeproot*

Goals, Policies, and Recommendations: **Flood Resilience**

Goals

1. The citizens, property, and economy of the TRO Region and the quality of the Region's rivers as natural and recreational resources are protected by using sound planning practices to address flood risks.
2. The Region is able to recover from flooding quickly and in a manner that improves flood resilience.
3. The creation of impervious surfaces and development in wetlands or upland forests is lessened, and where it does occur, is done in a manner that does not worsen flooding.

Policies

1. All new fill and construction of buildings in FEMA-mapped Special Flood Hazard Areas increases flood risk and is discouraged, and at a minimum must comply with the Association of State Floodplain Managers' No Adverse Impact policy.
2. All new buildings, other than accessory structures, in FEMA-mapped flood areas must have the lowest floor elevated or floodproofed at least one foot above base flood elevation.
3. Natural areas, non-structural outdoor recreational, and agricultural uses are the preferred land uses within river corridor areas due to the dangerous erosive nature of these areas. Commercial, industrial, and residential uses within river corridors are strongly discouraged outside of village and town centers.
4. New buildings within FEMA-mapped floodways shall be prohibited.
5. In order to lessen the conflict between roads and streams, towns and the State should consider moving or abandoning roads when there are more cost-effective solutions or other routes.
6. The State and municipalities should only rebuild/install culverts and bridges that are designed at least to VTrans' Hydraulics Manual and ANR's Stream Alteration Standards, and are encouraged to adopt road and bridge standards to the 50 or 100-year storm level for identified critical transportation routes.
7. Critical facilities such as emergency services, wastewater treatment plants, power substations, and municipal buildings shall not be built in Special Flood Hazard Areas unless floodproofed or elevated to at least 2 feet above the base flood elevation and designed to withstand erosion risk, and they must have dry access above the base flood.
8. To reduce flood flows and be more protective of existing development, the current one-acre threshold in Vermont's Stormwater Management Rule should be reduced to one-half acre.
9. Rock rip-rap and retaining walls should only be used to the extent necessary and when bioengineering techniques may not be adequate to prevent significant loss of land or property.
10. Upland forests and watersheds should be maintained predominately in forest use to ensure high-quality valley streams and to ensure that flood flows are absorbed.
11. Outside of areas of existing compact development, new development must preserve vegetated riparian buffer zones that are consistent with state riparian buffer guidelines.
12. All wetlands that provide flood storage functions shall remain undeveloped or have compensatory storage constructed so as to achieve no net loss of such wetland function.
13. In the long term, restoration and enhancement of additional wetlands should be pursued in order to improve the Region's flood resilience.
14. Structural development or intensive land uses shall not occur in Class I and Class II wetlands unless there is an overriding public interest.
15. The purchase of flood easements is encouraged to both reduce flood risk to structures and to support owners who leave lands open.
16. Emergency planning for flood response and recovery is encouraged.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Flood Resilience**

Recommendations

1. TRORC will work with towns to strengthen their Flood Hazard Bylaws in order to mitigate risks to public safety, critical infrastructure, historic structures, and municipal investments from inundation and erosion.
2. TRORC will work with VTrans on advocating for and improving the flood capabilities of state- or town-owned transportation infrastructure.
3. TRORC should continue working with the emergency coordinators, response agencies, and Selectboards from each town to develop mitigation plans and emergency preparedness and recovery procedures from flooding.
4. Existing homes and businesses at serious risk of flood damage should be identified and prioritized by towns in concert with the VT ANR River Management Section and TRORC for mitigation actions such as elevation/relocation or purchase and demolition.
5. To fully address flood risks, towns should add areas not designated in either FEMA's maps or in VT ANR's maps but that are flooded during a weather event to local flood regulations.
6. Watershed-level planning should be done by towns with assistance from TRORC to evaluate natural and constructed flood storage options upstream of existing areas of concentrated development that are at risk of flooding.
7. TRORC will work with VT ANR, towns, and landowners to lessen flood risk by restoring natural channel functions through berm or dam removal or intentional lowering of streambanks.
8. TRORC will work with towns to understand the impact stormwater runoff has on the Region and on specific towns, and then work to address impacts from impervious surfaces through increased retention and infiltration.
9. The State should institute a permanent buyout program to continue to lessen flood risk.
10. TRORC will work with VT ANR to adjust the boundaries of river corridors in developed areas per the Vermont Flood Hazard Area and River Corridor Protection Procedure.

Land Use Endnotes

1. See Vermont Natural Resources Board for "existing settlement" test.
2. Vermont Department of Fish and Wildlife.
3. Eric Sorenson, Robert Zaino, Jens Hilke (Vermont Fish and Wildlife Department), and Elizabeth Thompson (Vermont Land Trust), *Vermont Conservation Design: Maintaining and Enhancing and Ecologically Functional Landscape*.

TRANSPORTATION

4

Taftsville Bridge | © John Knox

A. Vision for Our Regional Transportation System

Our vision for our transportation system is one that efficiently and effectively moves people and commerce, is resilient to natural hazards, and is funded sufficiently to maintain and grow the system throughout the TRO Region.

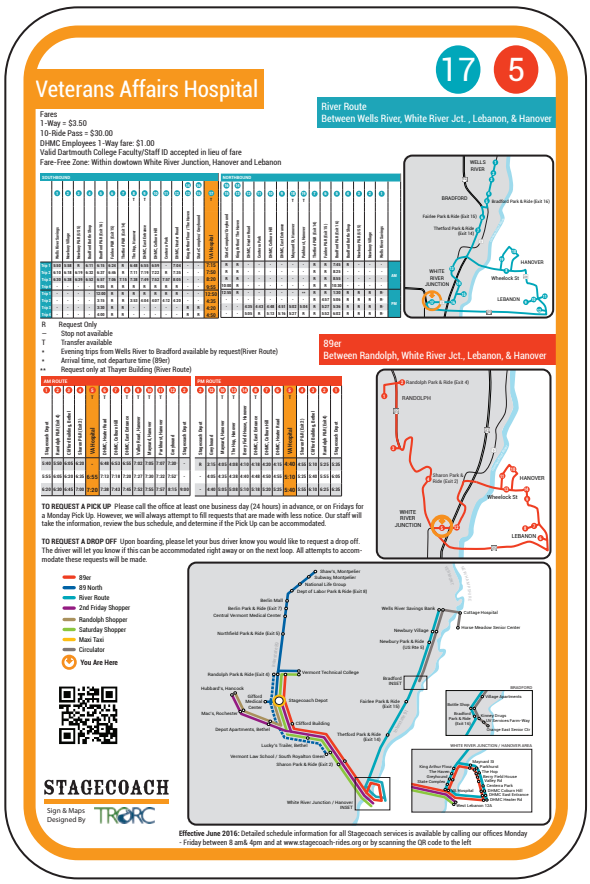
The purpose of this chapter is to identify goals, policies, and recommendations that will achieve a more sustainable transportation system in line with the desired outcomes of the East Central Vermont HUD Sustainable Communities planning efforts, including, but not limited to:

- More local, state, and federal budgeting for infrastructure needs
- Highway design built around context sensitive solutions, multi-modal uses, and transparent and open planning, design, and project management
- A more integrated transportation network with lower fuel consumption and emissions
- Greater concentration of development in previously built areas
- Improved infrastructure to accommodate local accessibility to daily needs
- Minimal impacts to the natural environment
- More resilient infrastructure that can withstand climate change
- A pattern and form of land use that is more efficient, affordable, safe, and healthy

While strategies in this chapter speak directly to our transportation goals, we recognize that similar polices may exist in other chapters, creating an interactive and supportive set of plan-wide strategies.

B. Introduction

When we plan for "transportation," or even "mobility," the word used in transportation circles to generally signify movement along roads, the primary goal is actually access: access to desired goods and services at an affordable price and a



Stagecoach Signage | *Source: TRORC*

convenient time. We may drive to the store by ourselves to get groceries, but what we need are the groceries, not the drive. If the groceries were delivered, that would work just as well. Most of us need to physically go to work, but if we live close, we can walk or bike there instead of driving. We can carpool if we live near enough to workmates, and we can take transit if there is a suitable route. If our job can be done online, all we need is good broadband to telecommute. Business and tourism needs are much the same as for households; they need access, not a specific means of transport.

The regional "transportation system" is not just the built network of roads. It also includes railways, airports, sidewalks, and even rivers and trails. Even the Internet can rightly be considered part of the built network. However, the transportation system is much more than this. It includes both public and private transit services. And it includes us: our feet, wheelchairs, bikes, and cars, and all the fuel we buy. Lastly, it includes the wider built system outside the Region that connects us to other areas, as well as a whole slew of support services, from gasoline tankers to road salt suppliers.

The bulk of this chapter focuses on the transportation facilities we use for vehicular access. This primarily is the road network, but the chapter also looks at means of access to these facilities (cars, transit, bikes, etc.), as well as other issues that affect our ease of access or the impacts of the transportation system. For example, how do access needs get served for those who cannot drive? And what have our roads done to our streams? This chapter also reviews transit services, rail, and carpooling facilities. We have no airports of any size, but residents, businesses, and visitors use smaller regional airports in Lebanon, New Hampshire, and Rutland, Vermont. Larger airports within an easy drive are located in Manchester, Boston, Hartford, and Burlington.

It is important that we understand our system in its full complexity, context, and cost as we head into the future. This way, we can adjust to changes and craft a system that has the most access and the fewest negative impacts, all while trying not to spend more money.

This chapter of the Regional Plan sets forth an agenda for the development and improvement of the regional transportation system, in all its parts. As transportation is constantly evolving alongside the technologies, environmental challenges, and values of our communities, it requires adaptive planning. A regional planning effort helps to ensure a consistent, coordinated, and proactive response among all 30 of our member towns, Vermont, New Hampshire, and the various other providers of services. Regional transportation planning promotes transportation as a complete system that addresses the diverse access needs for all people, while also emphasizing decisions made for the greater enhancement of safety, community livability, economic development, and the preservation of the environment.

This chapter is intended to be used for the following purposes:

- To provide a wealth of information regarding the condition of the existing transportation system in the Region;
- To provide a means to express the Region's transportation planning concerns and priorities at the state and local levels;
- To guide public investment in transportation infrastructure;
- To be consistent with state planning goals (24 VSA, Chapter 117 §4302);
- To implement the Transportation Planning Initiative and fulfill the duties of Regional Planning Commissions in accordance with 19 VSA, Chapter 1 §10l(b);
- To serve as a basis for evaluating transportation programs and projects that impact the Region, including the regional and State Transportation Improvement Plan (STIP); and
- To be used to evaluate development proposals within state regulatory processes.

Taken in its totality, this chapter is intended to guide TRORC in evaluating public and private recommendations affecting the Region's transportation system and is the foundation for TRORC's annual transportation work program. Any and all recommendations contained within this document, while extensive, do not constitute a complete and final listing of the Region's transportation needs over the eight-year lifespan of this document. Rather, it is a living, working document that will be used to guide the recommendations of all levels of transportation and development, from local to state levels.

Regional Transportation Characteristics

Most of the travel in the Region and by our residents is done in cars, and most of that is done alone. This is extremely expensive, polluting, and wasteful. However, it is (or at least has appeared) very convenient. Virtually any other mix of transportation would be better for us physically, financially, and environmentally, but we are accustomed to jumping in our cars and driving where we want when we want. To achieve a lower cost of living, fewer greenhouse gas emissions, better water quality, and improved health while still enjoying access to jobs, goods, and services, residents of our Region will need to drive less. This also fits with our demographic needs, since we are rapidly becoming more elderly.

In 2015, residents of Windsor and Orange Counties travelled more than 980 million miles, using over 45 million gallons of gasoline—that's more than 500 gallons and 11,500 miles per person. More than three-quarters of commuters in Orange and Windsor Counties drive to work alone, while just 9 percent carpool. Six percent of commuters walk, bike, or use public transportation.[1] Bike paths, transit, and other transportation options are limited, though some commuter transit routes exist.

The Regional Plan points out that scattered and uncoordinated residential development ("rural sprawl") continues to expand into rural areas, and commercial development has taken the form of automobile-dependent strip development along highways. These land use decisions limit people's transportation options while increasing their transportation costs, both in terms of direct costs (e.g., gas and ownership costs) and

Stagecoach Office, Randolph | *Source: TRORC*

opportunity costs (e.g., time spent driving instead of addressing other priorities like family needs). Ultimately, this translates into a higher overall cost of living for households.

TRORC's longstanding transportation priorities are maintaining the existing transportation system and diversifying transportation choice by expanding bicycling, walking, and public transportation. These two transportation priorities have been consistently stated as the lead priorities since transportation issues could be discussed on a regional level.

Undoubtedly, transportation networks and opportunities bring us benefits—especially economic benefits. Transportation networks allow Vermonters to commute to work and fulfill their other needs, such as shopping, connecting with friends, and seeing family. Critically, transportation networks allow Vermont businesses to function. Vermont's roads carry most of its visitors—in 2017, over 13 million visitors brought in nearly $3 billion and supported more than 32,000 jobs in the State.[2] However, we do benefit from more than just roads; bicycling and walking-related recreation are key components of the state's tourism economy.[3]

C. Background Trends and Challenges

Regional Transportation Trends and Challenges

The TRO Region is exemplified by a series of rural towns and one state-designated growth center. While all distinct in nature, these areas have a common theme of having a network of roadways and supporting infrastructure that emanates from town and village cores, roughly mirroring historical settlement patterns. In the past half-century, this transportation pattern has been challenged by the advent of cheaper cars, cheaper fuel, and larger, faster highway systems that connect once-remote villages and towns to larger growth centers throughout the Region.

The regional transportation system needs to be dynamic as the population, economy, land use patterns, and traffic demands continue to change over time. Changing regional needs have placed new limitations on transportation planning and present new challenges for future planning efforts.

Funding Constraints

Significant shortfalls in federal and state transportation dollars, owing in part to declining gas tax revenues and insufficient reserves in the Federal Highway Trust Fund, stymie statewide efforts to maintain and improve roadways and infrastructure. It is no secret that funds for transportation are tight. According to the Vermont Agency of Transportation (VTrans) 2018 Transportation Asset Management Plan, as of 2019, "current funding provides approximately 67 percent of the monetary resources needed to maintain Vermont's transportation system in a state of good repair. In 2018, the gap was approximately $258 million."[4] Funding levels have not allowed the State or towns to keep up with routine preventative maintenance. This is compounded by the fact that scattered rural development imposes additional fiscal pressures at the municipal level to maintain and improve local roadways and infrastructure year-round. Costly repairs in the wake of recent flood disasters have further strained local budgets. Towns have had to increase the resiliency of their infrastructure at a pace and cost that outstripped local capital budget planning.

Aging Roadways and Infrastructure

Many of the Region's roadways date back to the 1970s, including many of the Region's bridges. Currently, many of the roads and bridges are aging and require investment, while traffic volumes and vehicle miles traveled continue to increase. Maintaining the roads and bridges in safe and passable condition is essential for the safety of residents and economic health of the Region. Maintenance of the existing highway infrastructure is prioritized over the construction of new roads for added capacity. In the interest of

safety and environmental resilience, significant investments are required to improve what is, in some instances, crumbling infrastructure.

Habitat and Farmland Protection

Roadways can have detrimental effects on recreational activities, wildlife migration, and natural resource conservation by fragmenting or marring our landscapes and natural communities. Road projects may have the net effect of destroying or hampering habitats that provide key ecosystem services (such as wetlands).

Air and Water Quality

Impervious surfaces; undersized, blocked, or failing culverts; improperly designed or nonexistent roadway ditches; road salt, brine, and sand usage; and the release of petroleum and other chemicals into the environment from vehicular travel have a direct impact on our Region's air and water. These issues can have repercussions for the overall health and well-being of residents, causing illness and disease while also exacerbating climate change impacts.

Public Health

Driving is an inherently sedentary activity. For many, if not most, it is the most common means of travel to work, school, activities, shopping, and other routine needs. An increased reliance on this mode of travel often comes at the expense of physical activity. Land use patterns that emphasize smart growth principles around compact town and village centers with pedestrian and bike opportunities, in contrast, promote healthy habits.

Community

Time spent traveling, be it for a routine commute, shopping trip, or other journey, detracts from investments in personal social interactions. Time spent away from family, friends, and neighbors is time that could otherwise be utilized to improve an individual's connection to—and sense of—community.

Demographic Shifts

According to U.S. Census figures for 2010, the portion of the Region's population aged 65 or older is 18.4 percent. This number is set to climb appreciably in coming years, and the Region has to consider the distinct needs of this age bracket when adopting transportation policies. Ensuring that the elderly population has safe access to and within town and village centers as well as regional growth centers is imperative as their mobility likely declines. (These safe access needs can be echoed for the Region's youth population, though for different reasons.) Well-maintained, well-lit sidewalks, improvements to road signage visibility, and improved regional transit opportunities are key ways to ensure that elderly residents are afforded a chance to age in place. Strengthening the Region's multi-modal transportation networks may also help to attract and retain younger residents.

Access

Some segments of the population find that access to transportation is difficult within our predominantly rural region. Those who are under legal driving age, those who cannot afford the costs of vehicle ownership and maintenance, the disabled, the elderly, and others may find it hard to find safe, affordable transportation options within their towns.

Housing

Housing affordability and availability have pushed residents farther from historical downtowns and job centers in recent decades, increasing reliance on vehicular travel. While housing in areas outside of town centers may, on the surface, appear more affordable to residents, it belies the fact that this increased distance from work, retail, and recreational opportunities often increases costs of living significantly compared with in-town housing opportunities due to increased travel expenses. Average transportation costs in Orange and Windsor Counties are 26 percent of annual median household income ($14,233), nearly as much as housing costs (30 percent of annual median household income). Transportation costs are considered affordable if they do not exceed 15 percent of a household's

annual income.[5] And sprawl doesn't just hurt household budgets; it also negatively impacts the economic health of our Region's villages and community centers.

Energy

As of 2016, transportation continues to be the chief source (43%) of greenhouse gas emissions in Vermont,[6] and consequently remains a major focus in statewide planning for climate change mitigation. (For further discussion of climate change, see the Energy chapter.) Current transportation trends in the Region are heavily skewed toward reliance on fossil fuels.[7] Increasing the number of fuel-efficient and electric vehicles on the road is a critical step toward divesting from fossil fuel intensive technologies and achieving statewide energy and emissions goals. It is also imperative to improve transit and other multi-modal opportunities. Freight and passenger rail, both underutilized statewide, could, for example, receive investments to promote alternative transportation opportunities to residents to decrease this dependence as much as public bus, trail, and sidewalk improvements will.

Costs

As mentioned in the beginning of this chapter, our transportation system is not just a system of highways; it is literally everything that allows us to move around, from our feet to airplanes, from roads to rails. Its costs are the costs to build and maintain the network of roads, rails, airlines, trails, sidewalks, and bike lanes; the costs to purchase and operate (including fuel, repair, and insurance) all of the vehicles that use this system; and the costs that we often don't pay (but that are real costs) of the pollution, road kill, and other impacts of all of the ways that we get around.

We do not have a very good idea of the total sum of these costs, nor do we understand the impacts of these costs yet. Transportation is often the largest cost a family faces after housing, and we pay a particularly heavy price for the convenience of automobile travel. There are tens of thousands of vehicles in the Region that easily cost over a billion dollars to buy and tens of millions of dollars to operate every year, and yet the average vehicle sits idle for the majority of the day. Our road network cost us billions to construct and costs us many millions to maintain every year; most of this is funded by the state and federal government. Town highway expenses are typically the second largest local expenditure after school budgets, averaging several thousand dollars per mile to maintain. Local road salt alone can cost one to two million dollars per year. When floods come, the repair costs are largely due to road and bridge damages.

A list of the Region's priority infrastructure projects, along with costs and potential funding sources, can be found in Appendix E.

Willard Bridge, Hartland | © *John Knox*

Goal, Policies, and Recommendations: **Overall Transportation**

Goal

1. Our transportation system's costs are sustainably funded, including costs to remediate impacts.

Policies

1. Construction design, maintenance initiatives, or policies that help to minimize costs of maintaining state and local road networks are necessary.
2. Towns and the State must build roads to withstand or avoid future flooding.

Recommendations

1. TRORC will assist towns to develop capital improvement plans that address paved and gravel road maintenance costs.
2. Towns and the State should maintain roads and bridges in good condition and must design new transportation facilities to be flood resilient.
3. Towns should consider options to reduce winter maintenance costs, including, but not limited to, downgrading winter road maintenance policies combined with a public information campaign to alter traveler expectations of snow removal.
4. Towns should identify dead-end Class 3 town roads that serve few structures and consider reclassification to Class 4 to reduce town expenses.
5. Towns should identify any local bridges that are redundant and can be abandoned or removed, or that need not be rebuilt if destroyed.
6. TRORC will support efforts to better estimate the full cost of the transportation system.
7. TRORC will support regional coordination efforts by transit providers to achieve cost efficiencies, provided that services are not negatively affected.
8. TRORC should look into developing a capital budget for the Region.

D. Land Use and Transportation: Overview

Settlement patterns and transportation systems interact in ways that profoundly influence the well-being of our communities and the natural environment, so they must be closely coordinated. The consequences of unplanned development can be costly and long lasting. Development that does not take into consideration its impact on existing or future transportation systems can strain municipal budgets; reduce communities' resiliency to natural hazards; trigger long-lasting changes in the character of our communities; or degrade livability by creating noise pollution, safety hazards, visual blight, or barriers to passage or access. Likewise, expansions of or changes to our transportation systems must be context-sensitive to minimize harmful impacts and maximize beneficial impacts to the communities, human and natural, that they traverse. This section broadly outlines the relationships between land use and transportation; for more detailed discussion of current and prospective development, refer to the Land Use chapter of this Regional Plan.

Historical Overview

Improvements in Vermont's road system, particularly after the flood of 1927, were vital to the continued growth and development of Vermont's villages. Use of the automobile further cemented Vermont's position as a tourist destination; where before tourists who arrived by train were forced to hire transport to reach other destinations in Vermont, now they could travel freely. But it was not until the late 1960s, when Interstates 89 and 91 were completed, that Vermont became truly auto-accessible. The interstates brought the benefits of fast-moving transport, but they also destroyed some historic

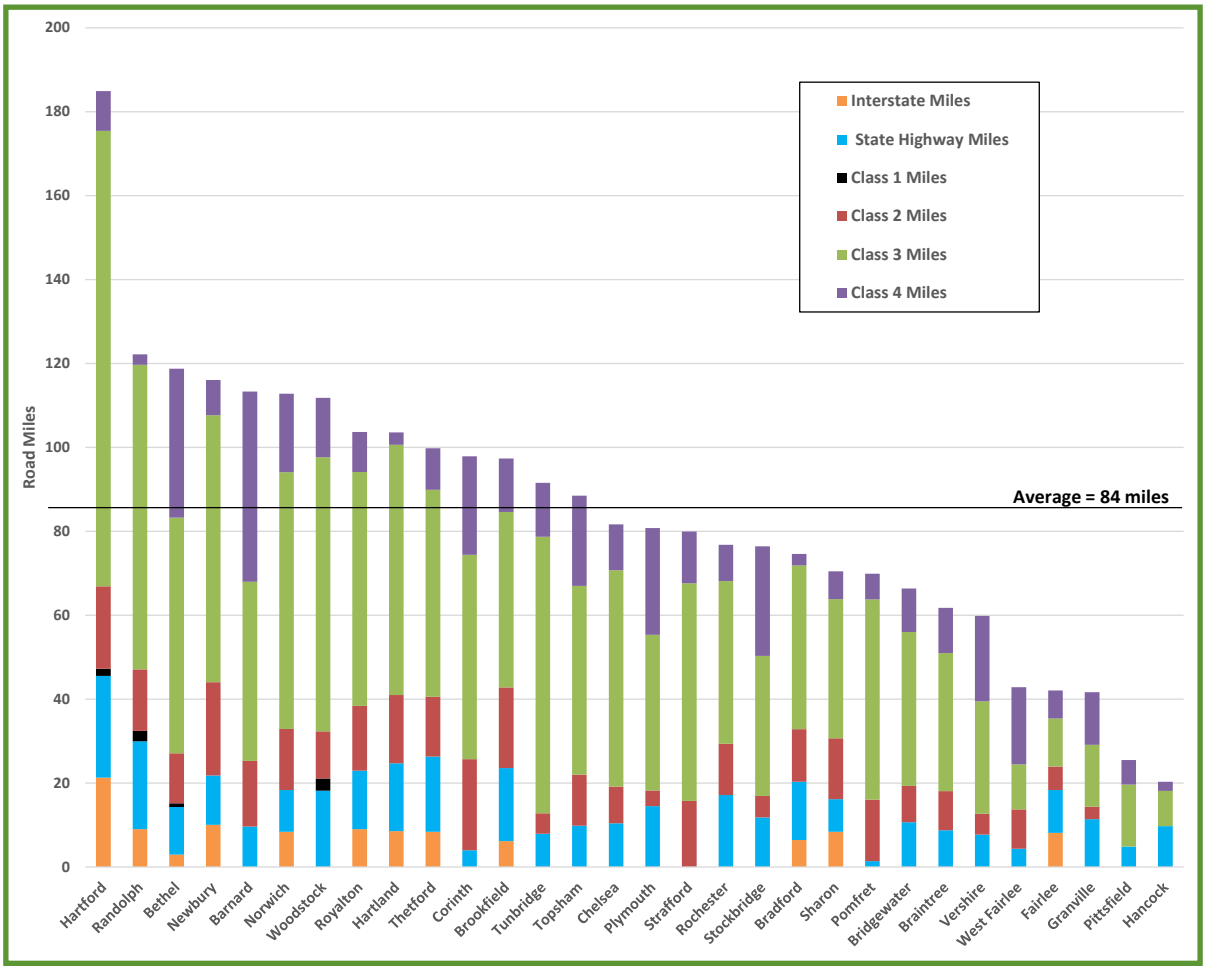
resources and physically divided some towns, creating a distinct separation between their villages and the rest of the community.

Current Land Use and Transportation

The TRO Region contains a number of key transportation corridors, including Interstates 89 and 91 as well as several state routes that are utilized for statewide trucking. In addition, our communities have extensive road networks of their own, with each town averaging roughly 84 miles of roads (see Figure 4-1). Most of the traffic generated by any given community involves residents driving to and from work. The bulk of residential development in our towns is located outside of village areas on rural roads, which increases the need for roads and road improvements. In response, some communities have instituted policies that restrict the construction of new public roads or that require private construction, improvement, or maintenance of roads serving certain development projects. It is not uncommon, though, for residents on a private road to eventually request that the municipality take over the road. Even without taking on new roads, additional traffic on small Class 3 roads can lead to costly upgrades to widen the road or make it a passable school bus route.

Twenty-three communities in TRORC's 30-town Region have some form of land use regulations, not counting flood regulations. While the towns with land use regulations control rural density to some extent, many of them do so in

Figure 4-1: Road Miles by Town



Source: TRORC

a manner that still allows a substantial amount of development outside villages and away from major transportation corridors. Vermont law requires local zoning to be consistent with the Town Plan, but there is no enforcement mechanism to ensure this happens.

The relationship between transportation and land use is especially evident in the TRO Region's interstate Interchange Areas. These areas are often magnets for development due to their high traffic volumes and easy access to the interstate highways, and can therefore compete with traditional villages and downtowns in Vermont. It is important to protect the aesthetic and natural resources of the land around interchanges and the economic and cultural viability of traditional village and town centers.

Future Land Use and Transportation

The complex relationships between land use and transportation need to be addressed through context-sensitive design of transportation infrastructure. Context-sensitive design entails comprehensive consideration of all the ways that a community relates to and is affected by transportation infrastructure, which go far beyond the fundamental goals of mobility and accessibility to include safety, environment, aesthetics, history, culture, and other community values. Ensuring that infrastructure is well integrated into its community context requires meaningful local participation in decision-making processes.[8] Context-sensitive design is supported by the goals, policies, and recommendations outlined throughout this Regional Plan, not exclusively in the Transportation and Land Use chapters. For example, the Natural Resources chapter discusses minimizing habitat fragmentation by roads, and the Historical, Cultural, Archeological, and Scenic Resources chapter addresses the preservation of scenic landscapes visible from public transportation corridors.

To ensure a future in which greenhouse gas emissions are reduced and the transportation system is safe, efficient, and economically sustainable, regional and municipal land use planning will need to encourage higher density development, particularly residential development, within villages and community centers. Possible approaches include raising permitted development heights and reducing parking requirements. Within growth centers, commercial development that requires trucking should be located adjacent to major roads to reduce the need for additional investments in transportation infrastructure and to reduce the

Hartford I-91 Bridge | *© EIV Technical Services*

potential for vehicle and multi-modal conflicts. That said, the task of increasing density in growth centers is challenged by the lack of municipal water and sewer infrastructure in many towns.

In Interchange Areas, many of the uses associated with serving travelers are also associated with the creation of sprawl or strip development. Development in these areas must therefore be controlled in accordance with the use descriptions detailed in the Land Use chapter of this Regional Plan. Transportation systems within Interchange Areas should focus on traffic and pedestrian safety, public transportation, and access management.

For development proposals that trigger Act 250 (10 VSA §6086) review, conformity with regional and municipal land use plans is considered under Criterion 10. Potential impacts on transportation facilities and systems—including bicycle, pedestrian, and transit access—are evaluated under Criteria 5 and 9K. This analysis is particularly important with large-scale developments, such as ski areas or retail shopping centers that are pulling from a regional customer base. Developments that are of a substantially larger scale than is common within our Region can have a considerable impact on existing facilities and infrastructure. The Implementation chapter of this Plan identifies those transportation impacts that meet TRORC's "substantial regional impact" definition for the purposes of Act 250 review.

Many large-scale developments are not completed in a single construction event. Generally, these types of developments are phased in or built over a number of years. Potentially negative impacts from large-scale phased-in development are challenging to identify based on the plans submitted during the Act 250 permit process. Therefore, it is common practice for developers to be required to conduct transportation impact studies through each phase of development until the ultimate project is completed. If a developer seeks, or a District Environmental Commission requires, a Master Plan permit, then transportation impact studies must be included in the permit application.

Goals, Policies, and Recommendations: **Land Use and Transportation**

Goals

1. The Region's transportation system is well integrated with current and future land uses of the communities in the Region, maintaining and enhancing the character of our downtowns, villages, hamlets, and rural areas.
2. Land uses appropriate to the unique circumstances of each Interchange Area (consistent with more detailed use descriptions in the Land Use chapter) are built in a manner that protects public safety and discourages strip development and sprawl, especially in rural areas.
3. The Region's transportation infrastructure is adequately funded, well-designed, well-maintained, and well-constructed.

Policies

1. Transportation infrastructure must be context-sensitive to surrounding development. Road and vehicle impacts should be ameliorated through context-sensitive solutions, signage, safety improvements, improved streetscapes, and design that fit the adjacent landscape.
2. Development that creates land use patterns associated with strip development and sprawl, especially in rural areas, are not consistent with this Plan.
3. High density development should be concentrated in areas served by public transportation in order to support reduction of single-occupant vehicle trips and associated greenhouse gas emissions.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Land Use and Transportation**

Policies (continued)

4. New development shall not significantly degrade the functionality (level of service) or safety, nor cause unreasonable congestion, of existing transportation infrastructure. Development that generates a substantial amount of truck traffic is only appropriate within Regional and Town Centers if it does not put an undue burden on traffic safety or the character of the area. Development that generates a substantial amount of truck traffic is only appropriate in rural areas that are immediately adjacent to Regional Growth Areas (as defined by this Plan), and only if existing infrastructure is sufficient to maintain traffic safety and rural character.
5. High density development, including residential subdivisions or multi-family housing, is not appropriate for rural areas if it results in a degradation of the roadway level of service (LOS) to D or worse. If the impact is LOS C or better, a traffic study may be required.
6. Transportation projects in Rural Areas should not focus on expanding or adding additional roads. Instead, the focus should be on improving existing infrastructure for safety and flood resiliency.
7. Commercial uses that generate a substantial amount of truck traffic, such as trucking terminals and manufacturing, are appropriate in those Interchange Areas that are not located within the Regional Center, consistent with more detailed use descriptions in the Land Use chapter.
8. Public and private transportation infrastructure investments in Interchange Areas are not appropriate if they encourage development that will have the effect of eroding the economic vitality and quality of life of the Regional Center.
9. Development within Interchange Areas shall utilize internal circulation systems that are conducive to multi-modal forms of transportation and shall be designed to share access points, reducing the potential for vehicle conflicts with main highways.
10. Large-scale developments that meet this Plan's definition of "substantial regional impact," whether they are located within the TRO Region or in a neighboring region, shall include transportation impact studies for each phase of development and shall mitigate any impacts identified as part of their permit.
11. Ski area development or other large-scale phased development shall be reviewed by the District Environmental Commission under the Master Plan permitting provisions of Natural Resources Board Rule 21.

Recommendations

1. TRORC will continue to review and participate in Act 250 permit proceedings.
2. TRORC will continue to work with towns to ensure Town Plans are consistent with the Regional Plan and state policy.
3. TRORC will work with towns and the Vermont Agency of Transportation to achieve context-sensitive solutions that enhance historic, scenic, and agricultural properties of roadways consistent with public safety through transparent public processes and project development.
4. The Natural Resources Board must revise Act 250 rules regarding Master Plans to make Master Plans a mandatory requirement for large-scale, multi-phase developments that have the potential for substantial regional impact.
5. TRORC shall support efforts to develop context-sensitive municipal parking facilities in Regional and Town Centers.
6. TRORC will encourage communities to develop land use regulations that promote reduced density in Rural Areas consistent with state planning law.
7. TRORC will seek out new ways its municipalities can approach issues of density in Rural Areas.
8. TRORC will update this Transportation chapter to coincide with any future updates to the Land Use chapter.

E. Housing and Transportation

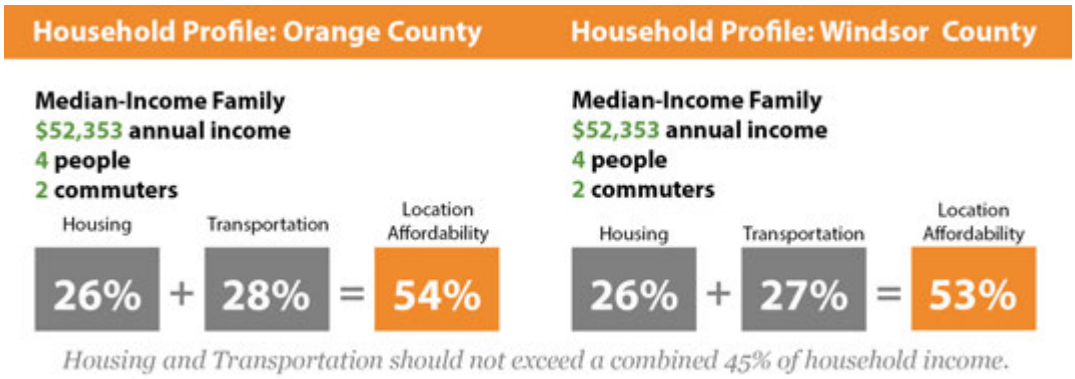
The housing market is costly and tight for residents to live affordably, particularly for the elderly population and those in need of workforce housing (largely those who are in the low- to moderate-income brackets).

New, rehabilitated, and infill housing opportunities should be located near—and supported by—regional transportation opportunities (both roadways and regional public transit) that provide access to growth centers, where jobs and retail shopping opportunities are most abundant. Housing should be accessible to town and village centers (per our historic settlement patterns). Encouraging housing growth along bike lanes, trails, sidewalks, and other access routes leading to local shops and services supports physically healthy and economically vibrant communities while also creating communities that are attractive from an in-migration perspective.

Traditional housing affordability numbers look just at the cost of the housing itself. Transportation costs are not included, yet these costs are heavily reliant on housing according to the Center for Neighborhood Technology. The Housing and Transportation (H+T®) Affordability Index combines both housing and transportation costs in an effort to present a more complete view of neighborhood affordability. Typically housing affordability is capped at 30 percent of household income; the H+T Index adds in 15 percent of income for transportation to set a combined affordability threshold of 45 percent of household income. According to the 2017 H+T Affordability Index, all towns within the Region exceed the 45 percent affordability threshold.[9] (Figure 4-2 demonstrates H+T Affordability for Orange and Windsor Counties.)

Places that are compact, are close to jobs and services, and offer transportation choices allow people to spend less time, energy, and money on transportation.

Figure 4-2: Location Affordability Index: Orange and Windsor Counties



Source: H+T® Affordability Index

Goals, Policies, and Recommendations: **Housing and Transportation**

Goals

1. Housing growth is largely located in areas served by transit services or within walking or biking distance to jobs and services.
2. All dense residential areas have transportation options beyond a single-occupant vehicle.

Policies

1. Housing developments' locations must be seen within a transportation context.
2. New housing developments that trigger Act 250 must minimize reliance on single-occupant vehicles as the sole means to access jobs and services by locating close enough to these areas, along transit routes, or through provisions that increase carpooling or additional transit.
3. Multi-unit housing developers shall be required in Act 250 to coordinate with public transit agencies prior to construction to seek input on potential transit service access.
4. Multi-unit housing development proposals alongside roads will include sidewalks, or their proportional cost of such, connecting the development to the main road when sidewalks are present and distances are such that walking is a viable option.
5. New affordable housing and assisted living facilities shall provide a mobility plan that evaluates mobility needs of residents and how they will be met.

Recommendations

1. TRORC will work with housing providers and developers to ensure that new multi-family housing, assisted living facilities, and health and human service facilities be located in close proximity to services in village and regional growth centers and along public transportation fixed routes.
2. TRORC will work with member towns during plan and bylaw revisions to further connect housing needs to transportation system efficiency, reducing the need to travel solely by car and increasing access to goods and services.

F. Environmental Considerations and Transportation

Flooding and Resiliency

In August 2011, Tropical Storm Irene impacted most of the towns in the TRO Region, isolating several for days. With bridges washed out, roads gone, homes taken downstream, and culverts squashed, the Region's transportation infrastructure was turned upside down. Post-Irene efforts to repair the infrastructure directly relate to mitigating damages when the next disaster hits. Hazard mitigation techniques have included upsizing culverts and lengthening bridges based on stream hydraulic studies, as well as improved bank stabilization. Climate change is expected to bring more frequent heavy rainfall events, increasing the risk of flooding.[10] Planning, not only for the next federally declared disaster but also for any upcoming extreme weather event, will require learning from past hazard events and continued coordination between the towns, TRORC, and state and federal agencies.

Not all impacts can be controlled, but there are mitigation strategies that TRORC can help implement. Funding has been the primary limiting factor. Replacing deficient culverts and bridges carries the greatest potential for addressing water quality; appropriately designed and scaled structures can handle flood events and stormwater runoff, promote fish passage, and minimize the discharge of road sediment. These upgraded culverts and bridges, operating in greater harmony with the natural environment, will also be less likely to fail during storm events. This is a particular concern as officials from the Agency of Natural Resources (ANR) and VTrans plan for the possibility of another storm event

equivalent to the 1927 flood. This has been illustrated in recent years as adjacent regions have suffered infrastructure damage and loss of life during flood events.

Ensuring that infrastructural concerns that arose from Irene and ensuing events are addressed is key to improving regional transportation resiliency; however, it is necessary to also consider the lay of the land in general terms and how to prevent growth that encroaches upon fluvial erosion hazard areas. Using river corridor maps provided by ANR, we can more readily discern the areas that ought to be avoided or where transportation infrastructure and roadway growth should be limited so as to not exacerbate the damage caused to life and property during flood events. Many towns have already or may be considering the downgrading or relocation of existing roadways to promote resilience. These efforts serve to improve public safety as well as to restore and protect our waterways and habitat for the public benefit and overall ecosystem health.

Flood Damage of the Lilliesville Road Bridge in Stockbridge in April 2019 | *Source: TRORC Staff*

Wildlife

Our transportation system impacts wildlife directly through vehicle strikes that lead to animal injury or death, as well as through less direct means. Vehicles generate air pollution harmful to adjacent vegetation. Transportation is one of the major sources of greenhouse gas emissions that are changing the climate. (In turn, climate change is shifting habitats northward or to higher altitudes and increasing flood frequency, straining plant and animal communities.). Road salt browns nearby plants. Roads have fragmented forests and fields, encouraging the spread of invasive species, creating barriers to smaller animals, and stressing organisms that require large continuous habitat blocks. Undersized or poorly placed bridges and culverts block aquatic and amphibious passage, reducing habitat or reproduction. Policies and recommendations to address these issues in addition to those below can be found in the Land Use chapter.

Stormwater

Stormwater, more so than piped discharges, is a major contributor to sediment and nutrient loading in the Region. Transportation facilities such as roads and parking lots create enormous amounts of impervious surface, nearly all of which was built before stormwater runoff standards were in place. These facilities generate swift-moving stormwater runoff that carries pollution and exacerbates flood risk. Runoff from paved areas contains nutrients, oils, silt, salt, and heavy metals. Evaluating the full effect of existing and proposed transportation facilities and working to install detention areas or other measures will reduce both flood peaks and water pollution.

As of July 1, 2017, per requirements of Act 64 and the Vermont Clean Water Act, municipalities are required to apply for the Municipal Roads General Permit coverage on all town roads. The Municipal Roads General Permit is intended to achieve significant reductions in stormwater-

related erosion from municipal roads, both paved and unpaved. Each municipality will implement a customized, multi-year plan to stabilize their road drainage system. The plan will include bringing road drainage systems up to basic maintenance standards as well as additional corrective measures to increase infiltration into soil and reduce erosion as necessary to meet a total maximum daily load (TMDL) or other water quality restoration effort.

Energy

The state's Comprehensive Energy Plan seeks to reduce Vermont's total transportation energy use by 20 percent from 2015 levels by 2025. A number of regional targets have been extrapolated from statewide goals, and these are outlined in TRORC's *Regional Energy Implementation Plan*. They include capping vehicle miles traveled per person, reducing the number of single-occupant vehicle trips, increasing the number of park and ride spaces, boosting transit ridership, and growing the fleet of electric vehicles on the road.

The Region has been making strides toward reducing its transportation energy usage. Hybrid buses have been introduced into Advance Transit's fleet, and track upgrades have improved the fuel efficiency of the Amtrak "Vermonter" passenger rail service. Park and ride lots continue to be built and expanded throughout the Region, and some are outfitted with electric vehicle charging stations. Some employers offer van services or incentives for carpooling or transit to reduce their employees' single-occupant vehicle trips. Nevertheless, significant changes in our transportation systems are still needed if the Region is to meet its targets. Meeting the regional target for electric vehicle fleet growth (82 percent of all cars by 2050) will be a particular challenge; the Region currently lacks sufficient charging station infrastructure to support consumers in making the transition.

The goals, policies, and recommendations in this chapter are consistent with TRORC's *Regional Energy Implementation Plan*, and are complemented by policies and actions outlined in the Land Use and Energy chapters of this Regional Plan.

Goals, Policies, and Recommendations: **Environmental Considerations**

Goals

1. The Region's transportation system is resilient to natural hazards and respects quality of life and environmental considerations.
2. Transportation development activities avoid adverse impacts to biodiversity and ecosystem function while also minimizing greenhouse gas emissions and water pollution.
3. Built infrastructure and roadways support the function and health of wildlife habitats and landscapes.
4. Roadway extensions avoid encroaching on conservation and resource areas.

Policies

1. New road systems, or expansions of existing systems, should avoid fragmentation of large blocks of land and shall not adversely affect critical wildlife habitat.
2. Where permitted, transportation development must be planned to minimize reduction of the resource value of forest and farmlands by furthering reasonable population densities, using cluster development, and ensuring that new community planning economizes on the costs of roads, utilities, and land usage.
3. Major highways should minimize barriers to movement of wildlife, terrestrial or aquatic, especially in high priority wildlife crossings (as mapped by the Vermont Agency of Natural Resources), through more wildlife-friendly culverts, bridges, railings, and signage designed to avoid collisions.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Environmental Considerations**

Policies (continued)

4. Efforts to reduce total vehicle miles traveled and vehicle emissions are encouraged.
5. Future road and parking development shall not adversely affect flooding, and opportunities to reduce flood flows from existing pavement and gravel roads are encouraged. However, in certain cases, transportation infrastructure developments within the floodway shall be allowed where there is a benefit to health, safety, or transportation.
6. New construction, upgrades, and maintenance should maximize resiliency to natural hazards.
7. It is the policy of this Regional Plan to require that developments subject to Act 250 should demonstrate that they have taken or will take reasonable steps to incorporate parking spots with electric vehicle charging stations.

Recommendations

1. The Vermont Agency of Transportation and TRORC's Transportation Advisory Committee will work to reduce wildlife crossing collisions through improved signage and wildlife passage facilities.
2. TRORC will work with local highway departments as requested to assist with compliance with the Municipal Roads General Permit to minimize stormwater runoff, minimize road/river conflicts, and minimize roadway erosion.
3. Towns should consider minimizing the use of impervious surfaces for parking through shared parking, reduced parking requirements when supported by data, or phased parking development when demand arises.
4. The Vermont Agency of Transportation, FEMA, ANR, the Vermont Department of Public Safety, and others involved in flood recovery should address wildlife and aquatic passage needs in new construction and upgrades of bridges and culverts when feasible.
5. TRORC will pursue funding opportunities to advance the planning and construction of projects that preserve or enhance water quality.
6. TRORC shall encourage agricultural and silvicultural businesses to use required or best management practices that minimize damage to roadways, land, and waterways.
7. With support from the State, TRORC will work with towns to implement the strategies and actions outlined in the *Regional Energy Implementation Plan*, thereby helping to shift the Region to more energy efficient and less polluting transportation systems.
8. Towns should track damages to highways during all hazard events.

G. Economic Development and Transportation

As previously mentioned, tourism is a critical sector of Vermont's economy, bringing in nearly $3 million in 2017. Visitors arrive by car, air (at the Lebanon Municipal Airport in neighboring New Hampshire or the private airport in Post Mills, Thetford), rail, bus, bike, or even on foot via long-distance hiking trails. Vermont is expected to see continued growth in tourism,[11] and the TRO Region in particular has many recreational assets that visitors will seek to access. As cars are the primary mode by which visitors access the Region, maintaining and improving the road network is an important investment in the regional economy.

The Region's transportation infrastructure must strike a balance between facilitating public access to its recreational resources and maintaining and enhancing the character of those resources and surrounding communities. This is particularly true of outdoor recreational assets. The public can find information about state owned and managed lands, including information about how to access these lands, on the Vermont Fish & Wildlife Department's website.[12] TRORC supports

the development of transportation infrastructure that improves public access to noncommercial outdoor recreational opportunities. For example, TRORC has assisted with planning efforts for the proposed Velomont Trail, a multi-use 130-mile mountain bike trail along the Green Mountains through the entire state. TRORC has also lent support through grant assistance to and participation in town projects that create and improve bicycle and pedestrian access to local trails.

Goal, Policies, and Recommendations: **Economic Development and Transportation**

Goals

1. The Region's transportation system facilitates a strong regional economy.

Policies

1. Public access to noncommercial outdoor recreational opportunities, such as lakes and hiking trails, should be provided and protected wherever appropriate.
2. Transportation facilities should be developed and maintained in a manner that supports the tourism economy, while maintaining and enhancing the character of the Region's communities and protecting important natural and historic features of the Vermont landscape.

Recommendations

1. TRORC will continue to assist towns with their efforts to improve public access to outdoor recreational opportunities, while ensuring consistency with local and regional land use plans.
2. TRORC will continue to ensure that regional transportation planning activities are integrated with land use planning and economic development planning efforts.

H. Health

As stated in Chapter 2 (Healthy Communities) of this

, increasing transit access is a key strategy for creating healthy communities. The availability of transit services can impact whether or not some community members are able to access medical care. It is also important to expand the Region's network of infrastructure for pedestrians and cyclists, which is currently limited and often requires access by personal automobile. Improvements in these areas can be achieved through the Complete Streets program, especially in downtowns, where the need is greatest. It has been proven that the implementation of such projects promotes healthier lifestyles. In our Region, it is imperative that these systems are designed to be accessible to the elderly, youth, and people with disabilities. The Region's priorities with respect to health and transportation are discussed further in the Healthy Communities chapter.

I. Mobility and Access

To move toward a more sustainable transportation system, we need to improve mobility and accessibility by expanding transportation options, changing land use patterns based on our new understanding of land use and transportation connections, increasing transit funding and services, and by building better infrastructure for safe walking and bicycling.

Mobility Status

A person's ability to effectively use the present transportation system significantly impacts their access to goods and services and consequently impacts their well-being. The present transport system in the Region is designed around the personal automobile; the inability to own or operate a vehicle severely limits an individual's mobility and thus their access to goods and services. Factors that affect mobility in the Region include age, disability status, and access to an automobile. The following is a list of demographic groups within the Region who are likely to have decreased mobility, along with their respective population shares according to the 2010 Decennial Census and the 2008-2012 American Community Survey:

- Children ages 15–19 (6.3% of the Region's population)
- Residents below the poverty line (10.6% of the Region's population)
- Disabled residents ages 18–64 (6.7% of the Region's population)
- Seniors ages 65+ (16% of the Region's population)
- Auto-less households (5.1% of the Region's households)

Because of their decreased ability to use a private vehicle to connect to goods and services, these groups are potentially more dependent on alternative forms of transportation such as public transit and ridesharing. They are consequently referred to as "transit-dependent populations." Examining the prevalence of transit-dependent populations within a town helps to shed light on that town's transit needs.

For the majority of towns, the transit-dependent demographic group that makes up the greatest share of the town population is seniors (ages 65+). However, in Bradford, Corinth, West Fairlee, and Royalton, residents below the poverty line are the largest transit-dependent group. In most (73.1%) of the towns where senior residents are the primary transit-dependent group, residents below the poverty line are the second-largest transit-dependent group. For transit-dependent demographic data by town, see Appendix A.

Although absolute numbers of transit-dependent residents can be used as a determinant of a town's transit needs, it is important to acknowledge that towns vary in the proportions of their populations that are transit dependent. Some towns in the Region have small numbers of potential riders but large percentages of their populations that are transit-dependent. For instance, Hancock had 323 residents in 2010, at least 20% of whom were transit-dependent. Despite offering relatively low numbers of potential transit riders, smaller towns still exhibit high need for public transit that might not be met if prioritization is based solely on potential ridership numbers. Taking into account the proportion of an individual town's population in need of transit services is an important step in increasing equity between towns.

There are limited data that shed light on the demographics of people who actually use local transit. Recent (2017) passenger surveys conducted by Advance Transit (as part of their Transit Development Plan update) and by Tri-Valley Transit suggest that lack of car access is a significant driver of local transit demand.[13]

With the exception of auto-less households, all of the aforementioned demographic groups are protected under various federal and state non-discrimination statutes and regulations. Through

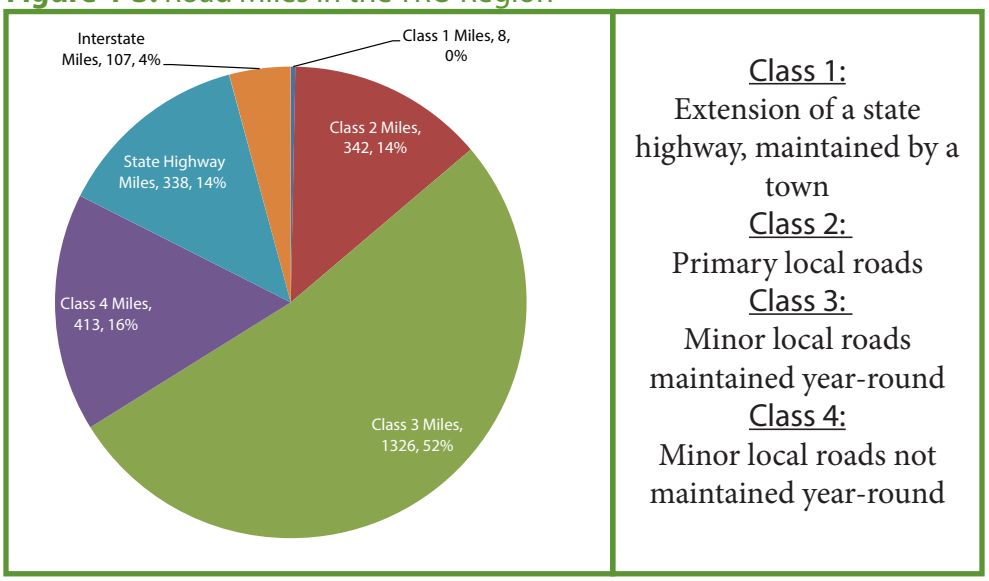
its Title VI Public Participation Plan, TRORC works to ensure that no members of protected groups are excluded from participation in, denied benefits of, or otherwise discriminated against under any of TRORC's programs or activities.

Driving

The Road Network

As roadways are the major transportation infrastructure in the Region, the population depends on and expects safe and good condition roads to get where they need to go in the Region. Figures 4-3 and 4-4 illustrate the various types of roads in the Region.

Figure 4-3: Road Miles in the TRO Region



Source: TRORC

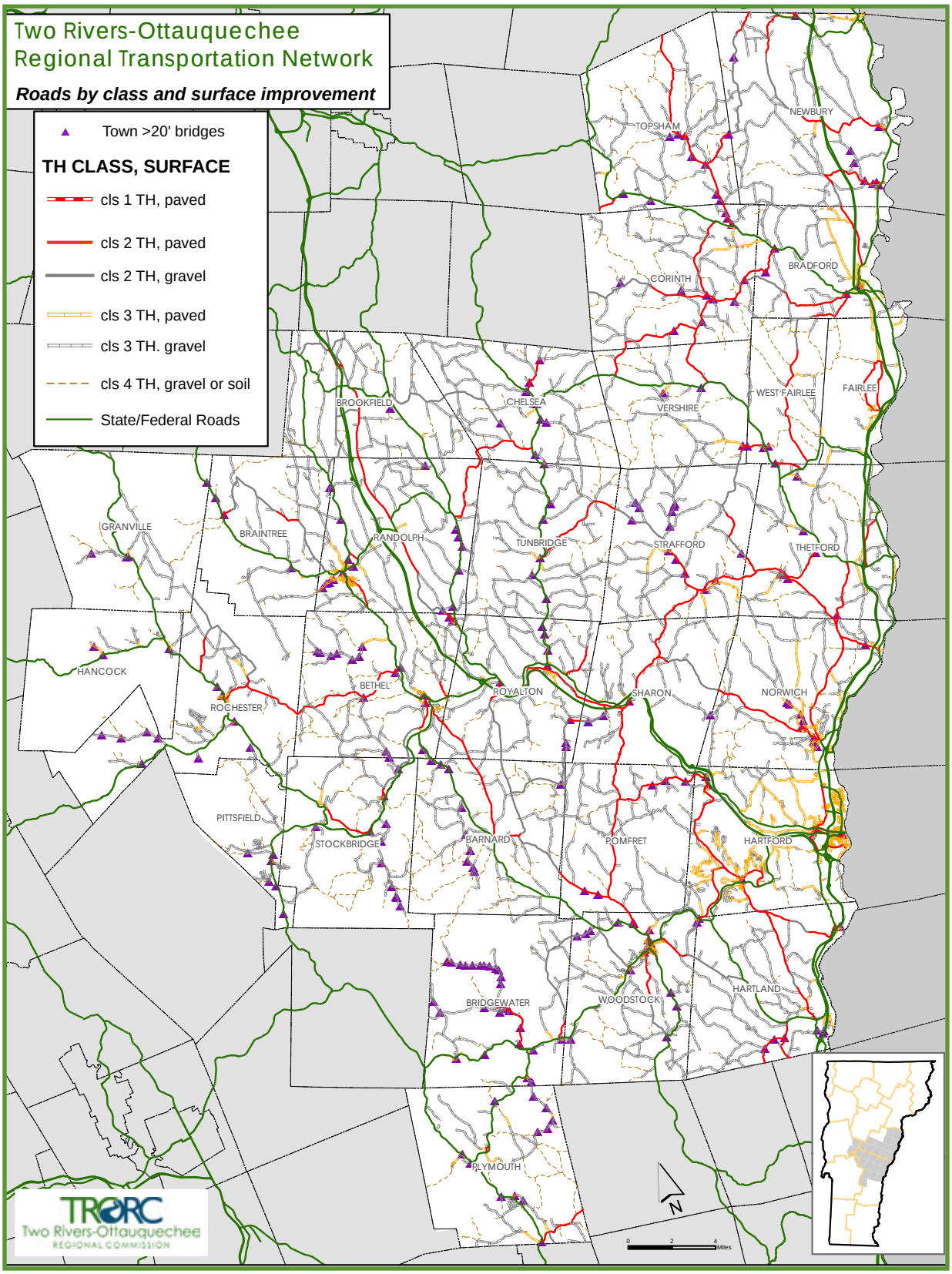
Of the state and federal highways in the Region, Interstates 89 and 91 carry the bulk of traffic (over 10,000 vehicles a day), followed by U.S. Route 4 and U.S. Route 5 (roughly 5,000 to 10,000 vehicles a day). The Region rarely encounters traffic congestion, even during peak hours. Population growth may exacerbate existing congestion along U.S. Route 5 in Hartford, VT-10A in Norwich, and the Route 4 corridor during peak hours (see Figure 4-5).[14]

In 2017, VTrans published pavement condition data for about 69 percent of federal and state highway miles in our Region. Approximately 16 percent of those miles were in Poor or Very Poor condition (see Figure 4-6).[15] There has been a concerted effort from VTrans to actively address poor pavement conditions, although demand continues to outstrip available funds for project implementation. Roads and bridges will be subjected to additional structural stress as climate change increases the frequency of extreme heat events in the Region.[16] At the municipal level, the high costs of building and maintaining local roads and related infrastructure can strain town budgets. Capital budget planning specifically for transportation facilities (including equipment) can help towns ensure they are maximizing the impact of their limited financial resources.

After obtaining adequate roadway funding, improving safety is the single greatest transportation issue for the Region. TRORC works with VTrans to reduce the Region's crashes through the state's Systemic Local Roads Safety Program. The program identifies and prioritizes safety risks on locally maintained roads traveled by fewer than 5,000 vehicles per day. VTrans addresses most risks through low-cost safety improvements (e.g., traffic signs or signals, centerline rumble strips, and pavement markings), though more significant construction may be undertaken in areas with high crash rates if needed. Summarizing the latest crash data received from January 1, 2012, to December 31, 2018 (5,149 records, mapped in Figure 4-7),[17] here are some interesting trends in the Region:

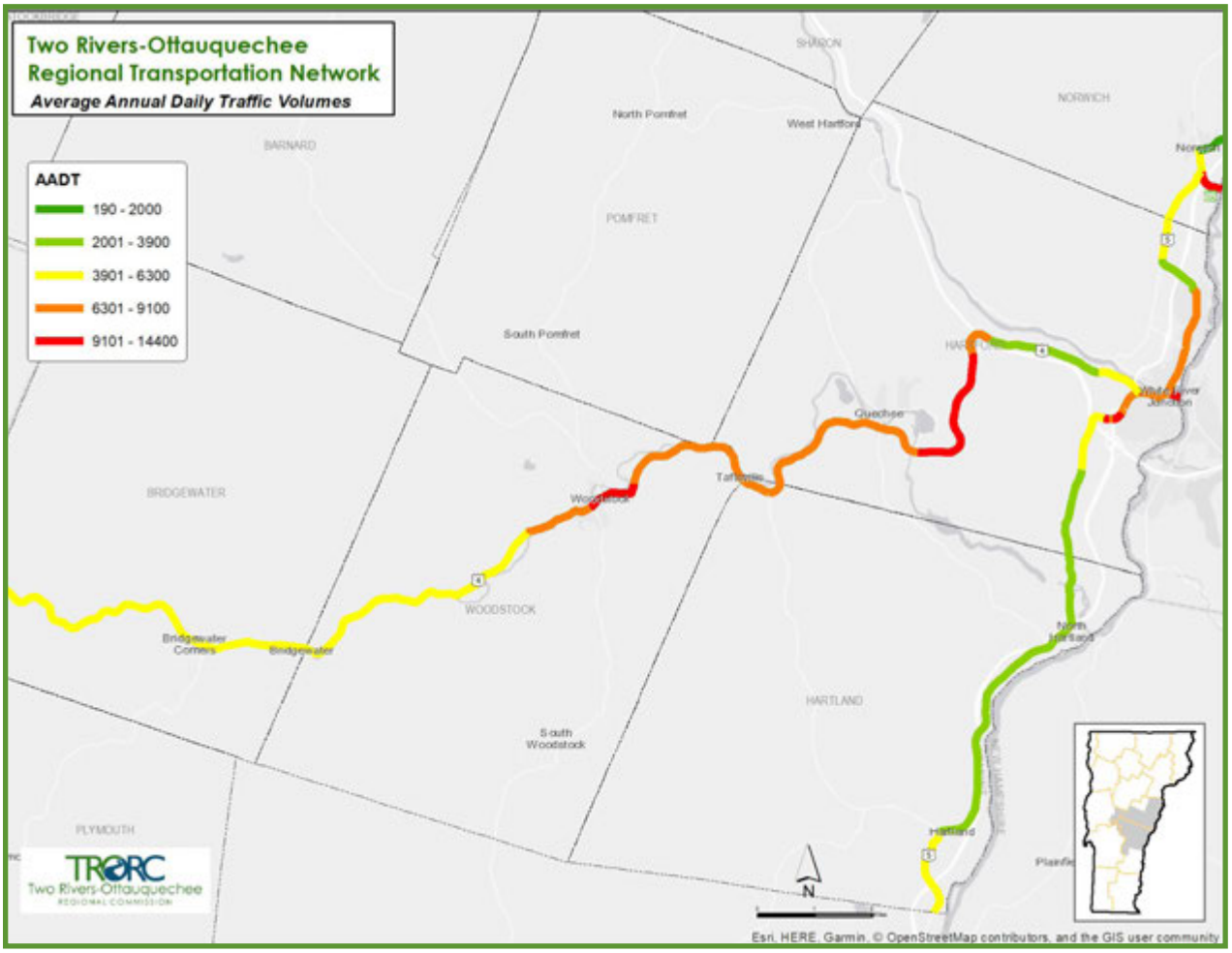
- The highest incidences of crashes are in

Figure 4-4: Regional Road Network



Source: TRORC

Figure 4-5: Average Annual Daily Traffic Volumes (2017) for Areas of Potential Future Congestion



Source: VTrans Traffic Research Unit

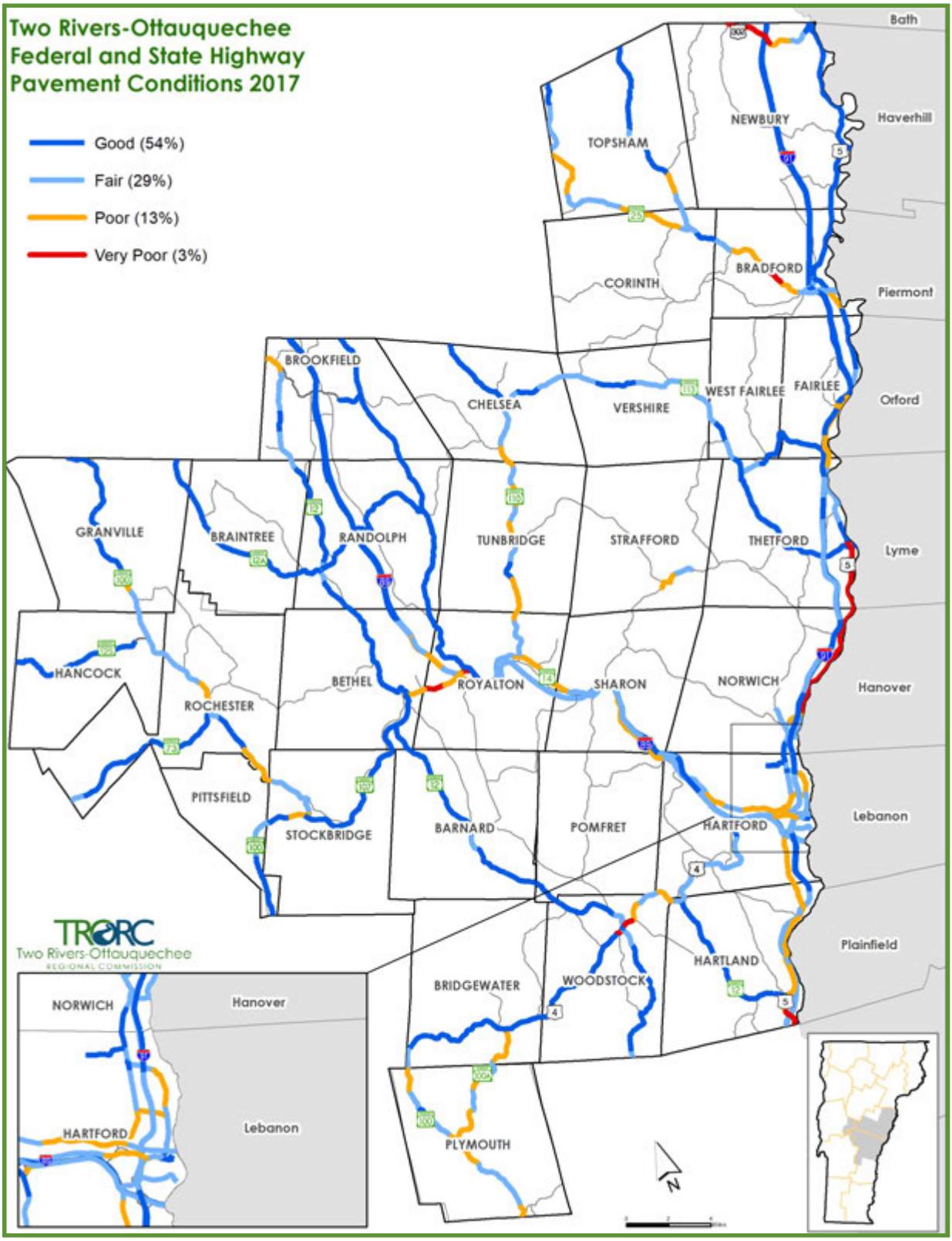
Hartford (26% of the Region's crashes), with the second highest in Randolph (7% of the Region's crashes).

- 53% of crashes result only in property damage, 19% result in injuries, and 0.5% result in fatalities. (By comparison, in the State as a whole, 70% of crashes resulted only in property damage, 17% in injuries, and 0.5% in fatalities.)
- 34% of total crashes involve only a single vehicle.

Scenic Byways and Routes

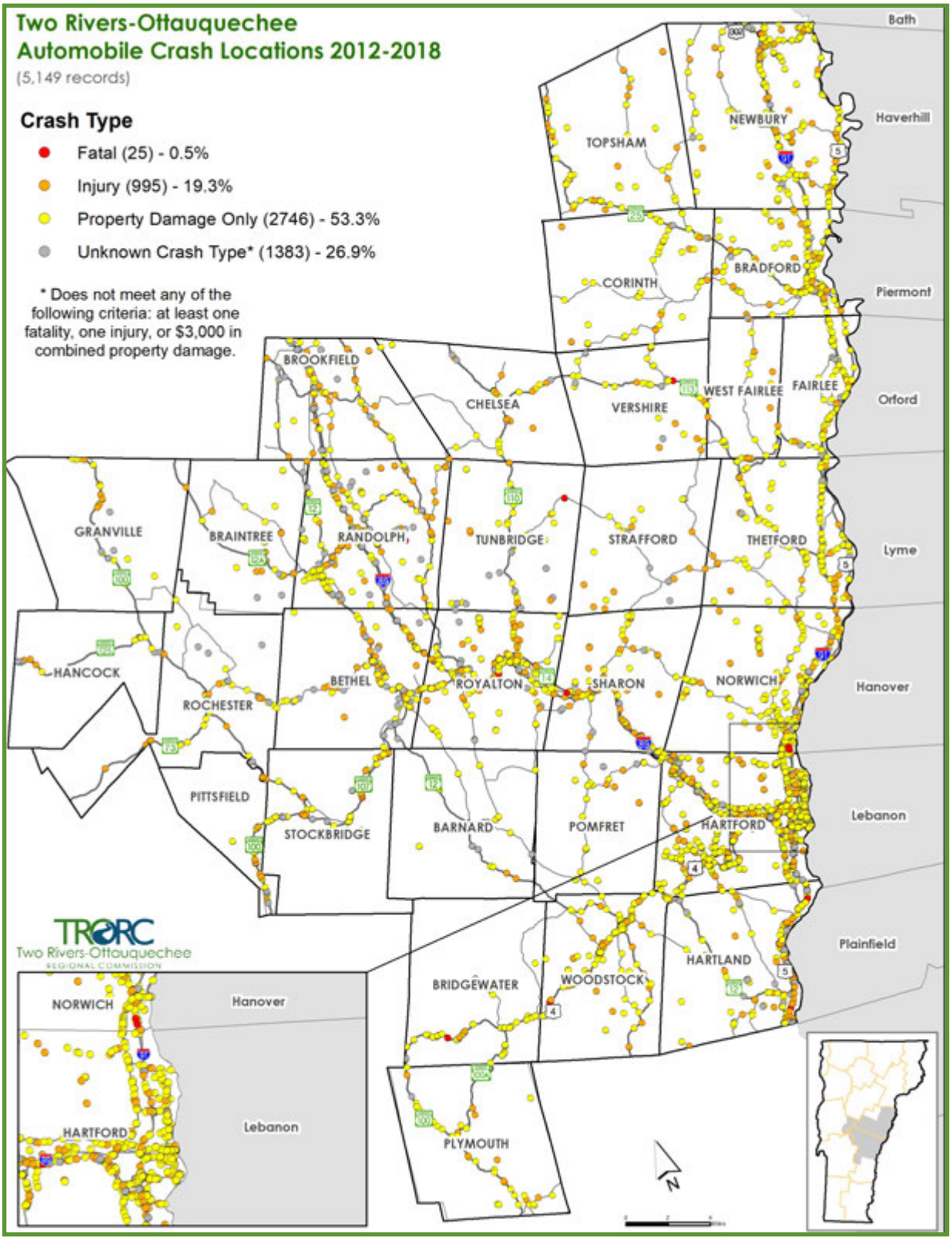
The National Scenic Byways program was established under federal transportation legislation in 1991 to help communities formalize corridors with outstanding scenic and heritage qualities. The Byways designation seeks to promote the scenic and historic nature of the road and the towns it passes through, but it does not restrict development in the corridor. Although the national program is no longer funded, there remain three designated Scenic Byways in the Region: the Connecticut River Scenic Byway, the Crossroad of Vermont (Route 4) Byway, and the Scenic Route 100 Byway. There is also one Vermont Scenic Road designated in the Region, the Route 125 Middlebury Gap Road. The Scenic Road designation places strict development restrictions on the road corridor to preserve the scenic nature of the road.[18] See Appendix B: Regional Special Road Designations.

Figure 4-6: Federal and State Highway Pavement Conditions



Source: TRORC

Figure 4-7: Rural Crash Locations 2012-2018



Source: TRORC

Goals, Policies, and Recommendations: **Driving**

Goals

1. There are reduced crashes resulting in injury and death.
2. Continued mobility on routes between settlement areas.

Policies

1. Continue partnerships with the Vermont Agency of Transportation's promotion of the "Towards Zero Deaths" mission.
2. Promote traffic calming projects for private development and for town and state roads that are located within Regional Growth Areas and/or have speeding related safety concerns.
3. Major traffic thoroughfares through Hamlet Areas should be planned or enhanced with traffic calming elements.
4. State transportation agencies should more actively apply pavement center line markings on state-controlled and Class 2 roadways. Fog line markings should be applied to all Class 1 and Class 2 paved roads.
5. Rumble strips should be integrated in state highway projects where appropriate.

Recommendations

1. TRORC will offer support to towns in capital budgeting for transportation facilities and related equipment.
2. TRORC will continue to work with towns to identify and address road safety risks through the Vermont Agency of Transportation's Systemic Local Roads Safety Program. Focus on roads that have development proposals and/or are expected to support increased development. If the State declares a road or intersection a high accident location, then conduct a road safety audit and advocate for those improvements to be implemented.
3. TRORC will continue conducting speed studies as requested by towns.
4. TRORC will work with towns to promote traffic calming, including development of road standards that promote traffic calming in private development.
5. TRORC will work with towns and Vermont Agency of Transportation to identify poor pavement conditions for improvement. TRORC will continue collaborating with Vermont Agency of Transportation on paving projects and district leveling prioritization.
6. TRORC will offer town support as needed as liaisons for Vermont Agency of Transportation projects.
7. VTrans should take over Route 132 as a state highway.

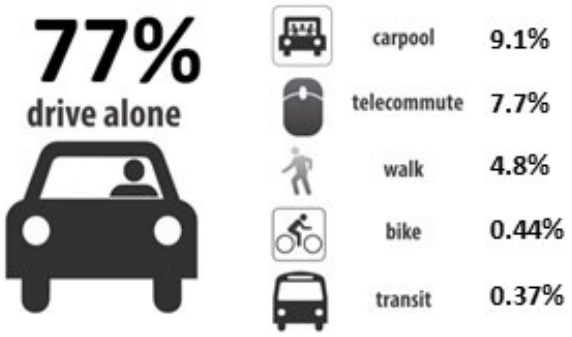
Transit

The mobility status assessment demonstrates the vital role that public transportation plays within the Region's transportation system. However, the rural character of the Region presents challenges for a traditional public transit system. Long distances between homes and employment centers strain commuter bus routes, while high transit dependency in low population density areas presents a uniquely rural challenge to the system. Furthermore, a culture of independence bred by a societal dependence on the private automobile inhibits usage of public transit because of its relative inconvenience. Figure 4-8 shows that a significant portion of commuters are still relying on driving alone to get to work. Currently, public transit provides less than 0.5 percent of the overall population with transport to work. Despite this adherence to single-occupant automobile travel, the Vermont Agency of Health and Human Services and the Vermont

Currently, public transit provides less than 0.5 percent of the overall population with transport to work.

Agency of Transportation have extensively studied public transportation usage and all projections indicate demand for these services will increase. Total ridership for the Region's two primary public transportation providers is displayed in Figure 4-9.[19]

Figure 4-8: Travel to Work Mode, Orange and Windsor Counties



Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

The Region has a number of public transportation services which are increasingly important to its transportation system. Fixed route services to the employment and commercial centers allow residents to work and shop. Transportation services for the elderly and disabled give alternatives to people who wish to live independently but who are less able to drive themselves. Figure 4-10 illustrates the transit network across the Region.

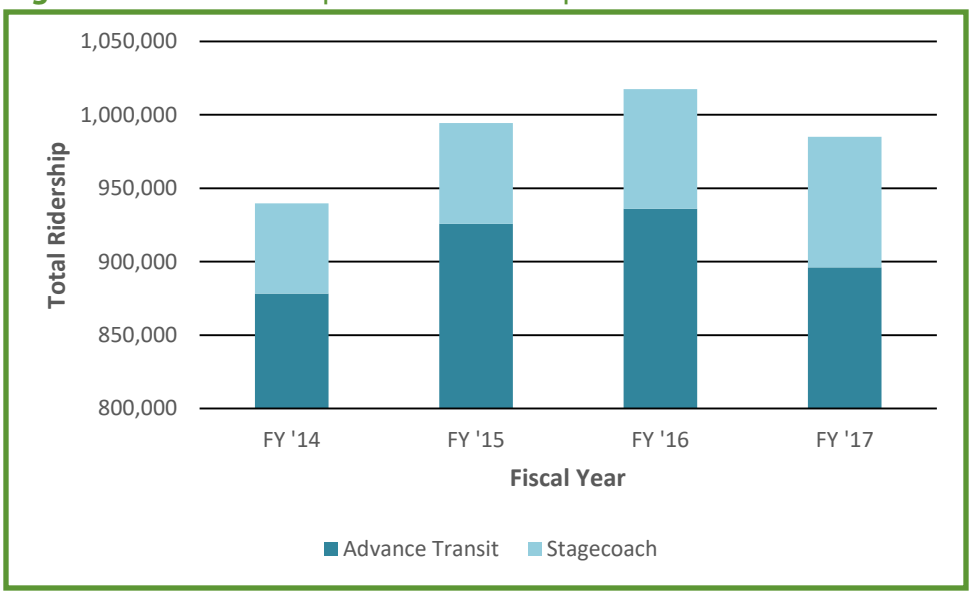
Regional Public Transportation Services

TRORC has consistently supported public transportation through planning, participation on committees, grant writing, and appropriating funds for marketing and planning services. The Region depends on two public transportation providers: Stagecoach Transportation Services and Advance Transit. These two agencies are recognized by the State to provide public transportation services within the Region.

Stagecoach and Advance Transit both operate fixed route commuter buses in the Region. Stagecoach serves three corridors with their fixed routes, connecting passengers to employment. On the I-89 corridor, passengers are connected from Randolph north to Montpelier and south to the Upper Valley. The I-91 corridor routes connect passengers from Wells River south to the Upper Valley. The third commuter route connects passengers from Montpelier and Randolph down the U.S. Route 14 corridor to South Royalton. Advance Transit operates five fixed service routes in the Upper Valley core towns of Hartford and Norwich in Vermont and Hanover, Lebanon, Enfield, and Canaan in New Hampshire. Notably absent is a commuter bus connecting towns along U.S. Route 4 to the Upper Valley.

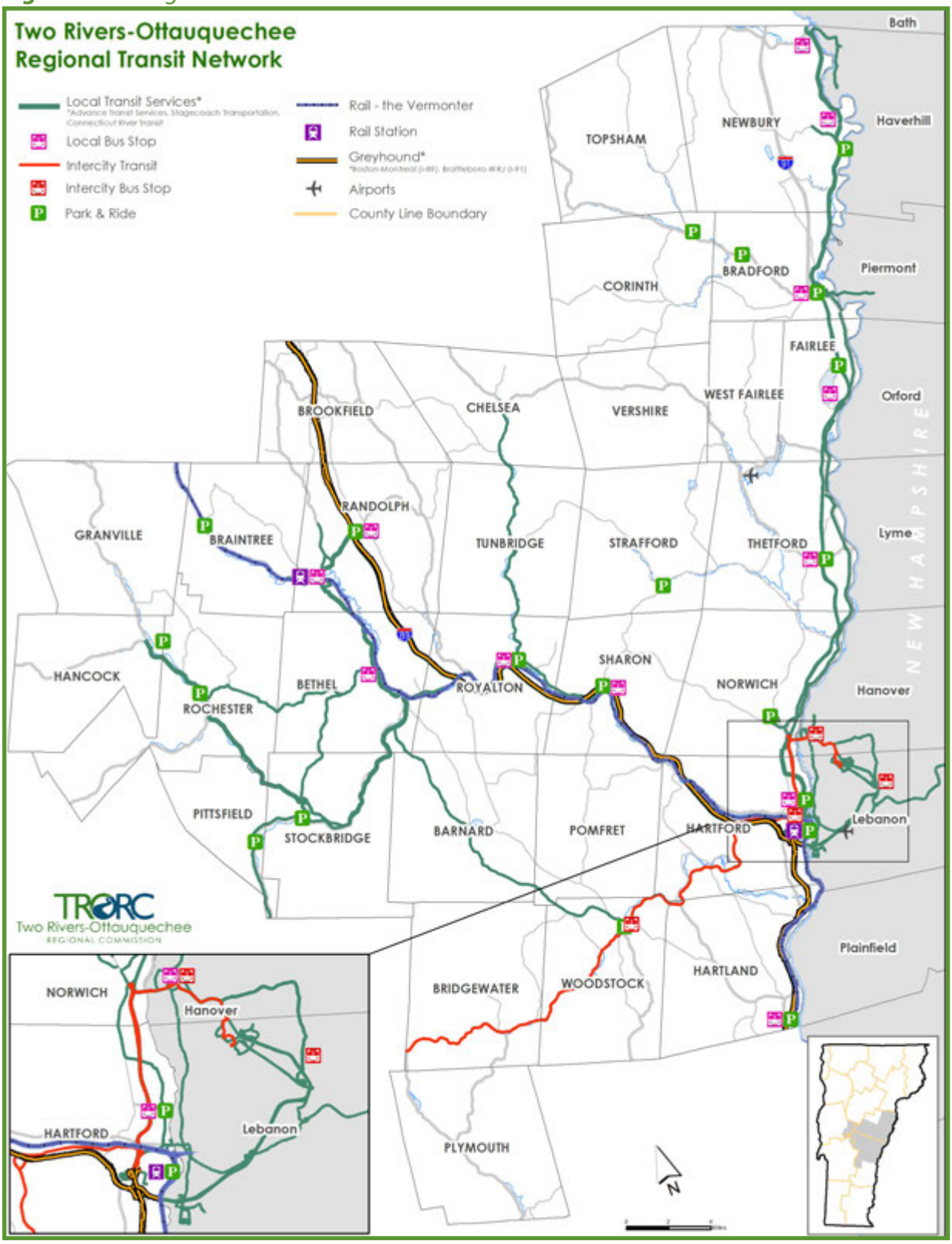
To connect transit-dependent residents with shopping and social centers, Stagecoach offers weekly deviated fixed routes to Lebanon and Randolph, serving the towns of Hancock, Rochester, Stockbridge, and Bethel. Upon passenger request, deviations of up to ¾ mile can

Figure 4-9: Public Transportation Ridership Numbers



Source: Advance Transit, Stagecoach

Figure 4-10: Regional Transit Network



Source: TRORC

be made for pick-ups or drop-offs. Stagecoach also operates weekday transit circulators in the Randolph and Bradford areas.

Intercity Transit Services

Private sector intercity bus transportation is provided by Greyhound, which has a regional service hub in White River Junction. The Greyhound route operates several daily round-trip runs between Boston, MA, and Montreal, QC, with stops in White River Junction, Montpelier, and Burlington. In 2014, Vermont Translines began operation of a route from Rutland to Lebanon, NH. In addition to Greyhound, Dartmouth Coach provides service between Hanover, NH, and Boston, MA, with stops in between at Lebanon and New London, NH. Dartmouth Coach also offers service between Hanover, NH, and New York City. Supplementing these bus services, Amtrak offers intercity commuter rail transportation with two stations in the Region: White River Junction and Randolph. For more information on rail transport, see the Passenger and Freight Rail section.

Transportation for the Elderly and Disabled

Transportation services for the elderly and people with disabilities are a unique asset to the transportation system and one that operates almost invisibly to most citizens. These services, funded by Medicaid and the Federal Transit Administration, offer transportation to eligible individuals for accessing medical appointments, senior meal sites, adult day programs, and commercial service and shopping centers. While medical rides typically are a priority for transportation, transportation to shopping and social interaction are also important factors to the quality of aging in place. Through its Human Service Transportation Coordination Plan, VTrans identifies the service gaps and other transportation challenges that impact the elderly and people with disabilities, and develops coordination strategies to better meet those needs. The Region's senior centers and adult day programs provide transportation for their elderly and disabled clients both through Stagecoach and through their own network of vehicles and volunteer drivers. Figure 4-11 illustrates the coverage areas of transportation providers for the elderly and people with disabilities in the Region. Although it appears the Region has redundancy in service areas, there remains a large percentage of unmet needs and service gaps. The partnering transportation groups continue to collaborate and coordinate services to maximize each provider in addressing service gaps. There may also be opportunities to expand capacity by utilizing school buses that would otherwise be sitting idle. Emerging technologies may be able to support providers' coordination efforts.

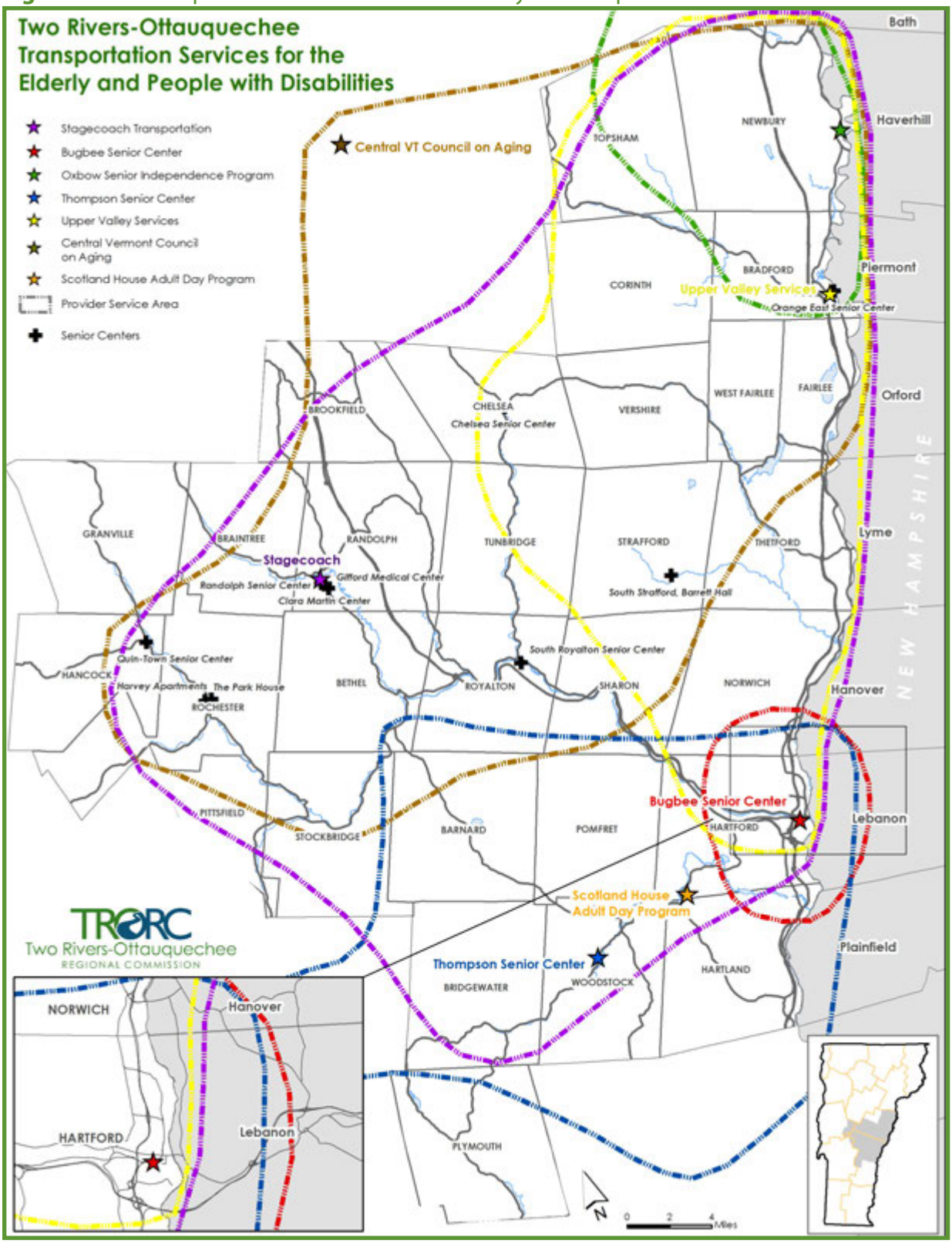
While medical rides typically are priority for transportation, transportation to shopping and social interaction are also important factors to the quality of aging in place.

In 2005, the Vermont Agency of Transportation, in partnership with the Vermont Department of Aging and Independent Living, human services agencies, transit providers, and RPCs, adjusted the Section 5311 funding formula for the allocation of monies to transit providers, focusing on the size of the elderly and disabled populations in each region, the distance traveled to facilities served, and the support of local volunteer programs. The Ticket-to-Ride program at Stagecoach subsidizes rides for seniors and people with disabilities, allowing individuals to contribute only 20 percent of the cost of the ride for a limited number of rides a year. While core funding comes from state and federal programs, the Region is unique in that it extends programs' resources by using volunteer drivers (i.e., trips provided by individuals using their own cars). The federal and state transportation programs are chronically underfunded and have become increasingly regulated by the respective transportation agencies.

Unmet Needs

Social service providers who work with transit-

Figure 4-11: Transportation Services for the Elderly and People with Disabilities



Source: TRORC

dependent populations including the elderly, people with disabilities, and people living below the poverty line have identified two primary unmet public transport needs. The first is the need for extended hours of public transit operation. Currently, buses operate generally between 6AM and 7PM. This schedule does not accommodate people who work evening or night shifts, or seniors who wish to attend social events in the evenings. The second need is for weekend bus service. Buses in the Region generally operate Monday through Friday; this presents a significant challenge for those who work on the weekend. In addition to these unmet needs associated with the existing bus service, there is a need to extend bus service along Route 4 in order to connect communities in the Ottauquechee Valley to the Upper Valley.

Goals, Policies, and Recommendations: **Public Transportation**

Goals

1. Accessible and diverse public transportation options are available and utilized in the Region.
2. Human service public transportation is adequately funded and supported.

Policies

1. More public transportation services should be provided for a greater percentage of the Region, with a particular focus on the needs of transit-dependent populations.
2. Increased accessible para-transit and demand-response transit services (door-to-door or curb-to-curb) for elders and persons with disabilities are strongly encouraged.
3. Continue assisting public transportation agencies with planning, marketing, and general coordination.
4. Opportunities for multi-modal transportation should be expanded within our downtowns, villages, and hamlets, with an emphasis on promoting safety and health.

Recommendations

1. TRORC will advocate for increased funding for more robust transit services that encourage increased ridership.
2. TRORC will support funding increases to meet demand in transportation services for the elderly and people with disabilities.
3. TRORC will advocate for increased capital investments for commuter and human service public transportation.
4. TRORC will continue coordination with agencies in providing transportation services for the elderly and people with disabilities.
5. TRORC will support the development of the Upper Valley U.S. Route 4 commuter bus service.
6. TRORC shall assist interested communities with studies and planning designed to improve multi-modal networks in Regional and Town Centers.
7. TRORC will assist transit providers in assessing unmet transit needs and developing strategies to meet those needs. Strategies could include, but are not limited to, improving coordination between providers to identify and address underutilized capacity of existing services.
8. TRORC will advocate for and support providers in continuing to adopt technologies that help reduce costs, improve efficiency, and enhance service quality.
9. TRORC will support regional efforts to disseminate public information about available transit options.

Carpooling and Park and Rides

Carpooling

In a rural, sparsely settled area where establishing a comprehensive public transit system is not cost effective, ride sharing allows people to mitigate the cost and environmental impact of their commutes without changing the location of their homes. Within the Region, 9.1 percent of commuters share rides to work. Carpooling requires a significant amount of coordination and a slight loss of independence in transportation. The Go! Vermont program managed by VTrans facilitates pairing people with other interested carpoolers.

Park and Rides

In order to facilitate the connection of single-occupant modes of travel to collective travel (either by ridesharing or by the use of public transit), the Region contains 20 park and rides. Of these, eleven are supported by municipalities and nine are supported by the State. Since 2017, two new municipal lots (a total of 34 parking spaces) have been added to the Region (bolded on Table 4-1, which lists the Region's park and rides). Additional facilities will be needed to meet regional demand. TRORC evaluates park and ride capacity and has contributed regional data to statewide needs assessment efforts.

Table 4-1: Regional Park and Rides

Town	Location	Jurisdiction	Total Spaces	Lighting	Shelter	Bike Rack	Public Transit Service
Bradford	I-91, Exit 16	State	**81**	Yes	No	Yes	Stagecoach
Bradford	VT25/Chelsea Rd	State	**5**	No	No	No	No
Braintree	VT12A	Municipal	**14**	Yes	No	No	No
Corinth	VT25	Municipal	**25**	Yes	No	No	No
Fairlee	US5/Train Depot	Municipal	24	Yes	No	No	No
Hancock	VT100, Town Hall	Municipal	29	Yes	No	No	No
Hartford	I-91, Exit 12	State	**40**	Yes	Yes	Yes	Advance Transit
Hartford	South Main St, WRJ	Municipal	**30**	No	No	No	Advance Transit
Hartland	I-91, Exit 9	State	**55**	Yes	No	Yes	CRT
Newbury	US5/Newbury Crossing Rd	Municipal	20	No	No	No	Stagecoach
Norwich	Turnpike Rd	Municipal	30	Yes	Yes	Yes	Advance Transit
Pittsfield	VT100, Town Office	Municipal	18	Yes	No	No	No
Randolph	I-89, Exit 4	State	**89**	Yes	Yes	Yes	Stagecoach
Rochester	VT100	Municipal	**10**	Yes	No	No	Stagecoach
Royalton	VT14/VT110	State	**20**	No	No	No	Stagecoach
Sharon	I-89, Exit 2	State	**24**	No	No	Yes	Stagecoach
Stockbridge	VT100/VT107	State	**10**	Yes	No	No	Stagecoach
Strafford	VT132	Municipal	**23**	Yes	No	Yes	No
Thetford	I-91, Exit 14	State	**25**	Yes	No	Yes	Stagecoach
Woodstock	US4	Municipal	**20**	Yes	No	No	Vermont Translines
TOTAL SPACES			**592**				

Source: Vermont Agency of Transportation

Park and rides facilitate the decrease in miles driven using single-occupant vehicles, which in turn benefits household budgets, reduces fossil fuel use and greenhouse gas emissions, and produces other environmental benefits. In commercial growth areas, park and rides can be combined with rest areas, tourist information centers, restaurants, and other land uses. This increases land use densities, keeps properties on local tax rolls, combines maintenance needs, and improves the overall likelihood that the park and ride lot will be successful. Park and rides can also support the growth of the Region's electric vehicle fleet by providing charging stations; VTrans is working to install charging infrastructure in state-operated lots where practicable.

Goal, Policies, and Recommendations: **Carpooling and Park and Rides**

Goal

1. Single-occupant vehicle dependency is reduced.

Policies

1. The number and size of park and ride lots should be increased to better support regional public transportation.
2. The development of public park and ride facilities in Interchange Areas shall be encouraged.
3. Public transportation agencies and the Vermont Agency of Transportation should coordinate in constructing park and ride lots and give higher priority to those located along interstate interchanges and existing bus routes.

Recommendations

1. The Transportation Advisory Committee (TAC) shall continue to identify park and rides in need of state investments and improvements, including the lot at the Hartford I-89/I-91 interchange (CMG PARK(12)SC).
2. Towns should apply to the Municipal Park and Ride Program and expand the regional park and ride network.
3. TRORC and towns should continue to support public transportation and ride-share programs to reduce the Region's dependency on single-occupant vehicle trips.
4. Towns should consider shared parking lots with other properties that may become formal or informal park and ride lots.
5. TRORC shall support efforts to develop and improve park and ride lots in village areas.
6. TRORC will advocate for more state funding for park and ride lots.
7. TRORC will support efforts to incorporate electric vehicle charging infrastructure into formal park and ride lots and other appropriate locations, as practicable.

Bradford Park and Ride | *Source: TRORC Staff*

Walking and Biking

Complete Streets

Acknowledging the importance of providing people with transportation choices other than the car, the Vermont Legislature passed a "Complete Streets" law in 2011. Vermont's Complete Streets law, Act 34, requires that all users be considered in the planning, design, construction, and maintenance of our roadway system. The context of each state and local transportation improvement project should be recognized in any recommendations for additional facilities or accommodations. In very rural areas, road shoulders provide a reasonably safe and cost effective facility for pedestrians and bicyclists. In more constrained areas where shoulders cannot be provided, shared lanes may be the only realistic option. In these cases, measures to maintain lower speeds and enhance safety, such as traffic calming, are appropriate. In areas with more multi-modal activity, such as downtowns and village centers, there are a range of appropriate accommodations for non-motorized users, including sidewalks of varying widths and designs, bicycle lanes, shared lanes, and bicycle paths. Current or future transit stops should be designed with consideration for pedestrian travel to and from the rider's final destination. "Complete Streets" planning should also make accommodations for small and low-speed vehicles like electric bikes, scooters, and mopeds, which are garnering increased interest as alternative transportation modes that can help reduce single-occupant car trips.

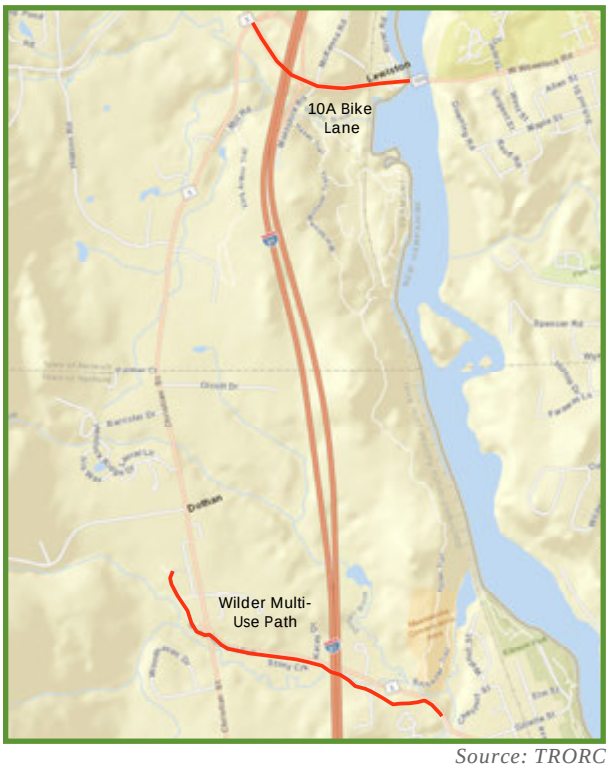
Pedestrian and Bicycle Facilities

Walking and bicycling infrastructure is an important component of the Region's goals for sustainable transportation and economic development. There are three formal bike paths (mapped in Figures 4-12 and 4-13, below) and many informal bike routes in use throughout the Region.

Higher use of these modes will have numerous benefits for the Region, including lower traffic volumes, lower emissions, and improved public health. While Vermont's Complete Streets policy should ensure that transportation improvement projects provide for these modes, there are additional considerations that can further the Region's goals. Land use planning that concentrates growth in areas of existing development, particularly village centers, supports the utility of pedestrian and bicycle infrastructure. The Region has also been supportive of federal and state initiatives that incorporate safe routes programs primarily for schools in or near the larger Regional Growth Areas. Although national Safe Routes to School funding has been curtailed, TRORC continues to support related planning work. Lastly, increasing bicycle and pedestrian travel will require continued community outreach and education.

Randolph, VT | *© First Light Studios*

Figure 4-12: Formal Bike Routes in Norwich and Hartford



Source: TRORC

Figure 4-13: Formal Bike Lane in Bradford, U.S. Route 5

Source: TRORC

Goal, Policies, and Recommendations: **Walking and Biking**

Goal

1. The Region has a safe and broad network for pedestrians and bicyclists.

Policies

1. Transportation infrastructure and services should be improved to facilitate independent travel.
2. Town land use plans or zoning should be updated to meet goals for walking, biking, and sustainable transportation.
3. Transportation infrastructure investments within Regional and Town Centers should improve circulation for vehicles and expand opportunities for pedestrian traffic. Development that negatively impacts pedestrian travel is not appropriate in these areas.
4. Construction projects shall consider improvements for bicyclists and pedestrians to be central to the project purpose, rather than an "enhancement." Accommodations for pedestrians include not only the sidewalk surface but also amenities to make walking feel safer and more comfortable, including trees, plantings, benches, and lighting.
5. Opportunities should be expanded for pedestrian transportation within our villages and hamlets, with emphasis on promoting safety and health.
6. Pavement conditions should be improved on state routes in order to improve cycling conditions.

Goal, policies, and recommendations continued on next page

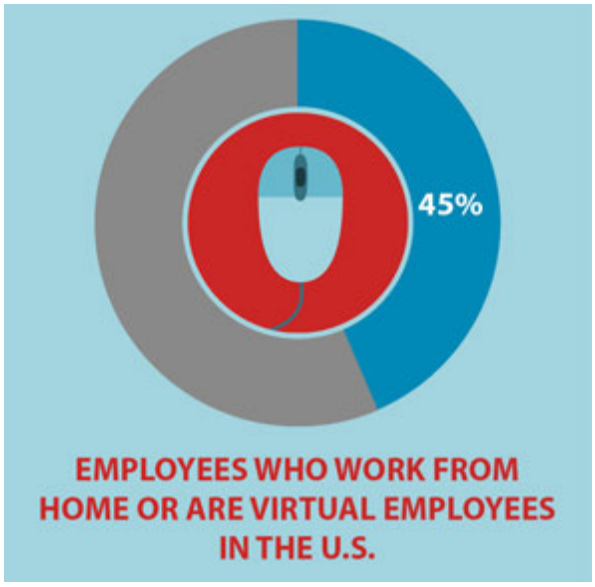
Goal, Policies, and Recommendations: **Walking and Biking**

Recommendations

1. TRORC will work with towns and the Vermont Agency of Transportation to institutionalize pedestrian and bicycle accommodations (including transit connectivity) in all of its planning, engineering, and construction related activities (i.e., implement "Complete Streets"), especially in regional, town, and village centers. In addition to the existing local land use regulations, this work will include development of free-standing Bicycle and Pedestrian Plans for interested towns.
2. TRORC will work with towns to support land use regulations that increase the density and mixed use development pattern that improves walking and bicycling conditions by shortening trips between where people live, work, and recreate.
3. TRORC will cooperate with private and public initiatives that seek to market walking and bicycling in towns and the Region and participate in state and local initiatives that promote bicycling and walking.
4. TRORC will use objective measures to gauge the potential for walking and bicycling to assess priorities for investments in these modes. These measures could include population density, employment density, and block sizes or intersection density.
5. TRORC will continue to support municipal planning for safe routes to school, especially within densely settled villages or town centers.
6. TRORC will advocate that commercial and other development projects invest in transportation infrastructure and services to increase use of alternative modes such as bicycling, walking, or transit, or provide necessary rights-of-way to allow later investment in those facilities.
7. As opportunities arise, TRORC will provide education and training to large employers on the benefits of providing showers and bike lockers for employees who commute by biking.

Telecommuting

Telecommuting offers an excellent way to reduce both energy use in transportation and resultant greenhouse gas emissions, while also encouraging commercial activity in the Region. Telecommuting can provide good job opportunities in more remote communities but also in more urban areas. Currently, 7.7 percent of workers in Orange and Windsor Counties access employment by telecommuting.[20] Strengthening telecommuting through greater availability and speed of broadband and fiber optic service would increase the attractiveness of the Region to individuals who have jobs that are not location-dependent, as well as provide additional economic benefits. Improved Internet networks would also benefit teleconferencing in the Region, which like telecommuting helps to reduce vehicle miles traveled. Teleconferencing may require additional supportive technology depending upon the needs of the participants.



Work from Home Graphic | *Info Source: New Jersey Institute of Technology's Online MBA Program*

Goal, Policies, and Recommendations: **Telecommuting**

Goal

1. Telecommuting and teleconferencing are easily done via widespread fast Internet access.

Policies

1. Broadband Internet service should be available throughout the Region's areas where development is desired.
2. High-speed fiber networks should be available in all village areas of concentrated growth.
3. Employers are encouraged to allow telecommuting and teleconferencing.

Recommendations

1. Towns, the State, telecommunications providers, and TRORC should map existing cellular and broadband services in the Region, identify gaps, and work to provide coverage in those gap areas.
2. Private businesses should support telecommuting and teleconferencing options where practical for employees.
3. As opportunities arise, TRORC will provide education to employers on the benefits of allowing some telecommuting for employees.
4. TRORC will support efforts to develop community-owned fiber optic Internet service.
5. TRORC will support efforts to provide public access to teleconferencing equipment.

Passenger and Freight Rail

Passenger Rail

The rail industry is an important transportation mode for freight and passenger services. The Amtrak "Vermonter" passenger rail service from St. Albans, VT, to Washington, DC, is currently subsidized by the State of Vermont and has stops in Randolph and White River Junction, traveling on the New England Central Railroad (see Figure 4-10). This rail service is utilized more for tourism purposes than commuter service. It has benefited from track upgrades in recent years that have shaved off ample travel time along the corridor and improved fuel efficiency.[21] Between 2011 and 2017, ridership declined 3.9 percent at White River Junction and declined 3.4 percent at Randolph, a total decrease of 3.9 percent for the Region's stations altogether. Statewide, passenger rail ridership increased 2.4 percent between 2011 and 2017. In its 2017 Transportation Energy Profile report, VTrans noted that ridership growth was lagging behind state targets.[22]

At one time, almost every town in the Region was serviced by rail links, be it for personal or commercial use. Regional access to passenger trains has decreased with respect to the number of functioning passenger rail stations, and there has been a decline in ridership in recent years, as noted in Table 4-2. Many residents in the Region would welcome the opportunity to access regional and local passenger train services in areas closer to home, i.e., within their town or an immediately adjoining municipality. Whether such services will be created or added to existing service lines in the future remains to be seen. In 2016, the Northern New England Intercity Rail Initiative (NNEIRI) study recommended the expansion of the existing "Vermonter" passenger rail services to connect Boston and New Haven to Montreal. The proposed daily round-trip service would stop at all existing stations and would require a number of infrastructure improvements in Vermont, including extension of railroad sidings, safety upgrades to at-grade crossings, new trackage and turnouts, and signal improvements. The projected future ridership (inclusive of passengers of the existing "Vermonter" route) from New Haven to Montreal is 343,000 riders per year, and from Boston to Montreal is 103,000 riders per year. Realizing the NNEIRI vision will require additional study as well as planning

coordination by various state agencies and departments in Vermont, Massachusetts, and Connecticut.[23]

Freight Transportation

VTrans has published a detailed map of railroad corridors in the State, including freight.[24] In our Region, the White River Junction station serves as a freight rail interchange point. The Washington County Railroad Company (WACR) line connects from the New England Central Railroad (NECR) at White River Junction north into Newport. This train line runs parallel to the Connecticut River within the TRO Region, with twelve designated stops in the river valley: White River Junction, Wilder, Norwich, Kendall, Thetford, Northboro, Ely, Fairlee, Bradford, Hooker, Newbury, and Wells River.[25] Additionally, the towns of Hartford and Bradford have industrial parks onsite. During times of emergency, VTrans has coordinated with the rail companies to ship needed materials on the Vermonter passenger rail route (described above).

Freight rail competes with other transport modes, namely tractor trailers, although it can serve as a more efficient, economical, and environmentally friendly means of transportation for heavy and bulky goods compared with other modes. Increases in freight rail service can only occur as long as service enhancements are carried out in conjunction with necessary safety improvements. Rail industries can be located within the Region as long as town land use policies are supportive and the necessary transportation road and bridge infrastructure exists. TRORC has had longstanding goals with which to pursue expanding rail service: preserving the existing infrastructure, expanding capacity where needed to accommodate double-stacked rail cars, and continuing the public's purchasing of privately held rail lines.

In 2017, there were 11 railway companies operating throughout Vermont, some of which leased rights to the tracks directly from the State.[26] Trains carried over 3.25 million tons of freight through Vermont in 2016.[27] With this much traffic on the rail lines, it is likely that a significant share of the goods transported are actually hazardous materials.[28] This presents a very real threat to health and safety in the event that there is a derailment or other spill, as occurred north of Vermont in Lac-Mégantic, Quebec, following a crude oil railway crash in July 2013 that killed at least 50 people and damaged swaths of property. Unfortunately, there is no way of knowing with any degree of certainty what materials are traveling through the State via freight, what their route is, and when they are traveling.[29] Towns with active freight lines are aware of this potential hazard issue and are actively working toward efforts to mitigate the effects of such an incident within their town borders, be it within a Hazard Mitigation Plan, an Emergency Management Plan, or otherwise.

Table 4-2: Boardings and Alightings on the Amtrak "Vermonter" Line by Fiscal Year[30]

	2017	2016	2015	2014
White River Junction	13,554	13,988	14,810	16,257
Randolph	1,833	1,940	2,073	2,302
Total for Vermont	**94,157**	**92,422**	**103,128**	**107,688**

Source: Amtrak

Goal, Policies, and Recommendations: **Passenger and Freight Rail**

Goal

1. There are increased rail (passenger and freight) services in the Region.

Policies

1. Support efforts to improve existing rail infrastructure to broaden rail services by working with the Vermont Agency of Transportation to prioritize service lines.
2. Support efforts to expand business opportunities for rail-to-truck connections and tourist travel.

Recommendations

1. TRORC will support the implementation of the Northern New England Intercity Rail Initiative final recommendations for a Boston/New Haven to Montreal passenger rail service.
2. TRORC will support improved rail service along the I-91 corridor.
3. TRORC will work with towns to consider land use and transportation investment policies that make rail-based industries a viable commercial activity.

Transportation Endnotes

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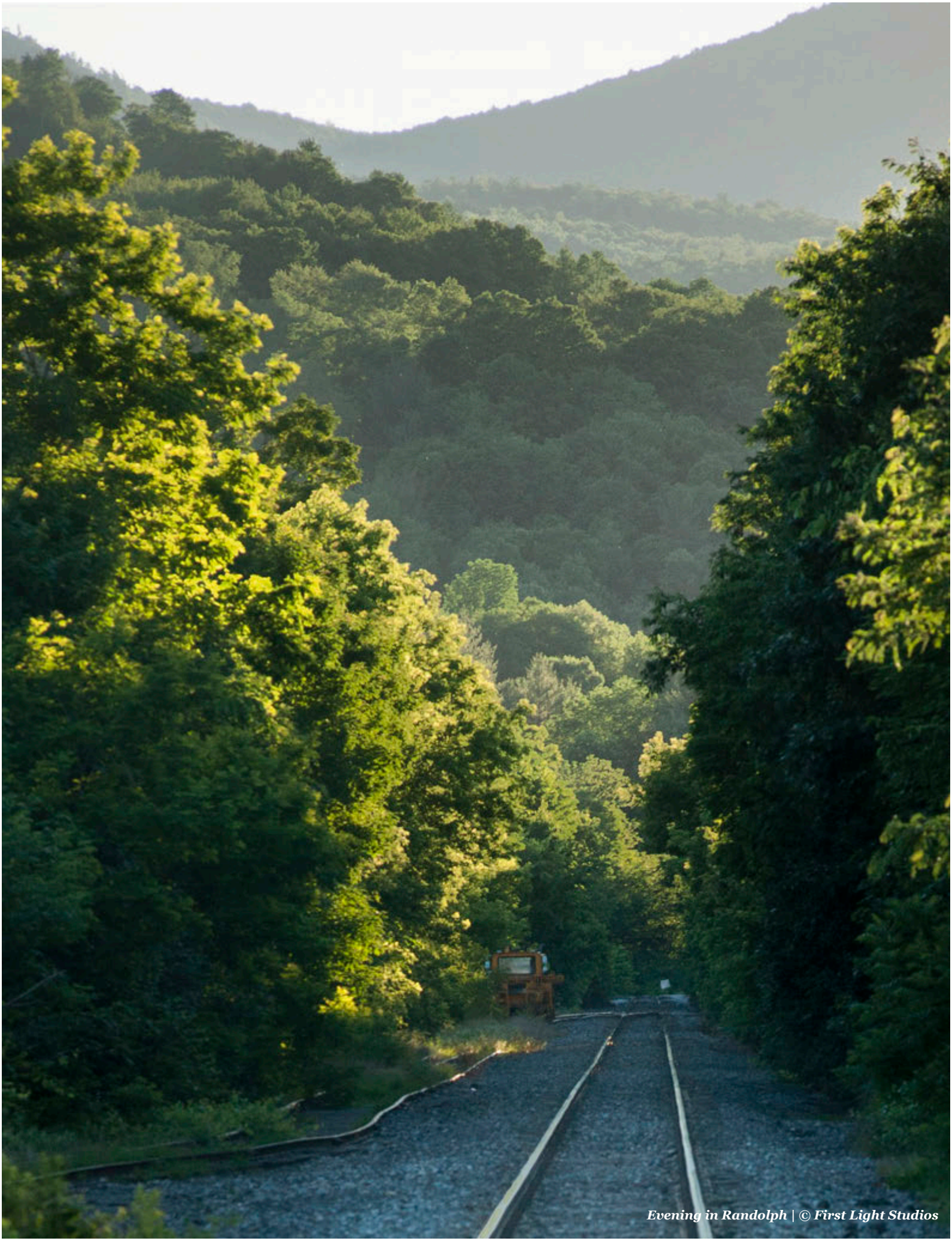


Evening in Randolph | © First Light Studios

WORKING LANDSCAPE: AGRICULTURE AND FORESTRY

5

Ware Farm: Tunbridge | © *First Light Studios*

A. Introduction

The TRO Region has had a strong history of our residents making their living through their land. Like much of Vermont, historically much of the work done in our Region once had its roots in the land, whether through farming, forestry, or mining. While the face of agriculture and forestry has changed significantly since the 1800s, these vocations remain an essential part of what makes our Region what it is. Businesses that utilize the land help to shape it and give it the character that it has today. Without farming we would not have open rolling fields. In order to maintain our working landscape and the occupations it supports, we must recognize its contributions to our Region and be prepared to address the challenges to its sustainability.

B. Agriculture

In 2014, the Vermont Agency of Agriculture, Food and Markets conducted a survey for their report on agricultural enterprises. Respondents to the survey identified the preservation of open space and access to locally grown and processed food as the primary reasons land should be kept in agriculture. Farms provide open space for wildlife habitat, scenic views, and a connection to the land that is hard to find in other places. In addition, agriculture is an important piece of our local economy, providing opportunities for entrepreneurism that extend well beyond the farm. As such, to continue to receive the benefits farming has to offer, TRORC and our communities must continue to support agriculture.

Farming Trends

An analysis of the USDA Census of Agriculture data between 2002 and 2012 (2012 being the most recent period of data collected) shows that farming in Vermont is slowly shifting toward smaller farms. Between 2002 and 2012, the number of farms in Vermont increased by more than 11 percent. Growth in farms was at its highest among smaller farms, specifically in the 10 to 49 acre range.

The overall trend in farm growth in Vermont and the Region is in farms that are considered "small scale"—those that that sell under $2,500 in agricultural products per year. While the number of small-scale farms continues to grow, these farms only produce 2.3 percent of Vermont's agricultural income. Generally, these small-scale farms tend to be more diversified and not dependent on a single source of production like dairy.

Agriculture is an important piece of our local economy, providing opportunities for entrepreneurism that extend well beyond the farm.

While smaller farms grew in number, larger farms (between 180 and 1,000 acres) continued their decline between 2002 and 2012. Yet at the top end, there has been growth in Vermont's largest farms (2,000 acres or more) as remaining operating farms, mainly dairy farms, purchase the land and stock of neighboring farms when those stop operating. The Region's largest farms are primarily dairy farms.

Farm Economy

Vermont is within easy reach of millions of people in cities like Boston and New York City. Additionally, Vermonters are increasingly seeking locally sourced, sustainably produced farm and forest products. Fluctuating fuel prices have led to an increased interest in food and energy security. Vermont is a national leader in innovative education programs based on local food, agriculture, and healthy eating. It is also widely recognized for its strong network of land trusts and other nonprofits that are models for conserving farm and forest lands. As such, there is a growing mix of emerging entrepreneurs and long-time land-based businesses that are constantly evolving to stay competitive. Farms are producing biofuels, artisan cheese, specialty wood products, produce, breads, and other value-added items—all of which rely on the farm economy.

According to the Vermont Farm to Plate Strategic Plan (2013), between companies responsible for farm inputs such as feed and labor, farms themselves, food processors, and wholesale food distributers, Vermont's agricultural economy has almost 9,000 businesses employing nearly 30,000 people.[1] In 2012, USDA data indicated the estimated direct agricultural revenue in Vermont to be $776 million per year.

Vermont has continued its efforts to encourage the continued diversification of on-farm businesses and more broadly to support rural economic development in both farm and forestry economic sectors. In 2012, the Vermont Legislature passed Act 142, which created the Vermont Working Lands Enterprise Initiative, a State-supported grant program aimed at investing in Vermont's farm, food, and forest economies.

Challenges

Loss of Farmland

From 1997 to 2007, Vermont lost (on average) nearly 8,200 acres of farmland each year, including 1,100 acres of prime cropland and pastureland, while the amount of developed land has increased nearly 4,700 acres annually.[2] This trend has slowed since 2013, but the loss of farmland remains a concern, particularly in more populated areas, where the pressure to utilize land for commercial or residential purposes is greater.

Vermont's agricultural economy has almost 9,000 businesses employing nearly 30,000 people.

For many farms (particularly dairy farms), a significant percentage of the lands actively managed do not actually belong to the farm, and instead are leased from a wide range of property owners for the purposes of haying or growing corn for feed, although some grazing takes place as well. The need to generate feed locally is a strong one, as local feed production is more cost-effective than purchasing feed. Purchased

grain costs are also often unstable due to external market fluctuations (such as fuel costs).

These leasing arrangements are beneficial to owners and farmers, but are not necessarily sustainable. When landowners sell their property to someone who intends to build a home on it, that farmable land is taken out of production. During a survey of farmers in Tunbridge, for example, one farmer indicated that if he were to lose 20 acres of land, it would seriously impact his ability to produce his feed locally.[3] Keeping farmland in farming is a critical concern, since when good agricultural land is developed, it is permanently lost to farming.

Aging Farmers

The average age of Vermont farmers is 56, and over a quarter are 65 and older.[4] This means that many farmers are reaching retirement age. While farm operations are often family owned, there is no guarantee that a family member will take over the farm.

Luckily, there are a growing number of young people interested in becoming farmers or starting a food enterprise business. The challenge is that farms are expensive to purchase and operate for new farmers. Most farms also require one or more family members to hold a full-time job to supplement farm income and maintain access to health insurance. The average wage for farm workers is just over $11 per hour.

Land and Taxation

Rising tax rates due to increased property values and education costs find owners of farmland faced with a tax bill on land that often exceeds its economic value for agriculture purposes. These high property tax bills coupled with the low prices paid for commodity agricultural products like milk, a demand for development land in general, and their own lack of retirement savings have all pushed landowners to place their land on the market.

Unless the cost of owning farmland is reduced, meaning a reduction in property taxes, it becomes difficult to rationalize conventional farming and forestry pursuits. The general problem of taxation is exacerbated because towns and school districts are primarily dependent on property taxes to raise local revenues. Furthermore, any reduction in the amount of taxes received from active open land needs to be made up by non-farm, non-forest, or non-enrolled taxpayers, many of whom are unable to pay more.

Vermont has lost (on average) nearly 8,000 acres of farmland each year, including 1,100 acres of prime crop and pastureland; while the amount of developed land has increased nearly 4,700 acres annually.

Climate Shift

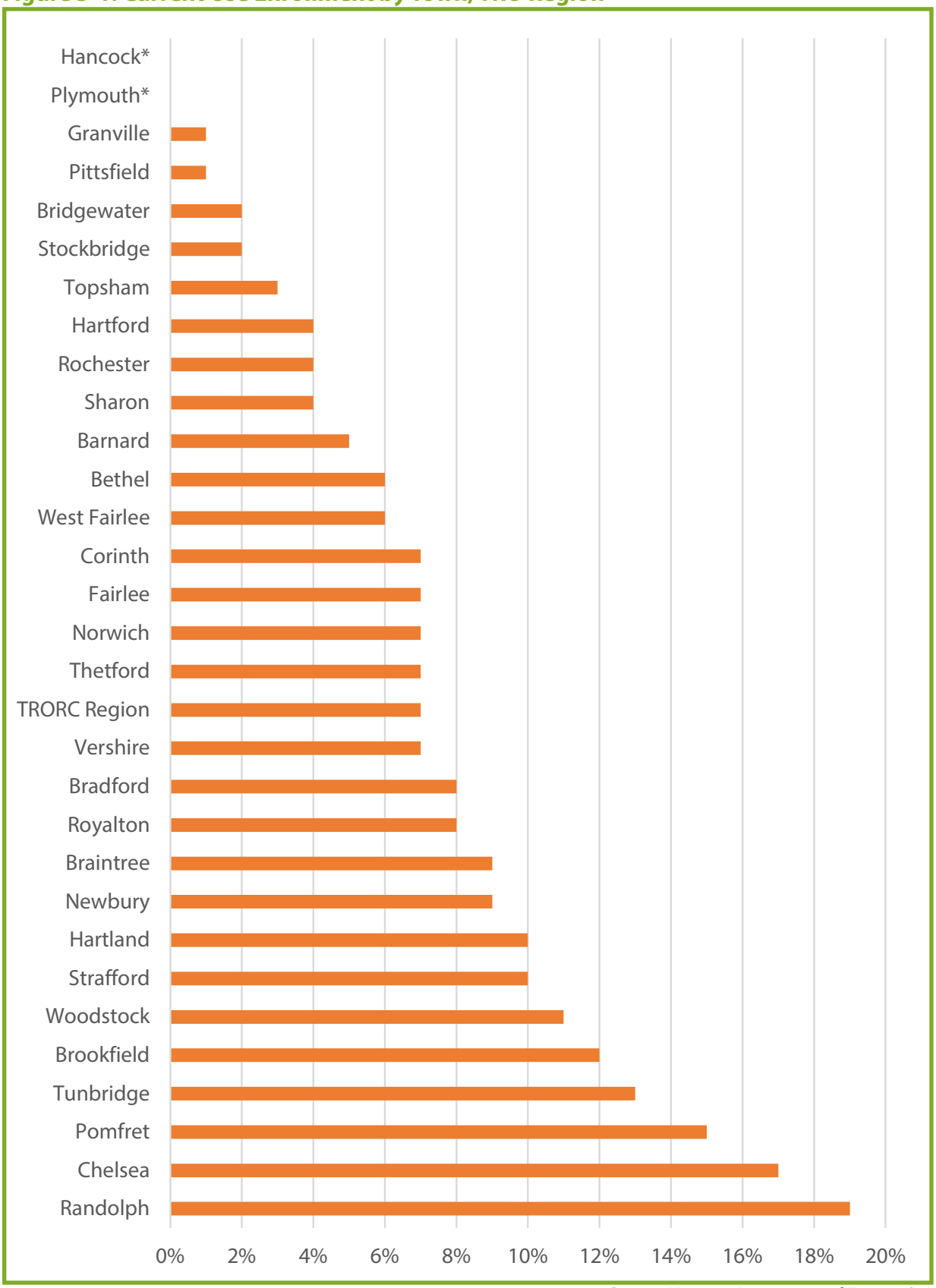
Farming is a livelihood that depends on the weather. Rain at the right time, frost that does not come too late or too early, temperatures warm enough but not too hot. All of the parts of weather have variability, but the general conditions that we expect over the course of the year are the climate. With the climate expected to shift toward one that more resembles that of areas farther south, there will be challenges and opportunities. One of the larger issues for milk production will be hotter days in the summer. Irrigation will likely be needed in July. Warmer winters will extend some cold season crops but will hurt maple syrup production as well. Greater rainstorms will make fields too wet to work at times and erode precious topsoil.[5]

Solutions

Current Use and Tax Stabilization

The most common method used to reduce the tax burden on farming and forestry operations is through the Vermont Current Use Program. The main incentive for Current Use to landowners is that it allows participating landowners to pay much lower taxes on their forest or farm lands based on their use value, rather than for their

Figure 5-1: Current Use Enrollment by Town, TRO Region



Source: Vermont Department of Taxes, 2016

Hancock and Plymouth are reflected on this graph as having 0% while in reality they do have a small amount enrolled.

development potential. The State makes up the difference in tax payments through appropriated funds every year, thus allowing towns to still benefit from full taxation. Since Current Use is funded by the State, all taxpayers essentially fund this program.

The primary objectives of the program have been to preserve Vermont's agricultural and forest lands, keep them in production, and achieve greater equity in property taxation based on use. Forty-six percent of the Region's total land is enrolled in some form of Current Use, and most of these lands are forested. Out of the total lands enrolled in Current Use, only 15 percent are agricultural lands. This is due to the program's strict definition of agricultural use. However, land that is enrolled as agricultural receives a significantly greater tax benefit than forest land. Both figures underrepresent land actually in agriculture and forestry, since not all owners take advantage of the program and some small farm operations are under the 25-acre threshold for the program.

Farmland Preservation

Preserving farmland is often achieved by utilizing a mix of programs that provide incentives for landowners to keep their land in farming and regulations that limit the impacts of development on the land. The most common nonregulatory method of farmland preservation is the purchase of agricultural conservation easements. While preservation efforts may begin at the local level, they often include organizations such as the Vermont Land Trust or the Upper Valley Land Trust, both of which work to actively conserve working lands in the TRO Region. The Vermont Housing and Conservation Board, which is the primary funder of land conservation projects in the State, may also play a critical in role in local farmland preservation efforts.

Municipal regulatory methods use zoning and/or subdivision rules to regulate the location, density, and design of development within selected areas to protect farmland. Regulatory methods include:

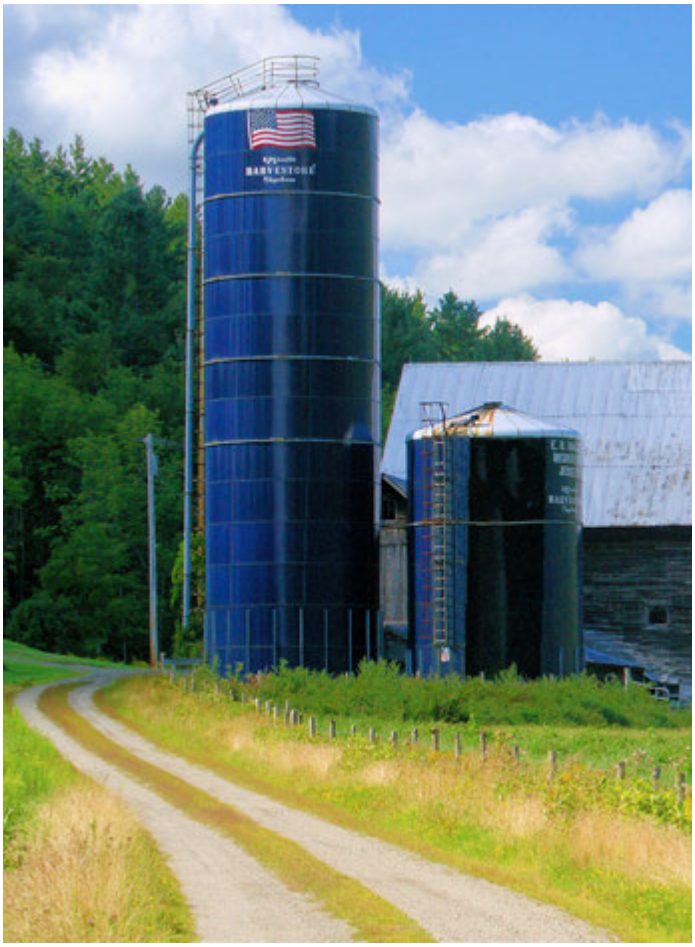
- **Overlay/Special Districts –** Overlay districts can be based on maps of open areas or agricultural soils. Within the overlay, additional standards apply to the underlying district and can be used to exclude development on farmland or to impose resource protection standards. Special districts are very similar, but there is no underlying district, and the district usually is based on general areas where agricultural lands are present and not the specific outlines of such lands.
- **Large Lot Zoning –** A crude but somewhat effective tool, zoning for certain districts can require a very large minimum lot size that is good for resource-based uses, such as farming or forestry, and helps to discourage residential development. However, it can also simply result in a pattern of very scattered, low-density development.
- **Density Provisions –** A more complex but effective solution than large minimum lot sizes is allowing a small minimum lot size paired with very low density provision. For example, instead of a district, where new lots would have to be at least 10 acres, with a 10-acre density, farmers or timberland owners could sell just a one-acre house lot and keep the remaining 9 acres as undeveloped and in production. This way, they can earn some income while preserving most of their land.
- **Conservation (Open Space) Subdivision Design —** Conservation or open space subdivision design is a subdivision design process wherein subdivisions are intentionally designed to protect rural character and open space, usually by concentrating development along the edge or in just one part of a large parcel. Towns can offer bonus incentives to do this so that developers would end up with more house lots than standard, but the overall effect would be less fragmentation of land. Both conservation subdivisions and meeting density provisions can be expanded by towns to apply not just within a parcel, but across

parcels. This could result in much more development on a single parcel/subdivision than would otherwise be allowed, but having much larger open lands retained in other areas.

Each of these methods has its own set of benefits and pitfalls and all of them should be thoroughly evaluated before they are implemented. However, there are many examples of successful regulatory land protection strategies in Vermont. The key to success is to ensure that the community supports the regulations.

Value-Added Products

Farm innovation and diversification is essential to sustaining our working landscape. Instabilities in traditional markets, such as dairy, mean that farmers need to embrace broader ways to utilize their farms and sell their products, such as direct-to-consumer sales, on-farm events, participation in farmers markets, agritourism, and the production of value-added products.



Farm in Granville | © John Knox

Direct-to-consumer sales represents a step away from the traditional model established by the dairy industry. As farms try to take advantage of the growing market for locally produced foods, they are often challenged by the perception that food should be cheap. The artificially low cost of our industrial food system impacts demand for local products. To counter this, farmers must improve consumer education, helping them recognize the broader benefits (social, economic, environmental, etc.) of buying locally and regionally produced food. Marketing and market development are key components to educating and encouraging new customers.

Utilizing on-farm assets to develop agripreneurial enterprises beyond direct food production is a way to increase sustainability and encourage economic growth. For example, many farms are experimenting with on-farm events such as weddings, farm stays, concerts, or festivals, as well as joint retail or processing of area farms' products. Some farms have developed their own restaurants that take advantage of the types of food produced on the farm and other local farms to create seasonally developed menus that focus on fine dining.

Farming itself is exempt from local land use regulations per Vermont statute, but many of these new types of nontraditional commercial uses can be regulated, at least to a certain extent. Legislation passed in 2018 expanded protections to "accessory on-farm businesses" so that towns cannot prohibit them. As farmers develop these new markets, land use regulations will need to be revised to address them, balancing the impacts of these potential uses with the need to support these new innovations. It should be noted that farming operations that are not regulated by towns are still subject to state rules on water quality and in most cases will comply with zoning setbacks.

It is important to recognize that the "value-added" concept in agriculture goes beyond

the development of products or services. When approached in an ecologically sound manner, farming adds value to our ecosystem. Regenerative agriculture techniques such as permaculture and holistic management utilize a range of approaches, including maintaining a high percentage of organic matter in soils, minimum tillage, biodiversity, composting, mulching, crop rotation, cover crops, and green manures, to improve soil health and biodiversity. By utilizing ecologically sound farming techniques, farmers are adding value to the lands in our Region by improving their health. This has broad benefits from an ecological standpoint, but it also allows for more sustainable agricultural production.

C. Forestry

Vermont is one of the most heavily forested states in the nation, with 4.6 million acres, 75 percent of its lands, covered in trees. The Two Rivers-Ottauquechee Region is emblematic of this and is situated within the larger northeastern forest corridor, which contains the Green Mountains (running down the spine of Vermont), the Adirondack Mountains (in eastern New York), and the White Mountains (in western New Hampshire). Accordingly, two famous hiking trails run through the TRO Region: the Long Trail (which stretches from the northern to the southern border of Vermont) and the Appalachian Trail (which cuts a path between Georgia and Maine).

Forestlands in the Region are widespread except in open bottomlands along rivers and in the agricultural centers from Randolph to Tunbridge. Forests are owned by the federal, state, or even local governments, but most forestland is owned by private individuals and companies. Some of the private properties have been conserved with the assistance of local land trusts (for example, the Vermont Land Trust or the Upper Valley Land Trust), while many others are enrolled in the State's Use Value Appraisal Program (UVA or "Current Use").

Healthy forests provide a significant number of benefits to our communities. Environmental services of forests include clean water supply, clean air, mitigation against climate change, wildlife habitat, and biological diversity. Economic benefits of forests include tourism, recreation, and raw supply for the wood products industry.

As can be seen from Figures 5-2 and 5-3, most of the parcels in the Region are 5 acres or fewer, with only 5 percent having 100 acres or more. However, this relatively small number of large (100+ acres) parcels contain more than half of the land in the Region. The data indicates that the number of parcels in the 50-200 acre range that are being subdivided into parcels of 2-25 acres is increasing.

Challenges

Forest Fragmentation

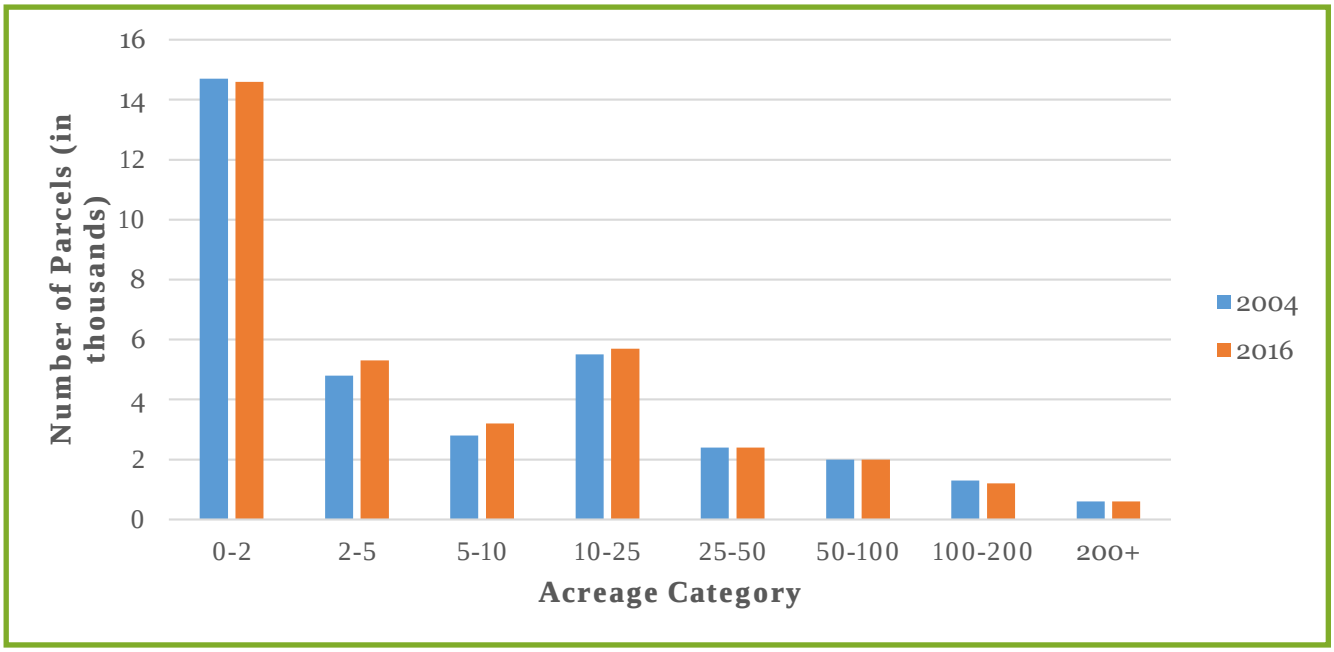
Vermont had long been gaining overall forest as fields reverted to woods, but that has now peaked. The 2013 U.S. Forest Service's national Forest Inventory and Analysis (FIA) program report indicates that since 2007 there has been a continuing, though gradual, loss, totaling about 75,000 acres of forestland in Vermont as forests are converted to developed land. Of even greater concern is the fragmentation of lands that are still forested, causing many of these lands to lose ecological functions and also to be harder to manage for forestry.

The 2015 Vermont Forest Fragmentation Report identifies the following causes of loss of forest:

- Escalating land prices
- Increased property taxes
- Conveyance of land from aging landowners
- Exurbanization (the trend of moving out of urban areas into rural areas)

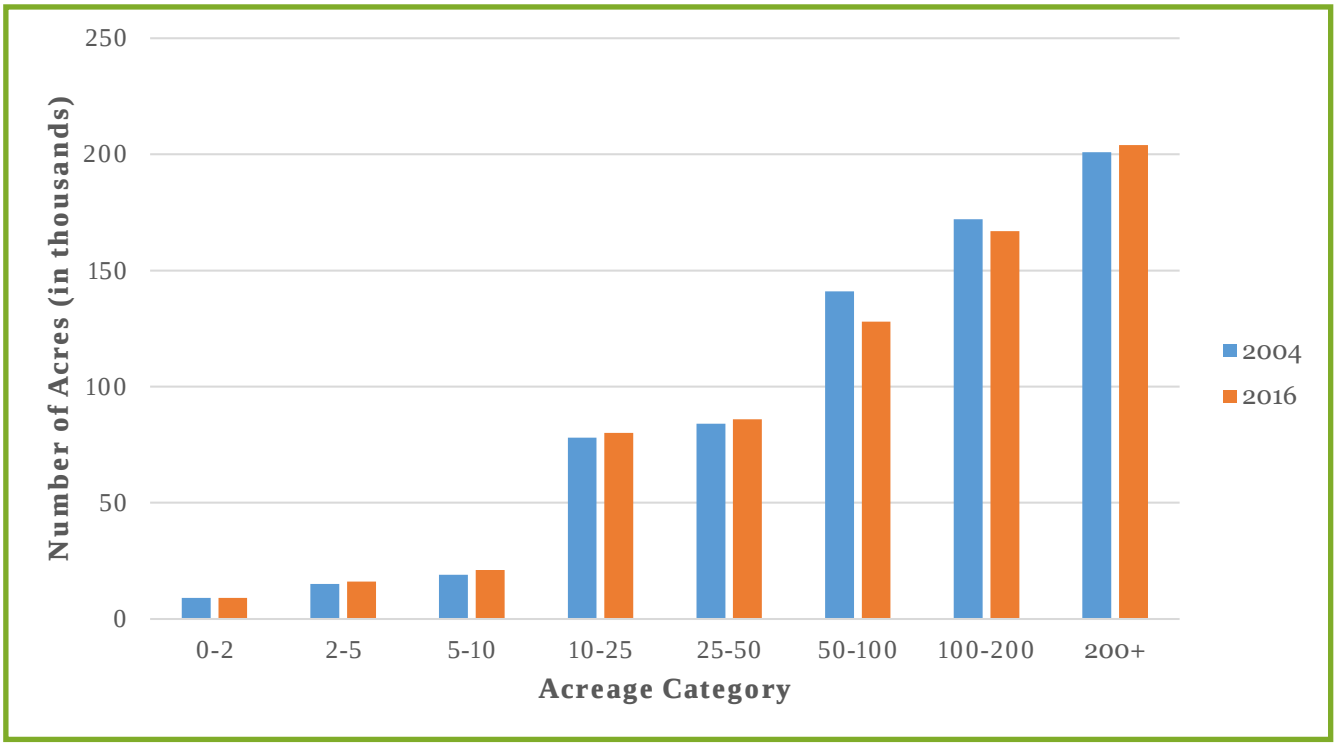
While development pressures have slowed in Vermont since 2010, the damage done to our forestlands has been significant, and statewide we are still losing 1,500 acres of forest a year.[6] In

Figure 5-2: Number of Parcels by Size, TRO Region



Source: Vermont Natural Resources Council

Figure 5-3: Number of Acres by Parcel Size, TRO Region



Source: Vermont Natural Resources Council

several of our communities (including Randolph, Hartland, and Brookfield), there are essentially no longer large, contiguous, forested areas to serve as significant wildlife habitat or to act as connections to larger areas of habitat. (See the Forest-Based Resource Areas section of the Land Use chapter for more on this subject.)

Changing Forest Economy

Forest product manufacturing and recreation represents a significant economic driver in Vermont. In 2011, the wood manufacturing industry generated over $1.4 billion in economic benefit for the State, and during the same year, forest recreation (e.g., skiing) generated $1.9 billion. Since 2011, however, the forest industry has experienced several significant changes that threaten its viability. Due primarily to outside forces, paper mills in Maine, which were a significant buyer of low-grade pulp wood, have stopped operating. While there are opportunities for low-grade woods to be used in renewable energy generation, these have yet to materialize at a scale that offsets changes to the paper industry.

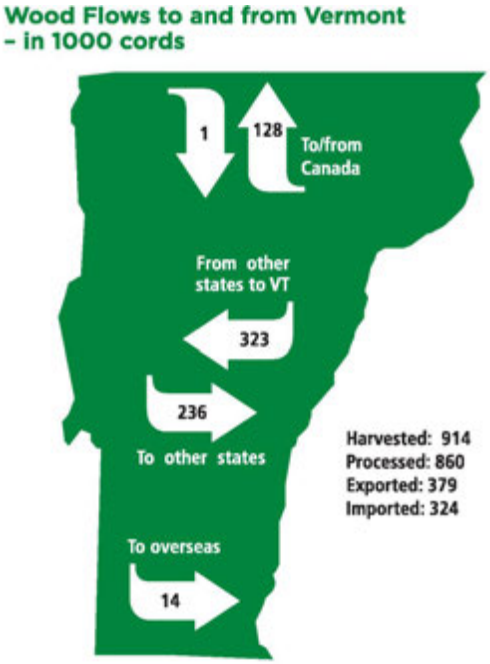
Changing Forest Health

As the pattern of climate change worldwide progresses, the habitat ranges of many North American species are moving north and to higher elevations. Forests are made up of complex webs of geology, climate, plants, fungi, and animals. Alterations in climate will affect not just animals, but also the trees that are the most visible aspect of forests. Tree species that make up our forests are expected to shift from the dominant hardwoods being maple, birch, and beech to oak and hickory. The habitat for the trees that we currently have is likely to shift 350-500 miles further north. Warmer climes will allow pests like the wooly adelgid (which can be killed off by cold) to become more prevalent and hurt hemlocks. Spruce will move up or out.[7]

According to the U.S. Environmental Protection Agency, in recent decades plants and animals have moved to higher elevations at a median rate of 36 feet per decade, and to higher latitudes at a median rate of 10.5 miles per decade. While animals can move faster than plants, some animals still can only move slowly and only if there is uninterrupted and suitable habitat. Grass and shrub species, including invasives, move faster than trees, which typically can only advance about 100-200 yards per year.[8] This is significantly slower than the rate habitats are shifting northward. While this climate shift means an expansion of range for some species, for others it means movement into less hospitable habitat, increased competition, or range reduction, with some species having nowhere to go because they are already at the top of a mountain or at the northern (or southern) limit of land suitable for their habitat.

Another separate, but related at times, threat to forest health is the spread of invasive species, primarily forest pest insects and diseases. Just as we lost our native chestnut forests and many of our elms, we now face pests to ash (emerald ash borer) and hemlock (wooly adelgid, mentioned above) that could decimate these trees. Many other pests and diseases are on the rise that also threaten maple, beech, and even oak.

Significant changes in our forest ecosystem will affect our current forestry management techniques and our forest economy. Even with sound ecological forest management practices, adapting to new forest species and combating invasive species will be challenging.



Source: North East State Foresters Association

Sharon | © John Knox

Challenges to Maintaining and Enhancing Our Forestlands

In 2011, TRORC formed a Forest Stewardship Committee to explore threats to forest stewardship in this Region and develop strategies to maintain and enhance our forestlands in the future. The Committee comprised forest landowners, consulting foresters, loggers, and members of local forest health organizations, such as the Linking Lands Alliance and the White River Partnership. They identified the following as this Region's top three threats to forestry:

1. The lack of personal and cultural connections to forests in general, actual forested lands in Vermont, and the many forest products we use and take for granted on a daily basis.
2. The lack of a "buy local" forest products movement, or lack of successful branding/marketing techniques for forest products.
3. The decreasing number of manufacturing or wood processing sites in Vermont, which has resulted in Vermonters shipping more raw materials out of state to become finished products.

Solutions

Support Current Use

As with agriculture, one of the key State-based efforts to maintain forestlands across Vermont is the Current Use Program. Funding of the Current Use Program has been identified by the Northern Forest Lands Council as vital to ensuring that landowners do not overharvest their forests or opt for liquidation cutting of tracts. In their study that used cost data, stumpage prices, and taxation scenarios, the Council concluded that timber management is only profitable at very low annual taxes ($2 per acre) and even at that level, only the better sites are profitable. In addition to the problem of high property taxes, forest landowners must grapple with the fact that property taxes are assessed on a yearly basis, and unlike most agricultural crops, timber harvests are not an annual event (indeed, they are usually set apart by decades). In addition to the tax benefits of the program, those lands in Current Use that are forested require a forestry management plan. The maintenance of these plans contributes to the overall health of our forests. Of the total lands in Current Use in the TRO Region (380,681 acres), the vast majority (321,765 acres) of them are enrolled as forestland.

Reduce Parcelization of Forests

A sustainable and economically viable forest products industry clearly depends on the availability of harvestable wood. Protecting forestlands from parcelization is a key component of maintaining forestry in our Region. This can be done through nonregulatory and regulatory means.

- Conservation Planning – As part of a local planning process, communities can identify the extent and location of forest resources, prioritize which areas are suitable for resource protection, and recommend

strategies for conserving these lands. This Plan takes a similar approach through the identification of Forest-Based Resource Areas in the Land Use chapter.

- Estate Planning — Municipalities can encourage landowners to engage in estate planning so that forestland can be maintained across generations, thus reducing the future threat of subdivision due to a death in the family, an unforeseen illness, or other events.
- Land Conservation – Municipalities can be involved in the land conservation process through the development of a conservation fund (generally managed by a conservation commission with oversight from the selectboard) that acts as a savings account that can be used to help conserve land.

Regulatory methods, such as those mentioned earlier in the chapter for agricultural lands, can similarly be applied to forest lands.

New Forest Product Markets

With changes to the forest industry throughout Vermont, it will be necessary to support programs and initiatives like the Forest Products Value Chain Investment Program (a collaboration between the Vermont Sustainable Jobs Fund, the Northern Forest Center, and the Vermont Working Lands Enterprise Board) that seek to enhance the economic competitiveness of the forest products industry in the Region by exploring ways to access new markets outside the State, developing new products that could be produced using Vermont wood, encouraging innovation, and facilitating collaboration among industry members.

Encourage Ecologically Sound Forestry Management Practices

Just as farms can be managed in a way that improves soil health, forests can also be managed both for fiber production and to improve habitat and maintain water quality. In order to effectively manage our forestlands in an ecologically sustainable manner, it will be necessary to properly educate landowners and the foresters who manage their lands as to what the best management practices are. Focusing on methods that support and improve biological diversity and forest vitality will help maintain good forest function.

Goals, Policies, and Recommendations: **Working Landscape**

Goals

1. Forestlands provide native species with adequate and varied habitat under a changing environment and threats from invasive species.
2. Agriculture and forestry continue to preserve, reinforce, and revitalize the best characteristics of the Region's landscape and communities while also improving soil and forest health.
3. A dynamic diversity of businesses based on farming and forestry provide food and fiber for our citizens and jobs and prosperity in our rural communities.

Policies

1. To improve timber stands and provide some value to forest owners, new thermal/ renewable energy generation systems, from residential to village scale, that utilize sustainably harvested, low-grade woody biomass are encouraged.
2. Local and regional marketing and value-added industries to improve the economies of farm and forest operations are encouraged.
3. Forestry practices shall maintain or enhance the diversity of ecosystems existing in the Region.
4. Businesses that are sited and designed in accordance with this Plan and promote the local processing, sale, and distribution of native raw materials and products are encouraged. Planning and regulatory review at the state and local levels should not unduly restrict the development of such commercial operations, which complement farming and forestry.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Working Landscape**

Policies (continued)

5. To minimize point and non-point source pollution, loggers and foresters must use Accepted Management Practices (AMP) and are encouraged to implement Best Management Practices (BMP) in their operations; farmers must meet state standards for Required Agricultural Practices.
6. It is the policy of TRORC to minimize or mitigate the loss of agricultural and silvicultural lands to development. When on-site protections are not able to be reasonably done to protect future agricultural or silvicultural use, TRORC endorses off-site mitigation techniques to offset the loss of these resources when it provides an equal or greater public benefit than conservation of the development site itself.
7. Where agricultural and forested lands are identified, clustered or peripheral development is required to protect such resources and prevent fragmentation and sprawling settlement patterns.
8. Contiguous forest and significant agricultural areas form the separations between town centers, villages, and hamlets and shall remain largely in non-intensive uses unless no reasonable alternative exists to provide essential residential, commercial, and industrial activities for the Region's inhabitants.
9. TRORC strongly supports property tax reform efforts at the local and state levels that would reduce the costs of land ownership for farming and forestry, while protecting against the Current Use Program's use as a low-cost vehicle for speculative holding of property for future development.
10. The construction of utilities, roads, or other physical modifications should skirt tracts of productive agricultural and forest land rather than divide them.
11. The use of public or private funds for purchase of development rights, or fee purchase of agricultural and forest land for conservation purposes from willing landowners, is supported and should be promoted. Town officials and landowners are encouraged to work with private nonprofit conservation organizations to identify options, and when conserving farms or forests, owners and conservation organizations are encouraged to also consider if other regional or local goals such as housing, production of sand/gravel, and increased employment can also be satisfied on such lands.
12. Septage, sewage sludge, and any other product of municipal waste processing shall not be applied or injected upon agricultural and forest lands without consistent chemical component testing of both disposal material and receiving medium for potentially harmful substance concentrations.
13. Efforts to revegetate streambanks eroded from natural or human activities are supported.
14. TRORC recognizes that certain local land development or subdivisions may conflict with policies to minimize the loss of existing or potential agricultural or forest resources. Furthermore, TRORC acknowledges that in certain areas, agricultural or forestry uses may no longer be viable due to a variety of factors, including:
    a. The existence of or planning for roads or sewers in the immediate area that dictate that involved land should be converted to more intensive uses; and
    b. The presence of parcel sizes or site conditions that affirm that conservation efforts to minimize loss of the resource result in marginal public benefit.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Working Landscape**

Recommendations

1. TRORC, as part of its ongoing Technical Assistance Program, will provide planning advice and support to town planning commissions, conservation commissions, nonprofit conservation organizations, and other groups interested in sustaining agriculture and forestry.
2. The Natural Resource Conservation Service, Conservation Districts, University of Vermont Extension, and others should continue efforts to educate landowners as to the benefits of maintaining and improving streambank vegetation and shoreline buffer.
3. The State and others should strengthen programs that are designed to provide new farmers access to farms and farmland, as well as programs designed to assist retiring farmers with the transition to a new generation.
4. Streambank stabilization erosion control projects to protect farmlands from erosion should use vegetation and other natural materials when practical to protect wildlife habitat and water quality as well.
5. Invasive species that threaten forestry and agriculture should be closely monitored by state and federal governments, and education and prevention methods shared with landowners.
6. In order to keep land in production, the State should work to ensure that there are price supports, better marketing, or other mechanisms so that producers of food and fiber are able to be assured they will at least get paid their production costs.
7. Local land use planning should consider the following as ways to promote agriculture and forestry:
    a. Agricultural zoning
    b. Cluster development
    c. Impact fees
    d. Overlay districts
    e. Performance standards
    f. Purchase of development rights
    g. Transfer of development rights
8. To promote a better understanding of farming and forestry practices, and natural resource management in general, the industry, conservation organizations, public schools, and the tourism and recreation industries should sponsor continuing educational opportunities to the public.
9. TRORC should organize a regional committee of stakeholders to focus on how TRORC can support the local agriculture and forest products industries.
10. Towns should set up a town fund for conservation purposes to purchase lands or easements outright that are important to the town, or to leverage other public funds or donations for conservation purposes.

Working Landscape: Agriculture and Forestry Endnotes

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NATURAL RESOURCES

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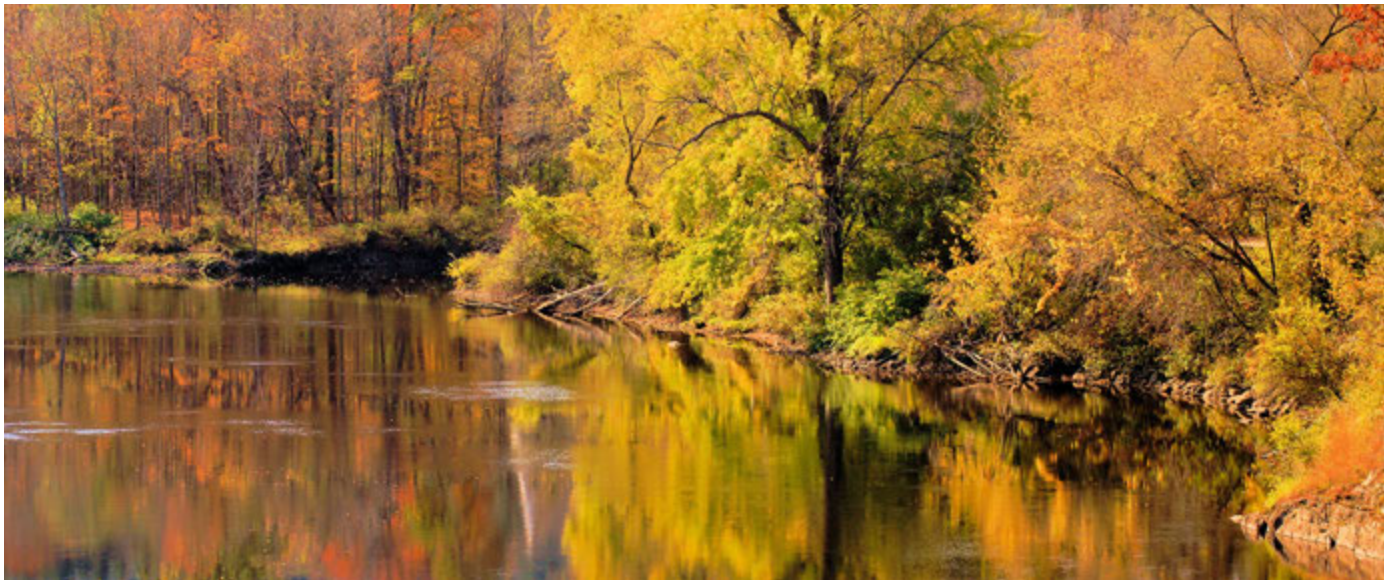


Newbury | © John Knox

A. Introduction

Town Plans throughout the Region express a universal desire to maintain the rural character of their communities while allowing appropriate, compatible development. An essential part of the rural character is the quality and quantity of natural resources of the Region. This character is appreciated by residents and is a primary attraction to tourists, retirees, second home owners, and potential residents. The place and the natural resources that are its foundation are therefore important economically as well as ecologically.

Most of the Region is hilly, with the highest portions along the western edge of the Region in the spine of the Green Mountains and in central Orange County. The lower hills are predominantly covered in deciduous forest that is largely maple, while higher and northern slopes have conifers such as white pine and hemlock. Given the Region's geologic formation and glaciation, it is not surprising that most of the valleys run north-south. Virtually the entire region drains south and east down these valleys to the Connecticut River. Seven rivers—the Connecticut, Ompompanoosuc, Ottauquechee, Tweed, Waits, Wells, and White—form the aquatic arteries of the Region. Along the rivers, especially the Connecticut and branches of the White, valley floors are large and fertile enough to have supported centuries of agriculture.

The diversity of plant and animal life within the Region are indicators of the health of the overall ecosystem to which all natural resources and human welfare are connected. Herbaceous and woody plants in the Region provide us with a myriad of benefits. Trees alone supply us with fuel, lumber, air and water filtration, carbon sequestration, scenic beauty, and that sweet sign of spring, maple syrup. Healthy wild animal populations provide us with opportunities including hunting and bird-watching and services such as pollination and pest control. Healthy surface waters support diverse aquatic plant and animal life and provide safe and beautiful areas

for swimming, boating, and fishing. Wetlands and large forested areas provide habitats for a variety of species native to Vermont and form a natural means of recharging groundwater for the health of the human inhabitants of the Region. The air gives us one of the basic needs of life.

Due to the rural nature of the Region and Vermont, the Region's natural resources are in better condition than in many of the other regions of the country, but they are vastly different from pre-settlement conditions. The topography has changed little, but rivers have been dammed and moved aside in valleys, and enormous swatches of wetlands have been filled. Virtually all of the timber has been cut over at least once, and immense amounts of soil have washed down from the hills. Native animals such as wolves and catamounts have been extirpated, trees such as chestnut and elm drastically reduced, and fish species such as Atlantic salmon almost lost. Still, we are left with fertile valleys, a returning forest, and many species of wildlife in healthy populations. If we can retain enough of our natural resources in good condition, then the place we cherish will continue to function as an ecosystem, a source of livelihood, and an integral part of the character of Vermont.

B. Groundwater

Background

Virtually all of the Region relies upon groundwater for domestic and commercial water supply. Protecting the primary water supply of the Region requires protection of the groundwater from contamination. Given the limited budgets of our communities, it is fiscally prudent to thoroughly review and prevent potential threats to groundwater before they occur. Protection of groundwater requires protection of surface waters, wetlands, watersheds, and recharge areas in a coordinated, ecologically sound fashion.

The groundwater that supplies public and private wells is pumped or pushed to the surface from an underground aquifer. An aquifer is an underground area of saturated sand, gravel, or fractured bedrock that is permeable enough to yield water though wells or springs. The surface area that drains into an aquifer is called a recharge area. Water tables are typically shallow, soils are thin except along valley floors, and fractured crystalline bedrock provides little in terms of filtration. The minimal groundwater data available in Vermont makes it difficult to distinguish, map, and protect vulnerable groundwater resources across the State.

The quality of the groundwater in the Region is generally good; however, there is potential for groundwater quality problems. Contamination sources of concern include old industrial and town solid waste disposal sites, leaking underground storage tanks, continuing use of improper industrial floor drains, accidental fuel or chemical spills, poor agricultural practices, road salt, natural nutrient runoff, and failed septic systems.

Many hazardous sites have been identified, and some cleanup actions and enforcement are taking place. Contaminated sites in need of public assistance can be assessed and brought back into productive use with public assistance from the state and regional brownfields programs with landowner permission. In the case of sites contaminated by oil products, new underground fuel storage tanks are much less prone to leaking, and sites must be tested for contamination when old tanks are removed. The State does have a Petroleum Cleanup Fund that helps pay for any cleanup at these sites. Though still too common, existing floor drains at industrial sites and garages are being either sealed or connected to treatment or capture systems that keep contaminants out of the groundwater. Fuel spills from rail or trucks are much more likely than a spill of any other toxic substance and are generally small. Well-trained and equipped road crews and fire departments are the best initial defense against a major spill becoming a groundwater nightmare.

Pesticides, herbicides, phosphorous, and nitrogen from manure can also infiltrate into groundwater. Proper use and storage of farm chemicals and manure can greatly reduce any negative effects on groundwater and limit impacts to surface water.

The hundreds of tons of salt brought into the Region each year for use on winter roads is a recognized ongoing groundwater threat. It is the salt leaching from uncovered storage piles that is a groundwater concern, which Vermont and the Environmental Protection Agency are in the process of addressing. The actual use of salt on roads is a surface water issue, however.

Lastly, there are failed septic systems. Many residential systems in Vermont were installed prior to regulation and have long since ceased to keep septage out of the groundwater. Some "straight-pipe" systems, where waste is directly discharged to a wetland or stream, are still probably unwittingly in use. Prior to the 1990s, systems may have been properly designed but not correctly installed, as the auditing of installation was very weak. Until 2002, many systems on lots over 10 acres were still exempt from regulation. The passage of the 2002 Wastewater System and Potable Water Supply Rules closed the 10-acre loophole, increased scrutiny of permits and installation, and eliminated the occurrence of groundwater pollution from new septic systems.

Goal, Policies, and Recommendations: **Groundwater**

Goal

1. The quality and quantity of groundwater resources are maintained or enhanced.

Policies

1. Commercial water withdrawal must be carefully monitored by the State and shall not lower aquifers and impact surface waters.
2. The Agency of Natural Resources will carefully review land use activities that potentially threaten groundwater quality, including the following:
    a. Underground storage tanks for petroleum or other hazardous substances. Permits are required from the State for most underground storage tanks containing gasoline or heating oil; however, exceptions are made for fuel oil storage tanks used for on-premises heating purposes and residential tanks storing motor fuel.
    b. Pesticide and herbicide applications on agricultural land, golf courses, resorts, residential properties, and railroad and utility rights-of-way.
    c. Junk yards and solid waste disposal sites.
4. Groundwater contamination from commercial and industrial uses must be remedied by the parties causing such contamination with assistance from regional, state, and federal sources when responsible and viable parties cannot be found.
5. It is the policy of TRORC to permanently protect Class I groundwater. These are high-quality resource areas mapped by the Agency of Natural Resources and so classified by the Secretary as currently being used or suitable for a public water supply source. In undertaking the above, regional land use policy and decision making should limit human activities in these areas.

Recommendations

1. TRORC will work with the Agency of Natural Resources and with towns to identify and map aquifers and aquifer protection areas.
2. Towns are encouraged to develop Source Protection Plans for public water supplies or aquifers that have been identified. Such programs may include limiting or prohibiting development and other land uses within wellhead or aquifer protection areas.

Goal, policies, and recommendations continued on next page

Goal, Policies, and Recommendations: **Groundwater**

Recommendations (continued)

3. The Legislature must keep the Petroleum Cleanup Fund at a level sufficient to meet all cleanup needs, including enforcement.
4. TRORC will work with the Agency of Natural Resources, town officials, and others on educational outreach about the proper use of floor drains and local spill response capacity.
5. TRORC will coordinate with the Agency of Natural Resources, other state agencies, and local officials in the assessment, cleanup, and redevelopment of contaminated (brownfield) sites.
6. TRORC will assist towns when requested to identify, monitor, and protect important local groundwater resources as part of their planning programs. Aquifers, public water supplies, and recharge areas should be mapped whenever possible in order to determine critical areas for protection of drinking water supplies.

C. Surface Water

Background

The surface waters of the Region are important resources for economic vitality and physical health. High-quality surface water attracts users and provides a source of direct and indirect livelihood for many of the Region's residents through various businesses related to sports and tourism.

The high quality and largely natural character of the surface waters are among the primary components of the quality of life deemed valuable to the Region. Surface waters are integrated with groundwater, land cover types, and land uses and should be considered in any decisions affecting those elements.

Water Quality Standards, Classifications, and Designated Uses

The Vermont Water Quality Standards (VWQS) are rules that concern surface waters throughout Vermont. They have been established to achieve the goals of the Vermont Water Quality Policy as well as the objectives of the federal Clean Water Act, which relate to the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. The VWQS, which were last updated in 2016, contain certain numeric and narrative criteria that describe the classification of all waters based on designated uses. Water quality classifications (A1, A2, B1, and B2) are administered by the Vermont Department of Environmental Conservation (DEC) which establishes water quality goals for each body of water in the State. These goals include protecting and enhancing the quality, character, and usefulness of surface waters; maintaining the purity of drinking water; controlling the discharge of wastes to waters; preventing degradation and preserving high-quality waters; and assuring maintenance of water quality to sustain existing aquatic communities. It is important to note that the classification assigned to any specific body of water does not necessarily represent a description of the existing conditions or quality of waters but may be a goal for improvement. A goal for lower quality than what presently exists is essentially illegal, except for minor impacts in very limited circumstances and only after a rigorous public benefit analysis.

The State's waters are currently classified as Class A1, A2, B1, or B2 with an overlay Waste Management Zone in Class B2 waters for public protection downstream of sanitary wastewater discharge points (10 VSA Chapter 47). Each classification is managed for specific designated uses. The same body of water may contain different classifications for different uses. Designated uses include aquatic biota and wildlife; aquatic habitat to support aquatic biota, wildlife, or plant life; swimming and other

primary contact recreation; boating; fishing; aesthetic condition; public water source; and irrigation of crops and agricultural uses. All waters of the State are required to be fishable and swimmable under state and federal law since 1983, and the gradations between A1 and B2 have to do both with the use of the water and its quality. B2 waters are the lowest legal classification, and most waters were placed into this classification when the Water Quality Standards were updated in 2016.

Class A waters are managed for enjoyment of water in its natural condition, as public drinking water supplies (the A2 classification is exclusively reserved for this use, and it includes the disinfection and filtration of waters) or as very high-quality waters in excellent condition that have significant ecological values. Class B1 waters are managed as waters that are in very good condition. The Secretary of the Agency of Natural Resources may designate by permit portions of Class B waters as "Mixing Zones" or "Waste Management Zones" for any waste that has been properly treated to comply with federal and state effluent requirements. Within a mixing zone or waste management zone, water conditions must not create a public health hazard; must not constitute a barrier to the passage or migration of fish or result in undue adverse effect on fish, aquatic biota, or wildlife; and must not interfere with any existing use of the waters.

Most waters in the Region are now classified as Class B2, with the exception of all surface waters above 2,500 feet elevation that are classified as A1. Other surface waters classified as A1 include waters within the Breadloaf Wilderness Area of the Green Mountain National Forest, surface waters within the Joseph Battell Wilderness Area of the Green Mountain National Forest, Bingo Brook in the White River watershed, Smith Brook in the White River watershed, and Beaver Meadows Ponds in the White River watershed. A few reservoirs and sections of tributaries have been classified as Class A2 and are designated as secondary sources of drinking water for the towns in which they are located.

Texas Falls, Hancock | © *John Knox*

All newly classified B2 waters that were previously simply Class B will be reviewed against the Vermont Water Quality Standards, and those that meet or could reasonably attain the criteria will be proposed for designation as A1 or B1 during the basin planning process. Nearly all of the Region's surface water will be placed into either A1 or B1 in the future, depending on the degree of protection desired and the actual quality.

An additional designation of Outstanding Resource Water can be decided by the Agency of Natural Resources. There is currently only one "outstanding" water resource in the Region: the Great Falls of the Ompompanoosuc River, located in Thetford. The main stem of the White River has been proposed as a prospective outstanding resource water because it is undammed.

In classifying the surface waters of the State, the Agency considers any adopted basin plan, existing

uses, background conditions, and the degree of water quality to be obtained and maintained. Recommendations for use reclassifications are made during the tactical basin planning process of each watershed. The Agency, on its own motion or in response to a petition, will review an established classification to determine if it is contrary to the public interest and, if so, what classification is in the public interest.

Sources of Water Degredation

Non-point pollution sources are the greatest cause of water quality impairment in rivers and streams now that the State has completed the building of public wastewater treatment plants and largely eliminated individual straight pipes. The four most common water quality impairments caused by non-point sources are siltation, thermal modifications, pathogens, and nutrients. Other common causes of impairment to rivers and streams are habitat alterations and flow alterations. The principal sources of these impairments are agricultural runoff, streambank destabilization and erosion, removal of riparian (streamside) vegetation, flow regulations or modifications (largely due to dams and withdrawals), stormwater discharges from developed areas, and highway maintenance and runoff. Specific sections of watersheds may be more affected by one of these factors than another. Known and suspected problems are often detailed in the DEC's basin assessments and the 303(d) List of Impaired Waters, but considerably more work is needed to identify problems in sufficient detail to undertake planning to address them.

In lakes and ponds, many recreational and development activities are also those activities that can threaten water quality. Shoreline development can cause erosion and sedimentation. Failing septic systems and poor agricultural practices contribute pathogens and phosphorous. Motorboats and trailers transport invasive species such as Eurasian water milfoil and zebra mussels. Intentional water level fluctuations from drawdowns harm bordering wetlands. Also, any entering rivers and streams can bring with them the above mentioned pollution.

Watershed Management and Basin Planning

A watershed or river basin is all of the land that drains into a certain point. The Vermont Watershed Management Division of the Vermont Department of Environmental Conservation has divided the State into fifteen basin areas, determined by the watersheds of major rivers and lakes, some of which actually combine the watersheds of two or more rivers that drain to different points for administrative reasons. The State has been required by federal law to adopt basin plans for decades, and state law requires that each of these plans be adopted by the Secretary of the Agency of Natural Resources. These plans have a duration of five years, and planning efforts typically commence one year prior to their expiration. TRORC is integrated into this basin planning process by statute.

The items that basin plans must cover are laid out by the Vermont Water Quality Standards and the federal Clean Water Act. Basin plans inventory the existing and potential causes and sources of pollution that may impair their surface waters and then establish a strategy to improve or restore waters. The plans form the basis for state implementation actions and should serve to coordinate stakeholders' efforts. In the development of plans, ANR seeks public participation to identify and inventory problems, solutions, high-quality waters, existing uses, and significant resources of high public interest and is required to consider approved municipal and Regional Plans. The plans will identify strategies, where necessary, by which to allocate levels of pollution between various sources as well as between individual discharges, and should, to the extent possible, contain specific recommendations by the Secretary of ANR regarding:

- Existing uses
- Fish spawning or nursery areas important to the establishment or maintenance of fisheries
- Reference conditions appropriate for specific waters
- Any recommended changes in classification and designation of waters
- Schedules and funding for remediation
- Stormwater management
- Riparian zone management
- Other measures or strategies pertaining to the enhancement and maintenance of the quality of waters within the basin

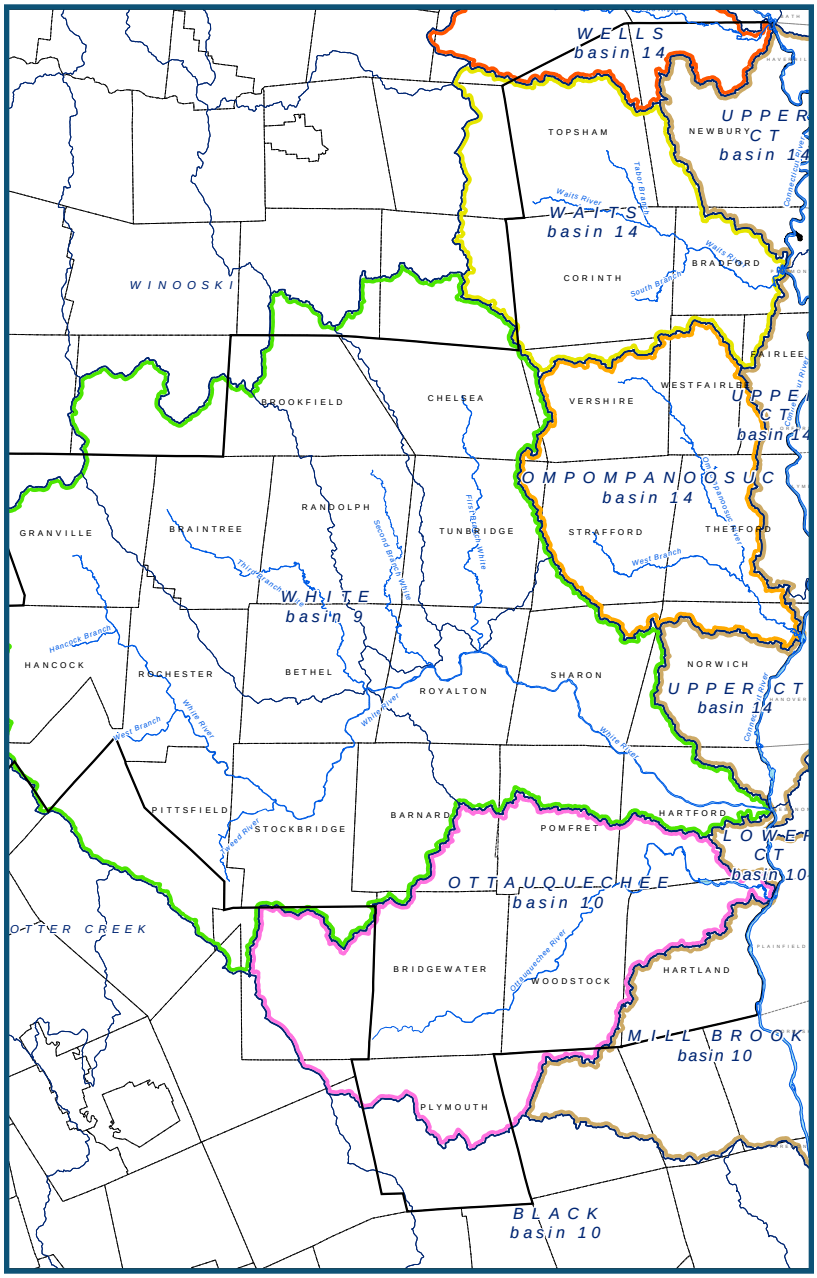
Tactical Basin Plans shall identify appropriate classifications for waters, including A1 for extremely high-quality waters and B1 for very high-quality waters based on existing and reasonably attainable uses as directed by water quality management goals.

Basins in the TRO Region include the Ottauquechee River, Black River, Lulls Brook, and Mill Brook (Basin 10); the White River (Basin 9); and the Wells River, Waits River, Ompompanoosuc River, and Upper Connecticut River tributaries (Basin 14). Very small portions of Otter Creek and the Winooski River are also in the Region.

The Watershed Management Division produces the State of Vermont Water Quality Integrated Assessment (305(b) report) every two years and the State Clean Water Strategy every five years, in which priority waters are targeted for remediation or protection. In the Region, several surface waters have been listed as impaired on the State's 303(d) list:

- Basin 9: White River Watershed
  - First Branch of the White River in Royalton, Tunbridge, and Chelsea
  - Second Branch of the White River in Royalton, Bethel, and Randolph
  - Third Branch of the White River in Bethel
  - Smith Brook in Randolph
- Basin 10: Ottauquechee Watershed and Connecticut River Tributaries
  - Neal Brook in Hartford
  - A small stream to the Ottauquechee River in Bridgewater

Figure 6-1: Watersheds and Basins



Source: Vermont Agency of Natural Resources

- Basin 14: Ompompanoosuc and Waits River Watersheds
  - Lords Brook and Headwater Tributary #2 in Strafford and Thetford
  - Tabor Branch Tributary #6 in Topsham
  - Schoolhouse Brook in Vershire and West Fairlee
  - Copperas Brook in Strafford
  - Cookeville Brook Tributary in Corinth
  - Pike Hill Brook in Corinth

In addition, there are numerous threatened and stressed surface water bodies in the TRO Region.

Shoreline Buffers and Riparian Areas

The maintenance and enhancement of streamside and lakeside vegetation is the easiest and most effective means of protecting the many benefits and values associated with surface waters. Setting aside unmowed areas of naturally growing grasses, shrubs, and trees is essential to the health of streams and lakes and to resource conservation. Appropriately vegetated shorelines contribute to the maintenance of water quality and shoreline protection because they:

1. Provide bank support and stabilization to reduce erosion
2. Help prevent bank undercutting and bank collapse
3. Provide food and shelter for fish, macroinvertebrates, and wildlife
4. Intercept, absorb, and filter out pollutants such as silt, fertilizers, toxic chemicals, and livestock wastes
5. Provide shade to keep water temperatures cool during hot summer months when fish are susceptible to heat stress
6. Slow surface water runoff
7. Increase wildlife diversity to include many amphibian, reptile, mammal, and bird species by providing habitat and travel corridors
8. Reduce flood and ice damage to stream channels, adjacent lands, and structures
9. Preserve the natural character of waters

The Connecticut River forms the eastern boundary of Vermont, and the entirety of the TRO Region lies within its watershed. The Connecticut River shoreline forms the border of the towns of Hartland, Hartford, Norwich, Thetford, Fairlee, Bradford, and Newbury. There are large sections of the shoreline area that have exhibited erosion. The Connecticut River features a major hydroelectric facility, the Wilder Dam, which is operated by Great River Hydro (formerly owned by TransCanada). The Wilder Dam's impoundment, or reservoir area, extends for 45 miles upstream to the Town of Newbury. The reservoir fluctuates daily as the owner of the facility increases the rate of water to the turbines to generate electricity during peak periods. However, the daily fluctuation, which can be up to five feet, can dramatically affect the shoreline areas of the Connecticut River. The rapid saturation and removal of water along streambank areas has caused erosion and the flooding of large areas along the Connecticut River, which impacts waterfowl nesting, fish habitat, transportation infrastructure, and private properties.

Kingsbury Bridge, Randolph | *© John Knox*

Goals, Policies, and Recommendations: **Surface Water**

Goals

1. Surface water quality and quantity for the purposes of recreation, aquatic habitat, and drinking water is improved.
2. A coordinated program for surface water quality and quantity is supported at municipal, basin, and regional levels.
3. High-quality waters, including fragile high-altitude waters, and the ecosystems they sustain are protected.

Policies

1. Maintenance or enhancement of recreation, fisheries, wildlife habitats, and quality aesthetics are high priorities. Water use decisions at all levels of government and the private sector shall protect these resources and their existing and desired uses and conditions.
2. Within each of the watershed basins in the Region (see Figure 6-1), state, regional, and local decisions relating to surface water must reflect:
    a. The public's high interest in the use and enjoyment of rivers and streams for recreation, fishing, and aesthetics
    b. Existing and projected growth rates for towns in each watershed, including towns within the Region, towns bordering the Region, and towns within each specific basin
    c. Present state water quality management plans and relevant portions of municipal and state plans
    d. Established environmental, social, and economic goals and policies of the Region as expressed in local plans and bylaws and this Regional Plan.
    e. Status of existing and proposed municipal and community wastewater treatment facilities, plans, and needs
    f. Existing water quality conditions and known public and private pollution sources
3. Efforts by public and private sectors to abate pollution in the Region's rivers, streams, lakes, and ponds are required. Existing water pollution problems, as identified in the Agency of Natural Resources' Basin Plans, the Water Quality Integrated Assessment (305(b) report), the 303(d) List of Impaired Waters, and the Vermont Surface Water Management Strategy shall be considered high priority for abatement.
4. Discharges to any water in the Region shall be based upon assimilative capacity studies. Allocation and use of limited assimilative capacity shall be based on the following priorities from highest to lowest:
    a. To abate pollution from existing and possible future sources
    b. To hold in reserve some capacity to account for any uncertainties in mathematical assimilative capacity estimates
    c. To accommodate new growth and development that is part of a detailed and publicly reviewed and accepted growth management plan or designated growth center
5. Class A1 and A2 waters shall be protected from development and other activities that diminish their purity, natural flow, or condition.
6. Vegetated buffer strips must be maintained in riparian zones and shoreland areas surrounding streams, rivers, lakes, and ponds. Rock rip-rap and retaining walls should only be used to the extent necessary and when bioengineering techniques may not be adequate to prevent significant loss of land or property.
7. Upland watersheds should be maintained predominantly in forest and low impact recreation use to ensure high quality of valley streams and their tributaries.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Surface Water**

Policies (continued)

8. Preservation of the natural state of streams must be encouraged by the:
    a. Protection of adjacent wetlands and natural areas
    b. Protection of natural scenic qualities
    c. Maintenance of existing streambank vegetation, which also supports wildlife habitat
    d. Proper classification that reflects the condition of high-quality waters in areas with little development
9. Given the statewide recreational resource value of the free-flowing White River, new hydropower development on that river shall not be consistent with this Plan, except where it can be done in a "run of the river" manner that does not affect the river flow volume and does not create any significant impounding or dewatering of bypass reaches.
10. All wastewater and stormwater runoff discharges into surface waters shall comply with water quality standards as administered by the Vermont Agency of Natural Resources (24 VSA Chapter 47 and related rules).
11. Municipalities must employ road maintenance techniques to prevent soil erosion and road surface deterioration. Towns need to use the procedures contained in the Vermont Better Backroads Manual (2009) and should work to implement Best Management Practices (BMPs) on hydrologically connected road segments to comply with the Municipal Roads General Permit.
12. Great River Hydro, and its subsidiaries, shall carefully maintain the ramping rates associated with its hydroelectric facilities to prevent erosion and loss of land along the streambanks of the Connecticut River.

Recommendations

1. Municipalities need to review existing and proposed water quality classifications of surface waters within town boundaries, or within basins, to determine if classifications meet the uses and needs. Both TRORC and the Agency of Natural Resources are available to provide support.
2. Municipalities must play an active role in the basin planning process and prepare water resources elements in municipal plans that are in compliance with state and federal laws.
3. The Vermont Department of Environmental Conservation's listing of threatened and impaired waters must be targeted for immediate attention by the Department.
4. Towns in the Region are encouraged to cooperate on a watershed-wide basis when planning for surface water quality and use.
5. TRORC, in cooperation with the Vermont Watershed Management Division, the Agency of Natural Resources, Vermont Local Roads Program, and the Agency of Transportation, should advise town officials on cost-effective road erosion and sediment control.
6. TRORC shall continue to participate in watershed and basin planning efforts.
7. Unless there are specific public benefits to lower classifications, the Agency of Natural Resources shall adopt the highest possible classification and uses for water bodies based on their actual conditions and uses or that which is reasonably attainable.
8. Public and private sectors should refrain from activities that spread invasive plants such as ill-timed roadside mowing, transporting invasive plants in ditch soil, and the cleaning of mowing and earthmoving equipment after working in an infested area. Road maintenance personnel should be trained to recognize the invasive plants on the Vermont Noxious Weed Quarantine List and Watchlist.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Surface Water**

Recommendations (continued)

9. The Agency of Natural Resources and local watershed groups are encouraged to monitor water quality, and when monitoring indicates a water quality violation, to promptly locate and address the source of degradation when possible.
10. In preparation for writing any basin plans, the Agency of Natural Resources must conduct a comprehensive assessment of water quality in such basins and identify the source(s) of any known water quality problems.
11. Proper erosion control procedures shall be applied in all construction activities, and all stormwater shall be treated through natural or mechanical systems to remove nutrients and sediments and to attenuate flood flows to natural levels before any stormwater reaches streams.
12. To protect high-quality forested riparian (riverbank, streambank, or lakeshore) habitat, towns should prohibit development near these areas and regulate the disturbance of vegetation in riparian zones through general, conditional use, and/or site plan standards.
13. The Agency of Agriculture, Food, and Markets must revise the Required Agricultural Practices to manage animal uses in buffer areas.

D. Fisheries and Aquatic Resources

The Region's rivers and streams provide cold water habitat for brook, brown, and rainbow trout, long nose and black nose dace, sculpin, smallmouth bass, and several other species of fish including Atlantic salmon, which are being reintroduced to the Region's rivers through state and federal efforts. Several bodies of water have been classified as warm water fish habitats, including Lake Pinneo in Hartford, North Hartland Reservoir in Hartland and Hartford, Lake Abenaki in Thetford, the Ottauquechee River from the North Hartland Dam to its confluence with the Connecticut River, Lamson Pond in Brookfield, Silver Lake in Barnard, a section of the Waits River in Bradford, Halls Lake and Harriman Pond in Newbury, and Lake Morey in Fairlee. In order to support native fish populations, both warm and cold water habitats must be able to provide adequate supplies of oxygen and support the plant, animal, and insect life on which fish populations feed. Also, because many cold water species return annually to the same breeding areas, waterways must remain open to fish migration.

In order for species such as the Atlantic salmon to thrive as they once did, habitat areas must be suitable to their survival. Warm temperatures, low flow levels, and contaminants can all threaten the success of salmon restoration efforts. Protection and restoration of habitat must precede reintroduction of species into the natural environment. Development or construction in and around rivers and streams can be harmful to fish habitat unless care is taken to prevent turbidity, sedimentation, decreased dissolved oxygen, and flow alteration.

The damming of streams to create ponds, either within a stream channel or drawing from the stream channel, can damage fish habitat by increasing water temperature, decreasing dissolved oxygen, encouraging nuisance algal growth, creating barriers to fish passage, and increasing the potential introduction of non-native species. All of these factors damage the natural ecosystem of the stream and decrease native fish populations.

Goals and Policies: **Fisheries and Aquatic Resources**

Goals

1. The water quality and quantity necessary to sustain existing aquatic communities is maintained.
2. The natural diversity, population, and migratory routes of fish are maintained or improved.

Policies

1. Manmade alterations to flows must ensure downstream protection of water quality and quantity for aquatic communities and stream functions and consider alternatives.
2. The design and construction of dams on rivers and streams, other than the White River where it is not consistent with this Plan, is discouraged except when the public interest is clearly benefited and the following criteria are met:
    a. Projects operate as "run of the river" and do not affect the flow of river volume.
    b. Fish passage and canoe portages are provided at dams.
    c. Water quality and minimum flows are maintained.
4. Because of threats to the natural ecosystem, the construction of ponds is discouraged, unless fed by groundwater and/or overland drainage. Discharges from ponds, if any, shall be designed to withstand a 100-year storm event and operate in a "run of the river" mode.
5. In-stream ponds are discouraged on all stream segments that support fish life.
6. Permanently vegetated streamside buffer strips of at least 50 feet on small streams and 100 feet on rivers should be preserved except in those areas with dense development in connection with existing similar development such as adjacent to, or infill of, existing downtowns or village centers. This does not include agricultural activities allowed by the State of Vermont's Required Agricultural Practices (RAPs).
7. New or replacement bridges and culverts must be adequately designed and constructed to handle stormwater, provide sediment transport, and accommodate fish and wildlife passage.
8. Bioengineered bank stabilization is the preferred method of streambank restoration. When rock armament of streambanks is necessary, efforts should be made to revegetate on top of the rock to reduce water temperature.
9. Fishing shall be considered an existing use in all waters of the State.
10. Increased public access to surface waters is the policy of TRORC.

E. Wetlands

Wetlands provide an array of functions and values that support environmental health and benefit humans. Benefits include flood and stormwater control, maintenance of surface and groundwater quality, open space and aesthetic appreciation, and fish and wildlife habitat (including a large number of threatened and endangered species). Wetlands are also important for recreational activities such as hunting, fishing, bird-watching, and photography.

Draining, filling, and development have resulted in the loss of more than 35 percent of Vermont's original wetland acreage, primarily due to agricultural and large-scale development projects. At present, roughly 4 percent of Vermont's lands are classified as wetlands, totaling 244,000 acres. The Vermont Wetlands Office estimates that an additional 80,000 acres of wetlands exist that have not been identified, bringing the actual total to about 5 or 6 percent of the State's land. The current rate of wetland loss in Vermont has been estimated at eight acres a year through incremental destruction by numerous smaller projects, many of which are less than one acre, with serious implications for short- and long-term wetland values. Although methods

exist for creating areas that have many wetland characteristics, it is not possible to replicate the intricate complexities of a wetland formed over tens or hundreds or thousands of years.

The State of Vermont defines wetlands as "those areas of the state that are inundated by surface or ground water with a frequency sufficient to support significant vegetation or aquatic life that depend on saturated or seasonally saturated soil conditions for growth and reproduction."

The State of Vermont defines wetlands as "those areas of the state that are inundated by surface or groundwater with a frequency sufficient to support significant vegetation or aquatic life that depend on saturated or seasonally saturated soil conditions for growth and reproduction." Such areas include but are not limited to marshes, swamps, sloughs, potholes, fens, river and lake overflows, mud flats, bogs, and ponds.

The Vermont Wetlands Rules (2017) (10 VSA Chapter 37) classify all wetlands into three categories. Class 1 wetlands are those identified as "exceptional or irreplaceable in their contribution to Vermont's natural heritage." No Class 1 wetlands have been designated in the Region. Class 2 wetlands are those shown on the National Wetlands Inventory, as well as any wetlands contiguous to these mapped wetlands. Most wetlands considered Class 2 have areas of at least three acres. Class 3 wetlands are those that have not been evaluated or are not considered by the Agency of Natural Resources to be significant. The Vermont Wetland Rules require a 100 foot buffer for Class 1 wetlands and a 50 foot buffer for Class 2 wetlands.

In addition to state protection, wetlands are also overseen by the U.S. Army Corps of Engineers, which has the responsibility of administering Section 404 of the Clean Water Act, which regulates the dredging or placing of fill into any wetland. The Environmental Protection Agency and the U.S. Fish and Wildlife Service have review authority over any Army Corps permit. Several other federal agencies, including the National Park Service and the Natural Resources Conservation Service (NRCS), administer grant programs that encourage the protection of wetlands.

In the TRO Region, just over one percent (1.2%) of the land area has been identified by the State of Vermont as "significant" wetlands, eligible for state protection under the Vermont Wetlands Rules. However, there are a large number of smaller wetlands that may qualify for protection. According to the Wildlife Management Institute in Washington, D.C., "ten one-acre wetlands provide habitat for many more duck pairs than does one 10-acre wetland. Small wetlands also thaw faster and provide more high-protein foods for nesting hens than larger wetlands." They are also critical in the flight paths of migrating mallards, pintails, teals, gadwalls, and shovelers. Forested wetlands have also been recognized as containing critical spring food sources for black bears and other species.

Wetlands are important feeding and breeding areas for a variety of plant and animal species. Certain freshwater fish species require wetlands as spawning grounds and as nursery areas for their young. Wetlands are also important for maintaining the quality of fish habitat by providing shade or discharging water from cold springs, both of which moderate surface water temperatures. Wetlands provide essential habitat for numerous wildlife species. The dense vegetation found in most wetlands provides a variety of foods and also nesting sites that are relatively safe from predators. Many species rely on wetlands for some or all of their life cycles, while for others, wetlands are important for a

part of their life cycle or during certain times of the year.

Wetlands provide necessary habitats for the survival of a high percentage of the threatened and endangered species in the State. Roughly 35 percent of plants and 21 percent of animals on the threatened and endangered lists are closely associated with, or are found exclusively in, wetlands.

A buffer zone is essential protection both for species in the wetland and for those species preferring the upland/wetland border. The trees and shrubs provide important food, cover, and nesting sites for large and small mammals, songbirds, reptiles, and amphibians. The vegetation also screens wetland wildlife from noise, light, and other human activities in adjacent uplands. Municipalities are encouraged to map and preserve wetlands and vernal pools, especially in large areas of undeveloped land, as crucial habitat areas for a variety of native plant and animal species. State officials at the Vermont Department of Environmental Conservation recommend a setback of at least 200 feet for wildlife habitat protection around wetlands.

The purpose of the Vermont Wetlands Rules is "to identify and protect significant wetlands and the values and functions which they serve in such a manner that the goal of no net loss of such wetlands and their functions is achieved."

Wetlands Identification

In order to be protected by Criterion 1(G) of Act 250, wetlands must be listed as significant by the State. Municipalities, TRORC, or other interested parties may petition the Agency of Natural Resources to (1) have a wetland reclassified to a higher or lower classification, (2) determine which functions make the wetland significant, (3) determine whether the size or configuration of a buffer strip associated with a significant wetland should be modified, or (4) determine the final boundaries of any significant wetland.

However, wetlands may be protected under several other sections of Act 250, including criteria dealing with water pollution (section 1), waste disposal (1(B)), floodways (1(D)), streams (1(E)), shorelines (1(F)), erosion control (4), natural areas and aesthetic considerations (8), wildlife habitat (8A), and public investments and facilities (9A), and under local and Regional Plans. TRORC recognizes the critical value of wetlands in relation to the health of the water, wildlife, and plant resources in the Region and to the ecosystem as a whole.

Vernal Pools

Vernal pools are temporary bodies of water that usually occur where small depressions, swales, or kettle holes collect spring runoff or intercept seasonally high groundwater tables. Although many vernal pools are small and isolated, they are often associated with more extensive wetland systems. In Vermont, most vernal pools occur in forested habitats, but they can also be found in meadows, sand flats, and river floodplains. It is estimated that each town in Vermont has at least one vernal pool.

Most vernal pools in Vermont are ephemeral, filled by spring rains and snow melt but dry during the summer. Some pools may become filled again in the fall and contain water during the winter, while others, during wet years, may contain water year round. Vernal pools are typically shallow (less than 3 feet deep) and can vary in size from just a few feet across to more than 150 feet in width. These habitats are safe breeding grounds for many amphibian and insect populations because they are not connected to stream systems and do not support fish populations.

Vernal pools provide important breeding habitat for amphibians, primarily the wood frog and Vermont's three species of "mole" salamanders,

and have characteristic populations of fairy shrimp, fingernail clams, snails, water fleas, and copepods. Since amphibians and many other species return to the same vernal pool each year to breed, destruction or alteration of vernal pools will result in the loss of local populations of some species.

Vernal pools are a unique and vulnerable habitat that must be identified and protected under municipal regulations. It is estimated that every town in Vermont has at least one vernal pool.

Because of their small size and temporary nature, vernal pools are not mapped very well, but they are now protected under the Vermont Wetland Rules as Class 2 wetlands. They are a unique and vulnerable habitat area. Scientists recommend a continuous forested buffer of roughly 500 feet around vernal pools.

Fens and Bogs

Fens and bogs are two rare natural communities found in the Region that are also host to several species of rare plants. Bogs typically receive their moisture from precipitation. Fens receive their moisture from groundwater resources. Whereas bogs tend to be found in areas with an acidic substrate, fens are usually found in areas of calcareous (limy) bedrock or till. Fens tend to have a diverse flora that includes many uncommon plants such as the showy lady's slipper (*Cypripedium reginae*). There are many important fens in the Region, and Fairlee hosts a "quaking bog." Most fens and bogs are identified by the Vermont Natural Heritage Inventory; however, towns are encouraged to identify and protect fens and bogs in municipal plans and bylaws as well.

Goals, Policies, and Recommendations: **Wetlands**

Goals

1. There is no net loss of wetlands that provide significant functions and values.
2. Critical natural communities such as vernal pools, fens, and bogs are identified and protected.

Policies

1. Significant wetlands must be protected from development by maintaining an undisturbed buffer strip of naturally vegetated upland of at least 50 to 100 feet in width (or wider according to the type of development and the wildlife species to be protected) around the edge of each wetland and by preventing runoff and direct discharge into wetlands.*
2. Development should not occur in wetland areas.
3. Vernal pools should be protected from development by establishing an overlay district that identifies vernal pools and their surrounding terrestrial amphibian habitat.

Recommendations

1. The State of Vermont must more accurately identify and map significant wetland areas not currently classified as Class 1 or 2 wetlands and petition the Agency of Natural Resources to have such areas reclassified at a higher level.
2. TRORC should work with towns to establish a priority list of wetlands for protection and/or acquisition.
3. The State should provide property tax relief incentives for the protection of designated wetlands.

Goals, policies, and recommendations continued on next page

**Rivers and streams should have wide naturally vegetated riparian habitat (for example, greater than 100 feet wide on at least one side of a river or stream that appears to connect habitat)*

Goals, Policies, and Recommendations: **Wetlands**

Recommendations (continued)

4. To protect wetland functions, native biological diversity, and the loss of habitat, towns should adopt zoning and/or subdivision regulations that discourage development near wetlands and vernal pools that are not already protected under state or federal law. They should consider restricting development within 500 feet of all wetlands in conservation districts.
5. TRORC supports and encourages community efforts to identify and inventory wetlands, including vernal pools, and to adopt mechanisms for their increased protection, including formal petitions to be shown on the Vermont Wetlands Inventory Map. This information can increase the effectiveness of the state and federal regulatory process.

F. Wildlife Resources

Wildlife habitat is defined as the physical and biological environment in which a particular species of plant or animal lives. Large wildlife species such as black bear, moose, deer, and bobcat, as well as large birds of prey and many varieties of songbirds require larger expanses of contiguous habitat to survive. In addition, large mammals serve as indicators of ecosystem health, so the health of one species may indicate the health of all. To maintain or improve the populations and diversity of these species, their habitat must be managed wisely and protected from unreasonable fragmentation and alteration. Wildlife of the Region is one of the primary attractions to the area and provides many of its citizens with direct and indirect livelihoods.

Wildlife management requires controlling human activities around animals as much as management of animals around human activities. Many wildlife cannot live where there is any amount of development, no matter how seemingly unobtrusive. Managing for specific species is not as desirable as managing for the entire ecosystem supporting the species. Parochial wildlife management programs usually manage for one species at the expense of others, while a more ecological approach is to ensure healthy habitat for all members of the food chain because they all have intrinsic value. Habitat that is productive for most species of wildlife in the Region requires a diversity of forest type and maturity. Forests that are carefully managed, for the benefit of both humans and animals, support older nut-producing trees, medium-sized trees for firewood, and an undergrowth of young trees and shrubs that provide food and cover for a variety of species. In addition, occasional clear-cuts, if done according to accepted management practices, can provide browse for moose, deer, and bear, and can be followed by planting trees such as oak. An Intent-to-Cut Notification must be submitted to the Vermont Department of Forests, Parks, and Recreation when a landowner plans to conduct a heavy cut of 40 acres or more.

Bird Habitats

Because of the diverse habitat types that range from the high elevation woodlands of the Green Mountain National Forest to the low grassland areas in the Connecticut River Valley, the Region is host to a variety of bird species, many of which depend on unique habitat areas in the Region for migration corridors, wintering areas, or breeding sites.

The Connecticut River Valley offers breeding habitat for a wide variety of birds and serves as a migration flyway for waterfowl and neo-tropical songbird species such as warblers and vireos. Many songbirds require wooded corridors for stopover sites during their annual migrations to and from the tropics. Grassland areas in the Valley are home to species such as eastern meadowlark, vesper sparrow, Savannah sparrow, upland sandpiper, and bobolink, some of which

Barred Owl at King Farm | *© Tory Littlefield*

have been declining in number in recent years. Rivers in the Region also provide important habitat for waterfowl such as snow geese and several varieties of ducks as well as herons and rails. Some sections of rapidly moving water in Bridgewater have been used by bald eagles during migration, and great blue heron rookeries are located in Hartland and Tunbridge.

High elevation areas (over 2,500 feet) support a unique assemblage of birds including Bicknell's thrush, Swainson's thrush, and blackpoll warblers. Cliff areas such as Eagle Rock in Vershire, the Palisades and Sawyer Mountain in Fairlee, and Vulture Mountain in Stockbridge are breeding areas for the endangered peregrine falcon. Wildlife biologists are well aware of the diversity of bird species in the Region; however, unlike deer and bear habitats, these important areas have not yet been thoroughly mapped.

Vermont occupies an important position in the conservation of North American bird populations. The diversity of Vermont's habitats, from northern hardwood and spruce/fir forests to farmlands and wetlands, support an equally diverse array of avian species. State endangered species and other species of concern have significant populations in Vermont. Conserving essential habitats for these species and others is the highest priority if we are to maintain Vermont's avian richness.

Important Bird Areas (IBAs) are sites that support significant populations of one or more species of breeding, migrating, or wintering birds. IBAs can be as small as two-tenths (0.2) of an acre or as large as thousands of acres, but usually they are discrete sites that stand out from the surrounding landscape. The identification and conservation of these important sites is a vital component of global efforts to sustain viable bird populations. In Vermont, seventeen IBAs and four IBA complexes (IBAs focusing on individual species at multiple sites) totaling more than 115 sites have been identified across the State.

Bird-watching is an important economic driver in this Region because of its unique habitat areas. According to the U.S. Fish and Wildlife Service, more than 66 million people over the age of sixteen spent over $38.4 billion in 2001 on trips and equipment for observation, feeding, and photography of wildlife in the United States. Communities can encourage birding and ecotourism and improve their local economies.

Mammal Habitats

Black Bear

The black bear is native to Vermont and is found primarily in remote, forested habitat. An estimated 5,400 black bear live in the State; they are a particularly good indicator of remote forestland. The mountainous, forested landscape we appreciate for recreation and beauty is the stronghold of bear; these animals will only exist as long as there is habitat to support them. Minimum habitat requirements must be maintained for black bear survival: adequate food supplies; forest blocks that meet home range needs; and connectivity to large blocks of forestland that serve as population sources. Simply conserving individual parcels

of land containing critical bear foods will not ensure a future bear population. If Vermont's forested landscape continues to be fragmented into progressively smaller, discontinuous units, the bear will likely decline and ultimately may disappear.

The Vermont Department of Fish and Wildlife has mapped two types of black bear habitat areas in the State: bear production habitat and seasonal bear habitat. Bear production areas are described as "generally contiguous and remote forestland, containing critical habitats necessary to bear survival." Production areas support relatively high densities of cub-producing females. Seasonal bear habitats are "regions frequently used by bears, including some cub-producing females. These habitats often contain critical seasonal feeding area and vital travel corridors." Bear production habitat covers much of the western part of the Region throughout the towns of Granville, Hancock, Pittsfield, and Plymouth, as well as sections of Barnard, Bridgewater, Braintree, Rochester, Stockbridge, and Woodstock. Seasonal bear habitat is also found in the eastern part of the Region throughout the towns of Corinth, Topsham, and West Fairlee and in sections of Bradford, Fairlee, Newbury, and Vershire.

Within bear production areas there are "critical habitat areas," which are defined by Act 250 as "concentrated wildlife habitat which is identifiable and is demonstrated as being decisive to the survival of a species of wildlife at any period of its life." Critical habitat for black bear includes hard mast stands (beech and oak), wetlands, and travel corridors within the production or seasonal bear habitat areas. However, such critical habitats have not been mapped.

According to the U.S. Fish and Wildlife Service, more than 66 million people over the age of sixteen spent over $38.4 billion in 2001 on trips and equipment for observation, feeding, and photography of wildlife in the United States. Bird watching has an underestimated and under-appreciated economic impact.

Deer

Deer wintering areas provide relief from harsh climatic conditions by providing protection from deep snow, cold temperatures, and wind chill. These habitats are characterized by a high degree of softwood cover (primarily hemlock), steep slopes, or areas that receive low snow accumulation, southerly or westerly aspects, generally moderate elevation, and low levels of human disturbance in winter.

The Vermont Department of Fish and Wildlife has been working to discover the habits and lifestyle of white-tailed deer during the past twenty years. Much of this effort has included the mapping of deer wintering areas. Overall, wintering areas have not changed significantly over time. Evidence shows that deer usually travel considerable distances to the same wintering areas. If habitat conditions are maintained, deer will utilize the same sites for a long period of time.

Residential, commercial, or industrial development that is within or adjacent to a deer wintering area decreases the amount of land available to deer and erodes a town's deer population, eventually decreasing the number of deer within the town. According to Department of Fish and Wildlife maps, deer wintering areas in the Region are widespread, with the largest concentrations existing in the towns of Bradford, Brookfield, Hartford, Norwich, Randolph, Royalton, Tunbridge, and West Fairlee.

Moose

The Vermont Department of Fish and Wildlife's 2010–2020 Big Game Management Plan contains objectives to allow for controlled growth of the moose population in most parts of Vermont and

to monitor populations to determine when and if population regulation is necessary. Modern moose management began in Vermont in 1992, followed by the State's first moose hunt in 1993, a hunt which has continued annually since then. During the 2008 season, 605 moose were harvested. Currently, Vermont's estimated moose population is 2,200.

Moose use different habitats during different seasons, preferring thick, brushy habitat for concealment and food. They have a large home range, often from four to ten square miles, making habitat management specifically for moose impractical. Critical habitat areas for moose include late-winter concentration areas, which include mature spruce/fir stands (older than 20 years) with nearby regenerating forests for food, wetland feeding areas, and salt licks.

Moose benefit from logging practices that create abundant browse (leaves, tender shoots, or other soft vegetation) on recently logged or burned land. A stable moose population relies on a balance of forest age classes. While moose and deer share similar habitats in non-winter months, there is not sufficient evidence to suggest that an increase in the population of one will cause a decrease in the population of the other. There is some concern, however, that larger deer populations will increase the likelihood of moose contracting the brainworm that is carried by deer but has a deleterious effect only on moose. Another concern for moose in the area is the presence of winter ticks. Winter ticks suck the blood of moose, leaving them weak and anemic.

Most moose in Vermont are located in the Northeast Kingdom; however, many have been sighted in the TRO Region. In order to maintain or increase the population of moose in the Region, towns may prohibit or limit development in large contiguous tracts of forested land.

Bobcat

Although once fairly common in the State, populations of bobcats and other large cats such as the legendary catamount, were greatly diminished in the early part of the century, when most of the land was cleared for agriculture. The transformation of land use over the last century from open fields to brush land and regenerating forests has expanded the habitat of the bobcat and the snowshoe hare, one of the bobcat's primary sources of food. As a result, populations of bobcats have shown an increase, but development pressures continue to threaten these animals.

The habitat of the bobcat is typically low to medium elevation spruce forest with the presence of rocky outcroppings for den sites and access to forest openings that sustain rodents and other small mammals. Large ski areas such as Killington, with open slopes next to dense forest, have shown fairly healthy populations of bobcats in recent years. In the TRO Region, bobcats are known to live in the Delectable Mountain range in the Chateauguay No Town Conservation Area. Uneven age management and occasional small clear-cutting of forested areas could provide beneficial habitat for bobcat production. Deeryards and wetlands provide benefits to the habitat.

Bats

Habitats critical to bat survival include "hibernacula" (usually caves or mines) where they can hibernate and summer roosting and maternity colony areas. This Region hosts two significant bat hibernacula: unused mines in Strafford and Vershire. Nine species of bats are found in Vermont: big brown bats, small footed bats, Indiana bats, northern long-eared bats, tri-colored bats, little brown bats, silver-haired bats, hoary bats, and red bats.

Bats congregate to give birth and raise young during the summer in maternity colonies. Tree cavities and trees with exfoliating bark are

Towns are encouraged to map any newly discovered bat hibernacula and restrict access to the caves during the winter season.

important to maternity colonies, but the colonies may also use buildings. Bats congregate to feed during the summer months in foraging colonies; these colonies may be small and dispersed or may contain a large number of individuals. The bigger colonies are the most critical and often occur in the same habitats as maternity colonies. Lower elevations in the Region, near rivers, provide a warm climate and an abundance of insects for bats. A summer netting survey of the Union Village Dam by the U.S. Army Corps of Engineers indicated the presence of little brown bats, big brown bats, northern long-eared bats, and small-footed bats. All four species were using the area for maternity colonies. Small-footed bats are known to roost in rock cracks and talus slopes; they may also roost on the face of the dam. The Region's forests provide foraging habitat for this species.

It is important to protect the winter habitat of bats, particularly the endangered species, which include the state endangered northern long-eared bat, tri-colored bat, little brown bat, and the federally endangered Indiana bat. During hibernation, Indiana bats cluster together on the walls of caves and abandoned mines to conserve energy and maintain a constant humidity. If the bats are disturbed while hibernating, their energy levels may decline, weakening their condition. The Vermont Agency of Natural Resources has worked with other groups to block human access to bat hibernacula.

Another threat to bat conservation is White-Nose Syndrome, a disease associated with millions of North American bat deaths. White-Nose Syndrome was first discovered in Vermont in 2008 and has been destructive to the cave bat population since. A White-Nose Syndrome steering committee has formed nationally to coordinate a response to the devastating bat disease.

Threatened and Endangered Species and Critical Natural Communities

Turtles—Integral Species in the Region's Ecosystem | © K. Kanz, 2002

Rare plants and animals are important for a variety of reasons. Some are indicators of unusual habitats or of colder or warmer climates in Vermont's distant past. Some serve as indicators of environmental quality. Some species may provide compounds for medicines and agricultural or industrial products. Some species are attractive and add beauty to the landscape. And most importantly, the presence of a diversity of plant and animal species is vital to a healthy, functioning ecosystem. Many uncommon species will disappear if not recognized and protected.

Species with a state status of "threatened" or "endangered" are protected by Vermont's Endangered Species Law (10 VSA Chapter 123); a federal status of "threatened" or "endangered" is protected by the Federal Endangered Species Act (P.L. 93-205). The Vermont Department of Fish and Wildlife maintains lists of threatened or endangered plants and animals. The State also publishes a list of rare native fauna to inform naturalists, biologists, planners, developers, and the general public. These animals may be rare because they have very particular habitat requirements, are at the edges of their ranges, are vulnerable to disturbance or collection, or have difficulty reproducing for unknown reasons.

The Vermont Nongame and Natural Heritage Program in the Department of Fish and Wildlife has identified and mapped special natural features or species and natural communities; there are 463 such features in the Region. Several

species of grassland birds, including the upland sandpiper, and other endangered birds such as the bald eagle, depend on critical habitat areas in the Region. In addition to animals on the Threatened and Endangered Species of Vermont list, the Vermont Institute of Natural Science (VINS) has recognized several species such as the wood turtle that are in decline and may soon become endangered.

Climate Change and Forest Shifts

As the climate warms, tree species need to shift their geographies northward in order to remain within an inhabitable environment. It is expected that under the best scenario the Northeastern United States will lose spruce/fir/paper birch type forests and that more oak/hickory forests will move in. Under high emissions scenarios (which is the current track) the maple/beech forests may also be largely replaced by oak/hickory.[1]

A study on the pace of tree species migration suggests that natural species migration rates in undisturbed forests range from 100 to 200 meters per year and will not match the speed of climate change, which is on the order of at least 350 meters per year. Therefore, while maintaining continuous forests for southern species to move northward will be critical, assisted colonization programs will also be needed, which will require large-scale environmental intervention. If tree movement is unable to keep up with temperature gradient shifts, this will result in fragmented landscapes. Invasive woody plant species may also colonize new forest areas, as they grow faster than trees and can take advantage of forest clearings. Invasive forest diseases and pests will also be worsened by climate change.[2]

Mast Stands

"Mast" is a term used by foresters and wildlife biologists to describe the fruit and seeds of trees and shrubs that are a source of food for wildlife. Hard mast, such as the nuts of oak and beech, is a critically important source of food for many kinds of wildlife. The Vermont Department of Fish and Wildlife considers areas of beech or oak with a history of bear feeding use to be necessary wildlife habitat, as these stands are absolutely essential for the survival and reproduction of black bear in Vermont. While scarred beech stands signify important bear habitat, their increasing susceptibility to death and disease make mature oak stands possibly more important and reliable resources. Because of their value as timber logs, mature oak are fairly rare in the Region. Since only older trees produce mast, mature oak trees are considered a critical resource to all forms of wildlife and should be inventoried and protected.

Invasive Species

The Region is currently undergoing changes to our woods, fields, wetlands, and waters due to invasive species. Invasive species are non-native species (both plant and animal) that flourish to the detriment of native species.[3] They occur in lakes and rivers, as with Eurasian milfoil or the algae didymo ("rock snot"); in wetlands, as with species such as purple loosestrife; fields, as with wild parsnip or buckthorn; and in forests, as with the emerald ash borer. Invasives are best managed by avoiding infestations through management actions that limit spread, such as the ban on moving untreated firewood across state lines. Some species can be managed through well-timed mowing or manual removal. A well-educated citizenry is one of the best defenses against inadvertent spread. Once established, invasives are very difficult to control. As climates shift northward, species that had been kept at bay due to extreme cold will be on the rise.

A Monarch Butterfly | *© Rosalie Geiger*

Goals, Policies, and Recommendations: **Wildlife Resources**

Goals

1. The biodiversity and population of wildlife, including natural predators, is maintained or enhanced.
2. Stable populations of state and federally designated threatened or endangered wildlife and their associated habitat areas are restored.
3. Game species populations are healthy and support sport and subsistence hunting in an ecologically sound manner.

Policies

1. Development should be designed and sited in a manner to preserve contiguous areas of active or potential wildlife habitat. Corridors connecting habitat areas for large mammals must be incorporated in plans for management and conservation of forested areas. Fragmentation of critical wildlife habitat should not be approved.
2. Conserve large tracts of bear habitat when possible and adopt cluster land use concepts in zoning bylaws as a mechanism for maintaining contiguous areas of forest cover.
3. Large contiguous tracts of forest should be managed so as to maintain the diversity of tree cover necessary for shelter and food supply for deer, black bear, and other large mammals and for birds.
4. The rate of harvest of wildlife for sport or subsistence must not exceed the capacity of an area to replenish the species.
5. Development, including roads and power line corridors, within designated bear habitat areas must be minimized.
6. Development should utilize existing roads and field edges to avoid additional fragmentation.
7. Deer wintering areas should be protected from development and other uses that threaten the ability of this habitat to support deer.
8. Developers must demonstrate that they have taken reasonable steps during development planning to minimize impacts on critical habitats, including, but not limited, to the following:
    a. Habitat connectors.
    b. Grassland regions.
    c. Cliff areas identified as potential or active nesting places for peregrine falcons.
    d. Areas over 2,500 feet in elevation.
    e. Large tracts of contiguous forest land identified as priority or high priority forest blocks.
9. Landowners, foresters, and developers must be sensitive to critical bear habitat areas in their management plans.[4]
10. Buffer zones, necessary for species' health, should be maintained between land development and critical habitat.
11. Actions to monitor and curb the spread of invasive species are encouraged.

Recommendations

1. With the help of specialists from the Department of Fish and Wildlife or the Vermont Institute of Natural Science, towns in the Region should work to inventory wildlife species; sensitive areas including wetlands, vernal pools, bogs, and fens; mature oak trees; and critical habitats for birds, deer, bear, bobcats, heron, and threatened or endangered plant species.
2. Towns should establish Conservation Commissions that work alongside VTrans, Vermont Fish and Wildlife, and nonprofit conservation organizations to maintain wildlife corridors.

Goals, policies, and recommendations continued next page

Goals, Policies, and Recommendations: **Wildlife Resources**

Recommendations (continued)

3. Towns are encouraged to use mechanisms such as cluster zoning, conservation districts, transferring or purchasing of development rights, or purchasing of land containing critical habitat areas in order to maintain the integrity of large forest blocks and preserve critical habitat and habitat connectors.
4. Towns should work cooperatively with and seek assistance from land trusts to maintain large tracts of undeveloped habitat that cross political boundaries.
5. Town Plans and zoning regulations should protect significant natural features and sensitive habitat areas by using setbacks and buffers.
6. Local officials are encouraged to work with staff from regional offices of the Vermont Department of Fish and Wildlife and wildlife biologists from VINS to assist in identifying and creating inventories of the critical habitat areas and significant natural communities in their municipalities.
7. Towns should attempt to identify critical bear habitat areas within the broader areas identified on Vermont bear habitat maps.
8. VTrans and towns should always consider terrestrial and aquatic wildlife passage as part of a design when constructing bridges and culverts, especially in areas along known wildlife corridors.
9. Towns should time roadside mowing to limit spread of plants such as wild chervil and wild parsnip.
10. When using heavy machinery near streams, machinery operators must clean them before and after use to avoid inadvertent spread of species such as Japanese knotweed.

G. Air Quality

Background

The air quality of Vermont and the TRO Region is a primary attraction to its inhabitants and visitors and is a major component of the quality of life and health in the area. Although air polluting industries are not a major component of our economy, automobile traffic, transregional pollution, illegal open burning of garbage, and wood-burning activities pose some threats to air quality and should be managed wisely in the short and long term.

Stoves

The Region has a traditional dependence upon wood-burning stoves for heating homes and businesses. The narrow topography and tendency for thermal inversions in the cooler months in these areas can potentially cause unhealthy and undesired pollution concentrations. Federal air quality regulations require stove manufacturers to produce cleaner burning stoves. However, the life span of older woodstoves is often several decades. These older, less efficient stoves will stay in use for many years to come and will continue to pollute unless replaced. Another heat source is outdoor wood-burning furnaces. Older heaters of this kind may not disperse smoke efficiently, which can have negative health impacts. Pellet stoves offer an alternative to traditional wood-burning stoves. Wood pellets produce less ash and lower emissions. A multi-town or sub-regional approach to woodstove pollution may be the most acceptable resolution to these potential problems, since airsheds do not limit themselves to political boundaries.

Garbage Burning

Because of the implementation of solid waste disposal fees, there has been an increase in illegal open burning of garbage in the Region. Open burning can cause wildfires and releases toxins into the air that cause health and environmental

impacts and impair general air quality. Such toxins include heavy metals, dioxins, toxic gases, and carbon monoxide.

Air Pollution

Trans-regional air pollution, where the Region is impacted by air pollution from hundreds or even thousands of miles away, will become more important in the future. Trans-regional air pollution should be addressed by the state and federal government, as the Region's communities may be the recipients of pollution that could affect them or their natural resources but will have little ability to deal with these issues.

Carbon Dioxide

With 81 percent of the Region being forested, it hosts a unique vegetative cover that processes a large volume of carbon dioxide and regulates air temperatures. Air quality is directly influenced by tree cover and biomass transpiration, and any land uses affecting the composition of the land cover of the Region or sub-regions must be reviewed in relation to their cumulative and incremental impact upon air quality and the factors influencing it.

The release of carbon dioxide and other gases responsible for global warming is a local issue and is therefore the responsibility of the people of the regions that produce them. Increases in carbon dioxide emissions, primarily as a result of combustion of fossil fuels, are a leading cause of the buildup of greenhouse gases in the atmosphere. Greenhouse gases warm the atmosphere by acting as an insulator that prevents some heat from escaping the earth's atmosphere. Forest growth naturally stores or "sequesters" carbon, and that carbon remains in the wood after it is processed into a product. It is estimated that an amount equal to half of the carbon emitted in Vermont is sequestered by our forests.[5] Harvesting operations that mimic conditions more akin to old growth forests have been shown to better retain carbon in the forest while also producing more wood than traditional harvest methods.[6] Activities that increase the biomass accumulation in a forest or in forest products increase carbon sequestration.

As climate change and potential regulations to curb its impact grow in importance to national policy makers, business leaders are considering forest growth as an inexpensive way to mitigate atmospheric carbon. Forest managers may be able to receive financial benefit from the value of carbon storage, in effect selling another product off their land, and thus increasing the economic viability of sustainable forest management in the Northeast.

Snow Covered Firewood | © John Knox

Goals, Policies, and Recommendations: **Air Quality**

Goals

1. Air quality in local and regional airsheds is maintained or improved.
2. Dependence upon fossil-fueled and single-occupant automobiles for transportation is reduced.
3. The transfer of pollution into the Region from outside sites is reduced.

Policies

1. Proposed developments must be reviewed for their direct and indirect impact upon air quality and acceptability by local and regional airshed users.
2. Wood burning as a method of disposal should be reduced; as a source of heat, wood burning should be continued, but efforts should be made to update wood stoves.
3. Air pollution impact review should include visual quality in addition to contaminant concentrations over time and distance.
4. Any emissions of hazardous or toxic air pollutants by commercial operations shall be controlled and monitored for public health and safety so that concentrations of hazardous or toxic air contaminants in local and regional airsheds are below those listed for human health protection by federal and state regulations.
5. Backyard burning of trash is illegal, and local education and enforcement activities are strongly encouraged to eliminate this practice.
6. The development and use of more energy-efficient devices and renewable energy resources is promoted.

Recommendations

1. Install and maintain a regional air quality monitoring network in cooperation with the Vermont Agency of Natural Resources so as to determine current and potential threats to air quality. Potential impact areas include village centers or other areas of traffic congestion and high elevations, where pollutants and acidic levels are potentially greater and more harmful to fragile vegetation.
2. Municipalities and state agencies should educate communities about the impacts of trash burning and develop more effective mechanisms to enforce laws prohibiting backyard burning of trash, including the adoption of civil ordinances.
3. Woody debris from site clearing or forestry operations should be left on site or chipped, instead of being burned, in order to reduce pollution and to enable this material to contribute to soil formation.
4. TRORC should be prepared to comment upon projects outside the Region that may potentially impact air quality within the Region.

H. Mineral Resources

Background

The wise use and management of the Region's earth and mineral resources are matters of public good. Maintenance of sustainable quantities of gravel, sand, crushed rock, and other materials are essential for the development industry as well as maintenance of state and local highways. Public and private interests are often in conflict over utilization of the resource. It is in the interest of the Region to enable utilization of these resources when such uses do not unduly threaten or significantly inhibit or conflict with other existing or planned land uses. TRORC recognizes the need to balance the rights of the owners of these resources with the public's right to minimize the nuisance potential resulting from mineral extraction.

Act 250

Vermont's Act 250 includes a project review criterion that protects land with the high potential for the extraction of earth resources and also requires planning for the future rehabilitation of the site. Generally recognized issues incidental to mineral extraction include:

1. Creation of excessive dust and noise as a result of truck traffic and operations at the site, thus denying reasonable use of neighboring properties.
2. Degradation of the site or adjacent areas that cause aesthetically unpleasing conditions in the vicinity.
3. Undue deterioration of and traffic congestion on town and state highways.
4. Improper management practices that result in unnecessary soil erosion and inadequate site restoration.

The Region is host to three former copper mines that are now federally listed "Superfund" sites: the Elizabeth Mine in Strafford, the Ely Mine in Vershire, and the Pike Hill Mine in Corinth. Each mine was operated during the nineteenth and twentieth centuries and extensive remediation is required by the U.S. Environmental Protection Agency according to CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act), the federal law that governs cleanup of these sites. Remediation is taking place at the Elizabeth Mine. Cleanup plans are in place at the Ely Mine, and investigation activities are ongoing at the Pike Hill Mine.

Goals, Policies, and Recommendations: **Mineral Resources**

Goals

1. Wise utilization of mineral resources occurs to accommodate growth and development of the Region and adequate maintenance of transportation infrastructure.
2. Extraction and processing of resources happens in a way that such activities are appropriately managed and the public interest is clearly benefited.
3. Remediation of extraction and mining sites in the Region occurs in every instance.

Policies

1. Mineral extraction and processing facilities shall be planned, constructed, and managed:
    a. To not unduly, adversely impact existing or planned uses within the vicinity of the project site
    b. To provide direct access to Class 3 or better highways
    c. To not cause a burden to the function and safety of existing roads and bridges serving the project site. Factors to be considered in determining impacts are:
        - Extent of increase in heavy vehicular traffic
        - Effects of weight loads on roadbeds and bridges

Goals, policies, and recommendations continued next page

Goals, Policies, and Recommendations: **Mineral Resources**

Policies (continued)

- Conflicts with pedestrians or bike users
- Numbers and frequency of heavy vehicles traveling through dense residential areas

d. To minimize loss of significant prime agricultural land

e. To minimize any adverse effects on water quality, fish and wildlife habitats, and adjacent land uses

2. Extraction sites must be screened to the extent practical if topography and vegetation allow.
3. Commercial extraction of gravel from streams is prohibited by law, and private extraction is strongly discouraged due to the destabilizing effects it can have. All streambed extraction should only be done after careful consideration of the site by qualified professionals and in consultation with the Vermont Department of Environmental Conservation's River Management Section.
4. Future extraction activities of copper or other metals must safely deal with mine wastes and not impact ground or surface water.

Recommendations

1. All sites must plan for their eventual rehabilitation so that slopes are stable and the surface is revegetated. To that end, topsoil shall not be removed from sites and excavations shall stop early enough so that stable slopes can be established on the property.
2. Mineral extraction and processing facilities must be planned and developed so they do not place an excessive or uneconomic burden on local and state highways and bridges.
3. All extraction sites must maintain at least a 50-foot buffer of undisturbed land by any wetland or surface water and sufficient additional land above the grade of adjacent streams to preclude a danger of avulsion of the stream into any working areas under flood conditions.

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HISTORICAL, CULTURAL, ARCHEOLOGICAL AND SCENIC RESOURCES

7

Covered bridge coming down and iron bridge going up over the White River, 1902 (the covered bridge was built in 1848; the iron bridge was built between 1901-1902) | *Source: Royalton Historical Society*

A. Introduction

Growth provides significant advantages for Vermont and the TRO Region, particularly in the creation of employment opportunities and housing. There are many examples of desirable development that have adapted very well to our historical landscapes and existing settlement patterns. The potential to create an attractive modified landscape (complementing the old with new development) exists, but change can result in landscape degradation unless cherished landscape patterns and community values are given proper consideration.

TRORC accepts the fundamental assumption that many instances of degradation are preventable or may be significantly mitigated. TRORC also acknowledges the strong desire of Vermonters to conserve the Vermont landscape while accommodating growth. This has been expressed by a long history of legislation, public policy, and local planning that addresses appropriate and legitimate standards for change. Criterion 8 of Act 250 embodies these values.

B. Historic Resources

Advantages of Historic Preservation

The reasons for the preservation of our architectural heritage are varied. To business owners, preservation is a mechanism to maintain a community's interest in and support of the local economy. Community leaders and preservationists see historic preservation as a means to curb the decay of the traditional village center. It is also a means to celebrating, appreciating, understanding, and protecting our heritage and built environment.

Preservation of historic buildings can increase the market value of property and increase tax revenues to towns, and buildings of architectural merit help shape community identity. In numerous settings throughout the Region, preservation of important landmarks such as the Strafford Meeting House, Bridgewater Woolen Mill, Bethel Town Hall, Fairlee Town Hall, Brookfield Town Hall, and Corinth Meeting House have contributed to sense of place

and community pride. Once work has begun in a community, other efforts follow, often heightening community betterment and identity. The combination of rural scenery and the attractive built environment is a key reason why thousands come to the Region and contribute millions of dollars to our economy.

"There's no way you can understand the present unless you have a firm grounding in the past. Our past is part of us always, and, for Vermonters, the preservation of the unique Vermont heritage is especially important. You do that in a number of ways. We preserve our heritage through the written word, but we also preserve it in our physical surroundings, the buildings created by our forbearers. The buildings each community has are unique to that community. They represent a certain part of our past, and they can become an agent for revitalization and growth."

~former Governor Hoff

This mix of tangible and intangible benefits is why historic preservation is important to the welfare of the Region. Beyond the practical and aesthetic, preservation is part of our ethic—do not throw something away if it is still useful. Instead, common sense and tradition seek to conserve, use, and improve what already exists.

And lastly, as eloquently stated by former Governor Hoff: "There's no way you can understand the present unless you have a firm grounding in the past. Our past is part of us always, and, for Vermonters, the preservation of the unique Vermont heritage is especially important. You do that in a number of ways. We preserve our heritage through the written word, but we also preserve it in our physical surroundings, the buildings created by our forbearers. The buildings each community has are unique to that community. They represent a certain part of our past, and they can become an agent for revitalization and growth."

The National Register and State Survey

Beginning in the late 1960s, the Vermont Division for Historic Preservation (Division) instituted a periodically updated Historic Sites and Structures Survey for towns.

More than 3,000 of the Region's historic structures have been inventoried by the Division; the records are digitally available for anyone to access on the Division's online resource center. Planning commissions, local historical societies, building owners, and others interested in the details surrounding buildings of historic and architectural merit are encouraged to contact the Division. Technical assistance and grants are available to assist in the preservation of these properties.

To aid in the preservation of the most notable historic resources, Congress in 1966 created the National Register of Historic Places (Register). The Register is a federally maintained list of culturally important districts, sites, buildings, and structures worthy of preservation. Historic districts are geographic locations that contain historically or architecturally significant buildings, properties, or sites. Such structures or sites are considered to be contributing components, but a historic district may also contain non-contributing (non-historically or architecturally significant) buildings, structures, objects, or sites.

Inclusion in the Register offers a measure of protection against federally licensed or funded construction projects because federal agencies are required to consider the impact of their projects on properties included in or eligible for inclusion in the Register. Many of the buildings and structures included in the State Survey are eligible for the National Register.

Under the provisions of Section 106 of the National Historic Preservation Act, prior to

proceeding with a federally funded project affecting a historic structure, the federal agency and the state historic preservation officer must attempt to identify ways to avoid or minimize adverse impacts. One successful example was the replacement of the Elm Street Bridge in Woodstock Village, which is listed on the Register. In this case, the Vermont Agency of Transportation and the Federal Highway Administration were forced to waive national bridge design standards and to downsize the project to retain many of the elements and components of the historic smaller and narrower bridge.

Another advantage of the National Register of Historic Places is that owners of income-producing buildings are eligible for tax credits on rehabilitation work, provided such work meets certain prescribed standards.

Table 7-1: National Historic Landmarks, 2018

Town	Landmarks
Plymouth	Calvin Coolidge Homestead
Strafford	Justin S. Morrill Homestead
Woodstock	George Perkins Marsh Homestead (Marsh-Billings House)

Source: Vermont Division for Historic Preservation

Table 7-2: National Historic Register Districts, 2018

Town	Districts	Town	Districts
Bethel	Bethel Village	Newbury	West Newbury Village
Bradford	Bradford Village	Norwich	Norwich Village
Brookfield	Allis State Park	Plymouth	Coolidge State Park
Brookfield	Brookfield Village	Plymouth	Plymouth Notch Historic District
Chelsea	Chelsea Village	Randolph	Depot Square
Fairlee	Aloha Camp	Randolph	Randolph Center
Fairlee	Lanakila Camp	Royalton	South Royalton Village
Hartford	Jericho Rural Historic District	Stockbridge	Stockbridge Common
Hartford	Christian Street Rural Historic District	Strafford	Strafford Village
Hartford	Hartford Village	Thetford	Camp Billings
Hartford	Quechee Village	Thetford	Thetford Center
Hartford	West Hartford Village	Thetford	Thetford Hill
Hartford	White River Junction	Thetford	Thetford Hill State Park
Hartford	White River Junction Boundary Inc.	Tunbridge	Tunbridge Village
Hartford	Wilder Village	West Fairlee	Aloha Hive Camp
Hartford	Terraces Historic District	West Fairlee	Camp Wyoda
Newbury	Bayley District	Woodstock	Slayton-Morgan Historic District
Newbury	Newbury Village	Woodstock	South Woodstock Village
Newbury	Oxbow District	Woodstock	Taftsville
Newbury	South Newbury Village	Woodstock	Woodstock Village
Newbury	Wells River Village		

Source: Vermont Division for Historic Preservation

Table 7-3: Vermont State Register Historic Districts, 2018

Town	Districts	Towns	District
Barnard	Barnard Village	Randolph	Lincoln/Chestnut Streets Historic District
Barnard	East Barnard	Randolph	North Main Street Historic District
Bethel	Bethel Mills Historic District	Randolph	Park/Central Streets Historic District
Bethel	East Bethel Village District	Randolph	Randolph Avenue Historic District
Brookfield	East Brookfield Historic District	Randolph	School St. Neighborhood Historic District
Brookfield	West Brookfield Village	Randolph	S. Main/S. Pleasant Streets Historic District
Corinth	Cookeville	Randolph	South Randolph Village
Corinth	Corinth Center	Randolph	Weston Street Historic District
Corinth	East Corinth	Rochester	Rochester Village Green Historic District
Fairlee	Fairlee Village	Royalton	Depot Square Historic District
Granville	East Granville Village	Royalton	Foxville Historic District
Granville	Granville Village	Royalton	Royalton Common Historic District
Granville	Lower Granville Village	Royalton	Royalton Village District
Hancock	Hancock Village	Sharon	Day Farms Historic District
Hancock	Virgin Avenue Historic District	Sharon	Sharon Village
Hartland	Hartland Three Corners Historic District	Strafford	Dublin Corner Historic District
Newbury	Boltonville Historic District	Strafford	Smith Farm Historic District
Newbury	Farnham - Atkinson Historic District	Strafford	South Strafford Historic District
Pittsfield	Pittsfield Village	Topsham	East Topsham Village
Plymouth	Plymouth Union	Topsham	Waits River
Randolph	East Randolph Village	Tunbridge	South Tunbridge Village

Source: Vermont Division for Historic Preservation

Programs for Historic Preservation

Several state organizations and agencies have been actively involved in historic preservation and community development. The Preservation Trust of Vermont (Trust) is a nonprofit corporation to assist in the continuing statewide effort to protect special architectural resources. The Trust works with local governments, individuals, and groups to secure and protect properties. The Division for Historic Preservation has matching grant programs for historic preservation projects for which communities and property owners are eligible. The Vermont Agency of Transportation is also engaged in historic preservation related projects.

To enhance downtown revitalization efforts in 1994, the Agency of Commerce and Community Development, the Preservation Trust of Vermont, and the National Main Street Center formed the Vermont Downtown Program (Program). The Program provides technical support to communities interested in using historic preservation as an economic development tool.

An innovative program is the Vermont Barn Preservation Grant Program, which awards matching grants on a competitive basis to individuals, municipalities, and nonprofit organizations who wish to maintain historic agricultural buildings. This program is administered by the Division for Historic Preservation with funding provided by the State of Vermont and Legislature through the Capital Construction Fund.

Another program is the Vermont Historic Preservation Grant Program, which provides municipalities and nonprofits with funding to

restore and rehabilitate municipal and non-profit buildings. This is also administered by the Division with funding from the State.

Lastly, the Vermont Community Development Program, administered by the Department of Housing and Community Affairs, provides grant funds to communities to improve housing, create and retain employment opportunities, and improve public facilities in support of housing and economic development activities.

Local Historic Preservation Methods

Under the provisions of the Vermont Municipal Planning and Development Act (24 VSA §4414), municipalities are enabled to protect areas of historic and architectural significance by designating historic districts or areas as part of local zoning bylaws. Within such areas, prior to exterior modifications to a structure or the erection of a new one, the local planning commission must first grant approval. In determining whether to grant approval, the commission must first evaluate the nature of the proposal against specific design criteria to ensure that the proposed changes would not impair the special character or significance of the surrounding area.

Under the provisions of Act 250, Criterion 8 protects historic sites along with other rare and irreplaceable natural resources. Before granting a permit, the District Commission or Environmental Court needs to find that a subdivision or development will not have an undue adverse effect on historic sites. Historic sites are defined as those included in the National Register of Historic Places, the State Register, or other properties deemed historically significant by the Division for Historic Preservation (10 VSA §6001(4)). In approaching such a determination, the Act 250 review process can evaluate local and Regional Plans to determine whether or not the proposed project violates a community standard intended to preserve the historic qualities of the site.

Non-regulatory approaches to historic preservation are of equal importance. The adaptive reuse of old buildings that no longer serve their original function is often preferable to the destruction and replacement of those buildings. Public acquisition and use of particularly important historic buildings may be appropriate when new or expanded public facilities are needed.

Challenges of Historic Preservation

Various aspects of historic preservation have substantial benefits as well as costs, including economic and social impacts. There is a perception that the amount of restrictions put on residents to keep all projects and maintenance within the guidelines of the historic preservation plans is too limiting or costly. While many may argue that the benefits to society, both financial and otherwise, outweigh the costs, the relationship between preservation and the economy as well as overall societal benefit remains imperfectly understood and only partially documented.[1]

Bradford Academy | © John Knox

Goals, Policies, and Recommendations: **Historic Resources**

Goals

1. The unique characteristics of historic sites or areas, where the public interest is clearly benefited thereby, are enhanced and preserved.
2. The renovation of existing or construction of new structures, when they are found to be consistent and compatible with the historic character of the site or area, is enabled and supported.
3. Sensitive economic development is promoted in areas of historic value such as in town centers, villages, and hamlets.
4. Improvements to historical transportation facilities, instead of replacement, are promoted.

Policies

1. Land development or subdivision within or immediately adjacent to areas or sites of historic significance should be permitted provided that efforts are taken to ensure that the design of the project fits the context of the dominant character of the immediate area or environment.
2. Restoration or rehabilitation of historic structures, buildings, neighborhoods, or sites should be encouraged where the design does not destroy or significantly alter its distinguishing qualities, integrity, or character and immediate environment.
3. Destruction or removal of historic structures, buildings, or sites is discouraged.
4. When new buildings or structures within historic areas are proposed, they should have a design that is compatible with and sensitive to the character of the neighborhood.
5. Public improvements or structures such as bridge rehabilitation or replacement, street widening, roadway reconstruction, signage, utility distribution systems, and lighting must be designed to avoid unnecessary degradation of recognized historic sites or areas.
6. Public investments of regional or statewide significance must be planned in consultation with local and state officials, as well as the Division for Historic Preservation, to encourage compatibility and consistency with their planning objectives.
7. Local historical societies should continue the research, documentation, education, and advocacy efforts that they have pursued in their communities.
8. Developers must be encouraged to incorporate historic structures and important architectural details into their project planning.

Recommendations

1. TRORC should continue to support efforts to designate National Historic Register Districts and Sites. In so doing, TRORC should coordinate with the State and affected municipalities. In accordance with Section 106 of the National Historic Preservation Act, TRORC must review all federally funded projects in the Region that affect Register properties or places to ensure that such publicly assisted projects are planned with due consideration to the resource.
2. TRORC, as part of its Transportation Planning Program, should continue its work with the Agency of Transportation, town officials, its Transportation Advisory Committee, and other groups and organizations to ensure that design standards and plans for proposed transportation projects are reasonably compatible with historic resource needs and values. (See Transportation chapter.)
3. Towns are encouraged to clearly outline in their plans those resources deemed worthy of protection. Town officials can participate in the Act 250 process, thus influencing decisions affecting historic sites in their community.

C. Archeological Resources

Background

Archeological evidence found throughout the State depicts a history of human occupation that dates back 9,000 years. Most Native American populations in the Northeast lived in small groups that subsisted by following a seasonal cycle of resource availability. Rivers provided an important transportation network, water supply, and fishing grounds.

The archeological record provides the only physical remnants of pre-European human occupation. In addition, the record can provide information about past environments, climate, and landscape changes. Although only a few archeological sites in the Region have been designated on the Vermont Archeological Inventory, there are many areas whose topography and proximity to natural resources indicate a likelihood of pre-European habitation. Areas in proximity to certain prominent natural resources should be recognized as areas of archeological sensitivity, such as:

- Current or relic water supplies: This includes streams, rivers, lakes, ponds, and springs. Topographic clues to relic water supplies include kettle holes and dry ravines. Long-term occupation or campsites were always located near a water supply.
- Chert or quartz outcrops: These sites were often used repeatedly on a short-term basis for extraction of materials for tool making. The terrain of such sites is often rugged; short-term camps may be located nearby.
- Rock-shelters: These transient sites, often used for generations, tend to be located in limestone outcroppings.

Most prehistoric sites are located within 300 to 500 feet of an existing or relic water source, on slopes of eight percent or less, and often have a southern exposure. Criterion 8 of the Act 250 permitting process requires that a development "will not have an undue adverse effect" on historic sites and sites of archeological importance. However, Act 250 only covers larger developments, and many archeological sites may be located on private land. For areas of potential archeological significance, private landowners need to know how best to preserve important resources on their land. Since many archeological resources are located in areas such as river corridors and prime agricultural land, preservation and conscientious management of such land will serve multiple purposes. As with any land preservation project, purchase of land and acquisition of development rights are important methods for preserving archeological sites.

Public awareness, appreciation, and understanding of the Region's archeological resources is limited. This is due partly to incomplete documentation of the resources, and partly to a narrow perception of what constitutes archeological resources. Lack of recognition and appreciation can result in missed opportunities for stewardship. These resources are not easily identified and are often subject to accidental destruction. Additionally, there is a perception by

Table 7-4: Predictive Factors for Locating Prehistoric Archeological Sites

• Near to existing or relic rivers, streams, lakes, and ponds
• Adjacent to wetlands in excess of one acre
• Near the confluence of rivers and brooks
• Adjacent to falls, rapids, and isolated springs
• Near to knolls, ridges, crests, terraces, outcrops, or other topographic outbreaks
• Near major floodplains or alluvial terraces
• Adjacent to caves or rock-shelters

Source: Vermont Division for Historic Preservation, Environment Predictive Model, April 1995

landowners that the protection of archeological resources invariably means more restriction on the use of their property without much benefit.

Goals, Policies, and Recommendations: **Archeological Resources**

Goals

1. Archeological resources within the Region are preserved, and an appreciation of their value as a vital aspect of the Region's historic and cultural past is promoted.
2. Comprehensive planning and land use development are better integrated with archeological resource protection at the federal, state, regional, and local levels.

Policies

1. Known and potential archeological resources must be protected where the public interest is clearly benefited. No land development should be permitted when it results in unnecessary loss of an archeological resource of state or federal significance.
2. Within archeologically sensitive areas, planning should consider the impacts a project may have on the resource. If warranted, a site inventory should be conducted as part of project planning. Projects that have undue adverse impacts on these resources should be discouraged or redesigned so as to mitigate the impact. Project planners are encouraged to contact the state archeologist for further information.
3. To preserve significant archeological sites, purchase of land or development rights is encouraged when such actions are compatible with local plans and this Plan. Because these sites are often farmland, floodplains, wetland margins, and other similar low-lying land, priority should be given to projects that serve multiple preservation purposes.

Recommendations

1. To increase public awareness of archeological resources, TRORC encourages archeologists, local and regional groups, towns, and landowners to organize educational programs focused on Vermont's ancient history. Such a program could be made a part of an overall cultural heritage program through public schools.
2. Local planning commissions, conservation commissions, historical societies, and other interest groups are encouraged to develop an archeological plan for their community as part of the overall master planning program. Such a plan could be an important step in planning for future development in identified areas or areas most likely to contain sites. Assistance and guidance are available from the state archeologist within the Division for Historic Preservation.

D. Scenic Resources

Background

The landscape of the Region is an economic asset. It represents some of the finest examples of townscapes and rural scenic character in the world. It has tangible economic value. Tourists spend money in the Region because they are attracted to the scenery, values, and quality of rural life. Tourism is a significant industry in Vermont's economy.

In Vermont, the economic value of scenic resources to tourism cannot be lightly brushed aside. The public's commitment to the preservation of our visual resources can be traced to the late 1960s with the passage of Vermont's anti-billboard legislation. A past Governor's Commission on the Economic Future of Vermont summarized: "We consider Vermont's environment to be the goose that lays golden eggs." All municipal plans prepared and adopted by member towns in the Region consistently stress the goal of coordinating

economic development with maintenance of rural character. TRORC believes it is appropriate public policy to recommend standards that, if reasonably followed, will minimize or mitigate any undue adverse effects of development on recognized scenic resources.

Patterns for Development: A Community Standard

The inherent beauty of the Region is tied to the visual relationship between buildings, the working landscape, and mountains and river valleys. Over the past thirty years, development patterns have emerged that propagate highway strip development. Certain areas immediately adjacent to major highways are examples of development sprawl. In some instances, these areas adversely affect the value of scenic resources for travelers. Such a land use pattern will serve, amongst other factors, to destroy the transition between town village centers and the countryside. It is not in the public interest to promote or endorse such a sprawling pattern of development in this Region.

The Region's landscape is also changing due to a gradual reforestation and loss of fields and meadows due to a reduction in agriculture. The resultant land use pattern is a product of economic forces that can permanently alter or pressure that landscape.

Determining scenic significance of resources and evaluating the probable impacts of land development or subdivision on the resource and the recommended measures that may be desirable to mitigate visual impacts is a complex matter.

Prominent Scenic Landscapes

The following areas are likely to be affected by projects and should be reviewed. Such areas are generally accepted as areas of scenic significance:

1. Shorelands immediate to public lakes, rivers, or ponds;
2. Areas immediately adjacent to scenic corridors;
3. Prominent ridgelines, mountaintops, or excessively steep slopes that can be readily viewed from public corridors;
4. Exceptional agricultural and historic areas;
5. Areas within or immediately adjacent to natural areas (i.e., wetlands) designated by the State; and
6. Areas of high scenic quality that are publicly recognized as exceptionally unique or are noted examples of the dominant characteristics of an area in the Region. Examples of prominent scenic areas within the TRO Region include designated byways.
    - Connecticut River Byway (a National Scenic Byway): Route 5, Hartland to Newbury
    - Crossroads of Vermont Byway: Route 4, Bridgewater to Hartford
    - Scenic Route 100 Byway: Plymouth to Granville

Red Barn, Quechee: An illustration of "rural scenic character" | *© Jericho Hills Photography*

Policies: **Scenic Resources**

Policies

1. Where development is proposed in areas of scenic value (including prominent ridgelines or mountaintops, highly scenic areas with distant views, scenic agricultural land, scenic areas highly visible from a public corridor, built environments with scenic value, and industrial or commercial development in areas of scenic value), because they possess scenic views, contain land with historic or scenic significance, or are highly visible within a scenic context, design plans must:
    a. Maintain the prominent natural feature of the developed area;
    b. Work toward enhancing or retaining views;
    c. Minimize adverse impact on views and areas of historic significance;
    d. Minimize contrasts with areas of historic significance; and
    e. Reflect traditional settlement patterns.
2. Project planners must minimize the adverse effects of strip development on existing visual resources by consideration of the following design principles:
    a. Integrate landscaping into parking areas;
    b. Encourage compact and densely developed projects that utilize land efficiently;
    c. Place street trees as buffers between traffic arteries and internal drives;
    d. Use unobtrusive signage;
    e. Vary the pattern, number, size, and location of structures within the site;
    f. Employ screening plans for visually objectionable features on the site; and
    g. Minimize access roads or curb cuts onto public highways and use of common access drives.
3. Given their unique visual experience, roads exhibiting exceptionally high scenic and cultural values, and determined to be of local or state significance, must be constructed or improved with due concern for the special scenic qualities inherent to the roadway and roadway fringe. Substantial modifications or off-alignment options that unnecessarily destroy the special characteristics of such roadways are not consistent with this Plan.
4. It is appropriate that municipalities, TRORC, and other entities employ a process for evaluating impacts and recommend design characteristics to be considered by those involved in the review and preparation of development proposals.

E. Outdoor Lighting Design and Management

Issues and Opportunities

Increased development in the Region in recent decades has brought about a corresponding increase in the use of outdoor lighting. While increased lighting can be seen as an inevitable result of growth, there is a concern that excessive and unplanned lighting results in unwise and uneconomic energy use, contributes to "light pollution," and affects our ability to view the night landscape, as well as creating an adverse impact on the character of our historic villages.

In May 1996, the Chittenden County Regional Planning Commission published *Outdoor Lighting Manual for Vermont Municipalities*. The suggestions and recommendations contained in the Manual form the basis of many of the design principles and issues reflected in this section of the Plan.

Choosing appropriate light sources and intensity makes good economic and environmental sense. By selecting a lighting design that enhances nighttime comfort, our town centers and other areas planned for concentrated mixed use will be better served. This results in a more efficient

and compact land use pattern and a sound transportation strategy for the Region.

Using a large quantity of light does not guarantee good visibility. Overlighting can cause problems that hinder good vision. Lighting problems also arise when competing properties are illuminated at very different levels. For example, a brightly lit auto sales parking lot situated next to an adequately lit restaurant can make the restaurant look dark by comparison. Studies have shown that this leads to "competitive" lighting—more light being added to reduce the risk of not being seen. This results in more lighting equipment, higher electric bills for businesses, and loss of character in an area.

Using the minimal amount of light necessary to allow adequate visibility for a site decreases sky glow and avoids escalation of light levels. Glare is another lighting issue facing growing communities in the Region. Glare is caused by misdirected fixtures or unshielded lamps. Light that is not directed toward the ground or toward the intended surface can shine into the viewers' eyes, impairing vision and causing potential safety problems.

Sky glow, or reflected light from surfaces, is visible in the night sky over towns or large commercial or industrial complexes. Sky glow is a form of "light pollution." Sky glow contributes to a loss of our ability to see stars and other celestial elements of our galaxy. Techniques to reduce the amount of illumination shining directly into the sky can reduce sky glow and the overall level of lighting needed.

Since the early 1970s energy crisis, large-volume users of electrical lighting have sought alternatives to conventional lighting. Several towns and many businesses in the Region have retrofitted street lighting and parking areas to high pressure sodium (HPS) fixtures. Light emitting diode (LED) technology is rapidly becoming a favorable option for outdoor lighting. LED lighting provides an alternative to HPS lighting that is more energy efficient, provides higher quality lighting, and may have a significantly longer life.

Security lighting is another popular use of outdoor lighting designed to protect people and property. Interestingly, studies by lighting professionals and those in the field of security show that light itself does little to prevent crime.[2] Other factors such as gates, locks, alarm systems, and guards are far more effective means to deter crime. However, lighting can act as a psychological deterrent to crime by increasing the chance in an offender's mind that he or she will be seen. Therefore, good security lighting should be designed to produce good visibility. This should be accomplished with even light that is not too bright, which could produce glare or create shadows.

Goals, Policies, and Recommendations:
Outdoor Lighting Design and Management

Goals

1. The nighttime ambiance and aesthetic qualities of village centers and other places are preserved by illuminating them for safety and convenience in ways that enhance the best qualities of streets, architecture, and public spaces.
2. Outdoor lighting systems designed to conserve energy and minimize life cycle costs are used.
3. Lighting design that is creative and functional, consistent with these lighting goals and policies, is encouraged.
4. Technical guidance and support are provided to municipalities and others on lighting trends, needs, and opportunities.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations:
Outdoor Lighting Design and Management

Policies

1. In developing lighting plans, design light levels and distribution should be appropriate for the proposed use of the site and compatible with the character of the neighborhood. New lighting installations should be designed to minimize glare, to not directly light beyond the boundaries of the area to be illuminated or onto adjacent properties, and to not result in excessive lighting levels.
2. For larger projects, lighting professionals should follow lighting design guidelines and other technical information established by the Illuminating Engineering Society of North America (IESNA). Additionally, project planners should give due consideration to the guidelines set forth in the *Outdoor Lighting Manual for Vermont Municipalities*. Project designers are encouraged to utilize fixtures to reduce glare. Where a light source is particularly bright compared to its background, use of cut-off or shielded fixtures to direct light downward or a reduction in the amount of light being generated is encouraged.
3. Project designers are encouraged to utilize fixtures to reduce glare. Where a light source is particularly bright compared to its background, use of cut-off or shielded fixtures to direct light downward or a reduction in the amount of light being generated is encouraged.
4. Excessively high lighting levels for uses in rural or very low residential areas are inappropriate.
5. Lighting levels for gas stations and convenience stores and similar uses should only be sufficient to facilitate the activities taking place in such locations. Lighting schemes that serve as advertising or to attract attention to these uses should be discouraged. Signs or other forms of advertising should be used for these purposes. Excessive pole height and brightness of lighting fixtures should be prohibited.
6. Illuminated signs that are excessively bright, causing glare and illuminating surrounding areas, are inappropriate. Large illuminated signs can be disruptive to rural areas or historic villages and should be carefully evaluated and discouraged.
7. Lighting designs should address the negative effects of sky glow. Project designers should advocate for lighting plans that minimize light pollution without unduly compromising safety, security, or utility. Methods to be considered for minimizing sky glow are:
    a. Directing luminaries downward, toward the ground;
    b. Using LED lights;
    c. Turning lights off after hours;
    d. Reducing illumination levels; and
    e. Prohibiting rays of light from being emitted above 90 degrees from luminaries.
8. Outdoor lighting schemes should employ generally available mitigating steps to improve their harmony with their surroundings, taking into consideration, among other things, the type and density of land use presently in existence, the type of topography, and whether the area has scenic value.

Recommendations

1. TRORC should assist local and state policymakers in evaluating lighting options. TRORC will consider sponsorship of educational workshops for planning commissions, design professionals, and others to acquaint them with the principles of good lighting design.
2. Towns interested in planning for outdoor lighting in their communities should consider using their municipal plans to establish goals and objectives for lighting. Additionally, consideration should be given to incorporating a lighting section into a town's zoning ordinance to cover lighting installations in all or parts of the town.
3. TRORC staff should continue to work with Vermont's public utilities and design professionals to evaluate lighting technologies and efficiencies.

Historical, Cultural, Archeological, and Scenic Resources Endnotes

1. PlaceEconomics, "Measuring Economic Impacts of Historic Preservation," Advisory Council on Historical Preservation, 2013, https://www.achp.gov/sites/default/files/guidance/2018-06/Economic%20Impacts%20v5-FINAL.pdf.
2. Chittenden County Regional Planning Commission, "Outdoor Lighting Manual for Vermont Municipalities," May 1996, http://www.darkskysociety.org/handouts/vermont_muni_lighting_manual.pdf, 19-20.

Middle Bridge, Woodstock | © John Knox

HOMES IN THE REGION

8

Chelsea | © John Knox

A. Background

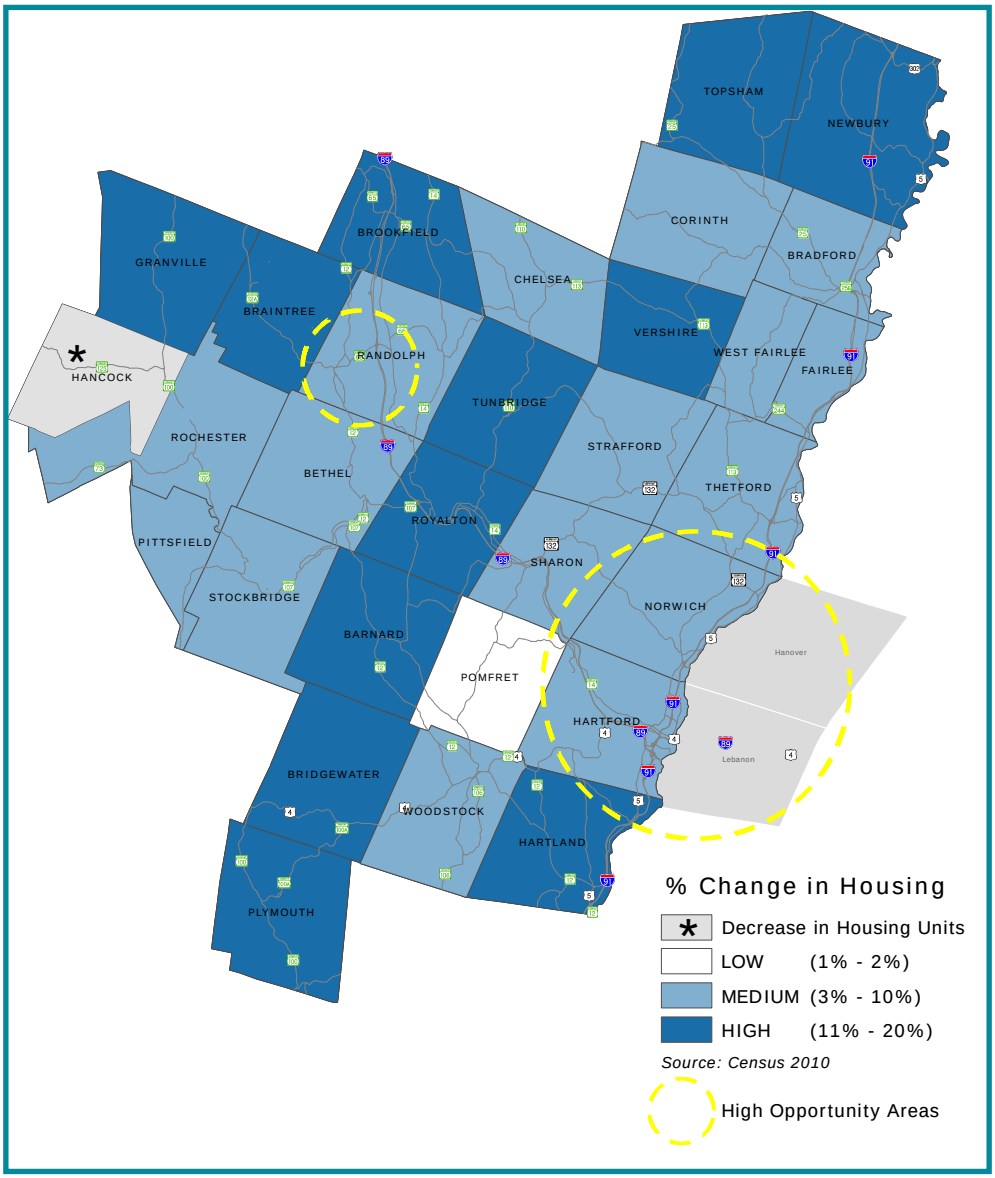
General Trends

During the 2000-2010 period, the Two Rivers-Ottauquechee Region saw moderate growth in the number of homes in spite of the economic downturn of 2008 (see Table 16, Appendix F). The Region as a whole is typified by a tight and costly housing market that does not adequately provide the types and availability of homes necessary for current residents or for younger families and others we want to attract to fill workforce needs. At the same time, the second-home market has become an even larger component of the regional housing market, according to 2010 Census data.

Continued increases in purchase and rental prices of homes, coupled with the limited housing supply, restrict first-time home buyers from getting into the market. These buyers are both people wanting to move to the Region for jobs and younger families ready to buy a home. Additionally, many people who successfully attain homeowner status find their income does not adequately support the expense of homeownership (see Tables 17 and 18, Appendix F). Municipal employees, teachers, service workers, and skilled tradespeople, among others, are confronted with limited housing options and high costs, including costs associated with transportation. There are real costs to towns when employees must commute considerable distances to other towns where they can't afford to live: road crews can't respond as well to brief storms, police take longer to be called in, and the feeling of helping one's own community lags. This problem is not limited to low-income households; skilled workforce recruits and young professionals increasingly find themselves burdened by housing costs in the Region. Many businesses rank housing costs as their number-one impediment to attracting new talent and economic growth.

According to Census data, the State of Vermont's population is projected to increase by 88,000 residents by 2030. At the same time, the elderly

Figure 8-1: Percentage of Change in Housing Units, 2000-2010



Map Source: TRORC

population in the State is projected to increase by 91,000.[1] As a Region, we need to ensure that we have the capacity to support this growing segment of our population, namely with respect to services and affordable housing opportunities. Increasingly, seniors are opting to maintain independence and live at home for as long as possible, particularly in light of the rising costs of elder care facilities.[2] However, these homes are often much larger than they need and not suited for the elderly. Many seniors could move to smaller, more accessible homes and apartments (especially if such housing were in their towns so they could retain their social circles), but these options are largely not available in their communities. Aging in place ensures that a person is able to maintain their quality of life as they age, allowing retirees to age happily and healthily in homes of their choosing that take into account the needs of seniors (single floors, accessible doors, smaller yards, etc.). Aging in place allows communities to keep their aging populace, conserving vital sources of local knowledge and a cadre of volunteers, as opposed to compelling them to move to facilities at a great distance from their homes and families. Given that nursing home care expenses are currently costing the State millions of dollars annually, Vermont officials would like to accommodate seniors' wishes to remain home longer as well.[3]

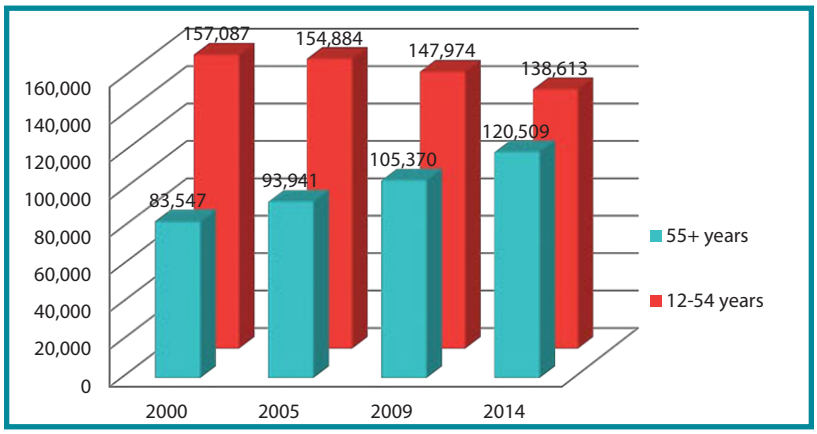
Regional Housing Challenges

The Region faces numerous housing challenges that this chapter and its policies seek to address. The following list, while not exhaustive, illustrates some of our most pressing housing issues:

- A lack of construction of homes of the appropriate types and prices needed for residents and newcomers throughout the Region.
- Poor infrastructure in town and village centers, making it harder for these areas to attract in-migration and provide the needed housing growth.
- A lack of developable flat land in areas serviced by municipal water and/or sewer systems.
- The high cost of land in many towns.
- The aging of a significant part of our population and the need to develop more elder housing and care facilities as well as other measures that ensure seniors can maintain their lifestyles in a manner that fosters continued independence.
- A scarcity of housing that is affordable across the income spectrum, both for purchase and for rent, to accommodate the Region's current and future workforce.
- Limited adaptive reuse of buildings in town centers, housing conversions, and creation of accessory dwelling units, particularly in growth centers.
- The prevalence of most new construction as scattered housing away from compact designated growth centers, which puts a strain on municipal resources and furthers fragmentation.
- Regulatory burdens restricting housing development, especially around multi-family houses, and permitting appeal processes that make new housing construction difficult.
- The large number of residents burdened by the costs of their current housing (see Figure 8-6).
- Widespread resistance to increasing the density of housing.

Roadblocks toward the provision of "affordable housing" are pervasive, perhaps in part due to the misunderstandings commonly associated with workforce housing. False notions around declining property values, increased traffic, and alteration of existing neighborhood character are commonplace and hinder the creation of integrated, mixed-income, mixed-tenure neighborhoods. In fact, affordable homes help a community prosper. They allow new families to move to town, bringing in fresh energy, children for schools, and replacement workers for an aging workforce. New small, accessible units let seniors safely stay in their towns and lead independent lives. Rentals that are affordable provide competition so that apartment quality is kept high and renters can save for a down payment. Housing that is affordable frees up income that is then spent on the local economy for food, clothing, and services.

Figure 8-2: Vermont Households by Age of Householder



Sources: VHFA Analysis of U.S. Census Bureau 2000 SF1 Table P-21; American Community Survey 2005 Table 25007; and Nielsen Claritas estimates (2009, 2014)

Local processes and the Act 250 process can hinder projects or raise costs, especially if there are appeals. However, this challenge can be avoided or improved with state exemptions available in compact centers and good zoning.

B. Characteristics of Our Homes

Number of Homes

People live in homes. Some rent and some own.

Some homes are small apartments and others are large estates. Though we don't call where we live a "housing unit," that is the term the U.S. Census uses to define separate living quarters, whether they are conventional houses, apartments, mobile homes, or rooms for occupancy. According to the U.S. Census Bureau, there were a total of 31,486 housing units in the Region as of 2010, an increase of 9.2% from 2000 to 2010. The 1990s saw a more modest growth rate of 7.2%, following the 1980s and a 22.8% boom in growth. Both the Region and the State grew at fairly similar rates from 1980 through 2010, with 43.8% growth for the Region and 44.5% for the State.

Only one town (Hancock) in the Region saw a decrease in housing units between 2000 and 2010 (see Table 16, Appendix F). Our largest towns grew slowly, and several smaller towns had the highest growth rates between 2000 and 2010, some within close range of high opportunity areas and others likely due to lower land costs.

During the 2000s, Newbury experienced the most dramatic change, adding 225 new units for a growth rate of 19.5%. The four towns with the next highest rates of growth in housing units from 2000 to 2010 were Bridgewater (18.2%), Brookfield (16.6%), Vershire (15.1%), and Royalton (14.8%).

Several factors influence new housing growth: the relative cost and availability of real estate, a healthy and vibrant economy, good schools or school choice, and the comparative ease of access to employment centers. Certain towns have seen growth in second homes, which is partially attributable to access to recreational opportunities in the Region and other scenic and cultural opportunities.

VHFA's 2013 "Housing Needs in East Central Vermont" study looked at projected growth in households in our Region, with particular emphasis on those in Windsor and Orange Counties. If VHFA's anticipated projections hold true, Windsor County will see a need to house only 20 additional households per year between 2010 and 2020; and Orange County will see a need to house 90 additional households per year between 2010 and 2020. However, the study also highlighted the current pressing need for 675 additional elderly housing units and a further affordable 4,409 workforce housing units for existing residents who are currently cost-burdened by housing. Finding the most suitable locations for the Region's current and anticipated housing needs is imperative to accommodate the needs of the Region's aging population and the population segments the Region wishes to attract. Accommodating these needs will help keep communities vibrant and thriving. (For further information, please see "Housing Needs in East Central Vermont," Appendix G.)

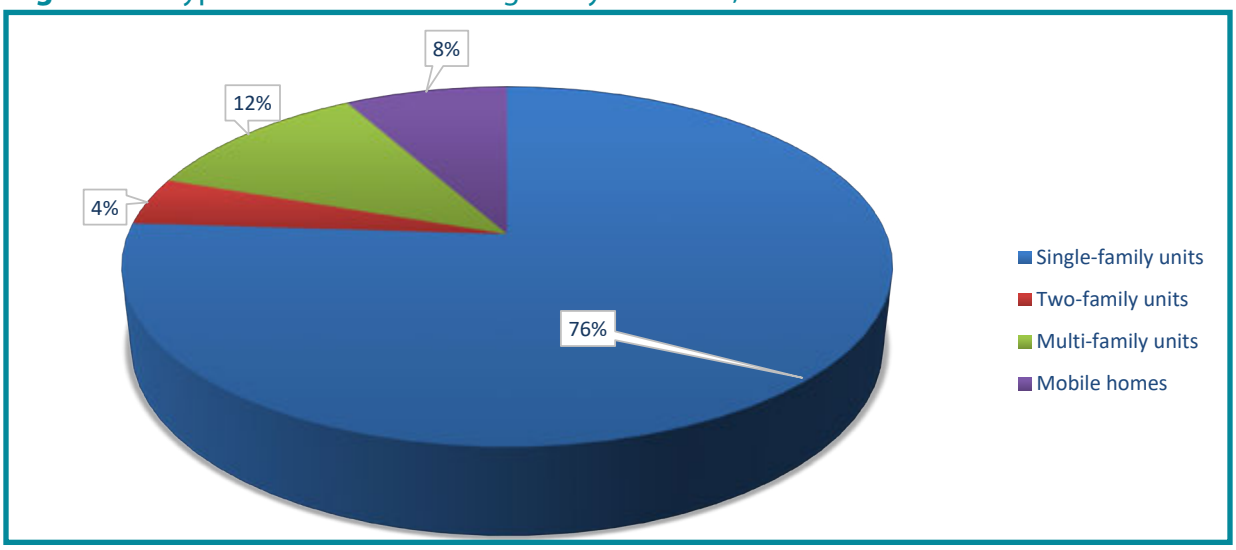
Types of Homes

Single-family homes are the most common housing type in the Region. The second most common type of housing unit is multi-family units (which can range from a triplex to an apartment building). The larger communities with defined centers and in closer proximity to employment centers have the largest proportions of multi-family housing units.

Mobile homes constitute only 8% of the overall housing stock throughout our Region, but these homes offer low- to moderate-income homeowners a financially accessible housing opportunity. The towns with the largest percentages of mobile homes in 2016 were Braintree (23.8%), West Fairlee (20.1%), Hancock (17.6%), Topsham (16.5%), Royalton (14.7%), and Sharon (14.7%), according to the U.S. Census. While older mobile home units may be much more affordably priced than other housing opportunities for many residents in our Region, their lower initial cost also comes at the expense of thermal and energy efficiency. It is estimated that owners of manufactured homes in Vermont pay up to 66% more of their income on energy than owners of brick-and-mortar homes do.[4]

In response to the ownership cost associated with older mobile home units and the fact that 15% of

Figure 8-3: Types of Homes in the Region by Structure, 2016



Source: Housingdata.org

homes damaged by Tropical Storm Irene were mobile homes, the Vermont Energy Investment Corporation, in conjunction with the Vermont Housing and Conservation Board and other partners, have designed and created new Vermod Nordic Homes. These homes feature numerous energy-saving design elements and are priced at under $125,000 per unit. Vermod homes have been constructed in the Region in White River Junction and may become much more of a feature of the Region's housing market, particularly where incentives are available to homeowners to defray the unit price.[5]

Single-family homes are more prevalent in the Region than in the State overall. Additionally, the TRO Region has significantly lower percentages than the State of two-family and multi-family housing opportunities, particularly with respect to multi-family housing (11.3% for our Region compared to 16.6% for the State). Growth in these latter housing sectors will be necessary to increase housing opportunities for low- to moderate-income households. It is also important to note that the market for single-family homes for sale is incredibly tight for those seeking housing near the median price of $173,000, and more has to be done to ensure growth within that area as well.

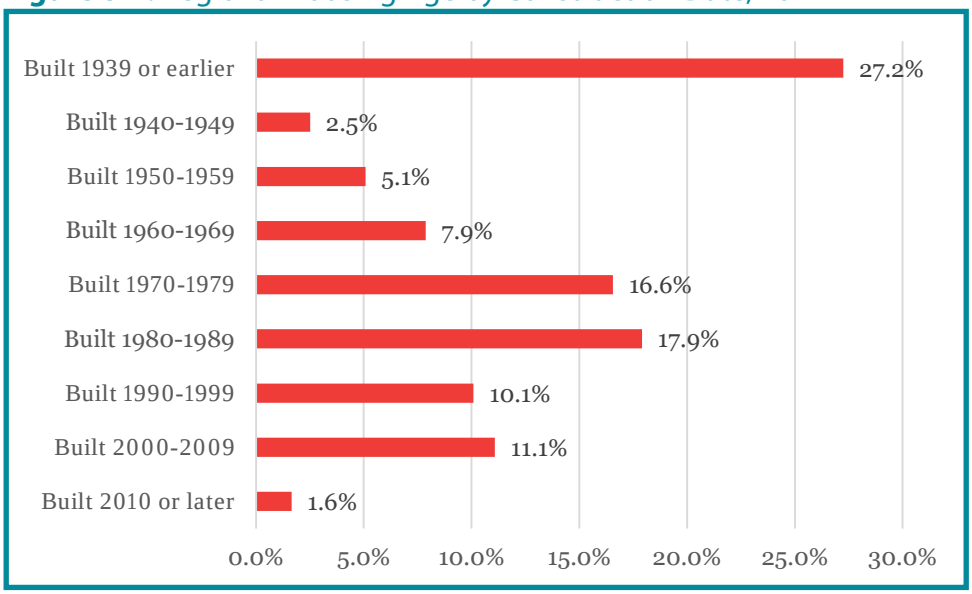
Housing Age

The age of the Region's housing stock, like much of the rest of Vermont, is skewed heavily toward older homes that are increasingly more costly to maintain and heat and may be financially burdensome to their owners. The greatest percentage of housing in this Region was built prior to 1939 (27.2%); the Region's slowest growth era was 1940–1959 (7.6% cumulatively). Much of the Region's housing stock (42.7%) predates 1970. Likely this also means that there are a large percentage of homes that have the existence of lead paint. Renovation, retrofitting, and general maintenance on these properties are imperative in order to ensure the health and well-being of residents just as much as to conserve energy and maintain home values and overall aesthetic appeal. Larger, older homes may offer opportunity for additional units if the residential zoning permits multi-family housing.

U.S. Census data show that only 12.7% of the Region's housing stock has been built since 2000, which is similar to the state percentage of 13.4%. However, ten towns experienced higher than average rates of housing construction since 2000, with three much higher than the regional percentage: Barnard (24%), Sharon (21%), and Stockbridge (19.9%). Three towns experienced

significantly below-average rates of construction in the 2000s: Braintree (7.5%), Pittsfield (6.9%), and Bradford (6.3%).

Figure 8-4: Regional Housing Age by Construction Date, 2017



Source: 2012-2017 American Community Survey 5-Year Estimates

Figure 8-5 depicts the breakdown of new housing construction in the Region by selected timeframes.

Housing Occupancy

The Region has a shortage of single-family, two-family, and multi-family housing, as illustrated by vacancy rate numbers from the 2000 and 2010 U.S. Censuses. This is a region with a strong second-home and seasonal-home housing market, which can distort overall figures for vacant homes for rent or purchase on a year-round basis. To interpret the vacancy rate numbers, we must extract just the rate that applies to primary residences and not allow the vacancy rate to be skewed by seasonal residences. In 1990, the vacancy rate for the Region's primary residences (those having year-round occupation) was 6.6% (see Table 20, Appendix F). In 2000, it dropped to 4% and remained fairly steady between 2000 and 2010 (3.99%). A vacancy rate at or below 3% is considered to be a "functional zero." There are deemed to be essentially no vacant units at 3% or lower because obstacles like substandard conditions likely keep the vacant units from being inhabited.

Vacancy rates in the Region are some of the lowest in the State as demand outstrips the supply of properties. This in turn increases prices for financially burdened residents.[6] Steady job growth, low unemployment rates, and a shortage of housing development (especially housing that is affordable to low- and middle-income earners) have given us a very tight housing market.

Housing Tenure

Historical Census figures on housing tenure reveal the proportions of owner-occupied housing units and renter-occupied units. Between 1990 and 2000, the Region's housing stock became even more owner occupied, a trend that has steadily continued since 2000, with growth in owned units continuing to outpace rental unit opportunities (see Table 21, Appendix F). For Census purposes, housing units, both rental and owned, are considered occupied when the property in question is the usual place of residence for the individual(s) living there.

The majority of the Region's housing units are occupied by their owners (78.49%), more so than the state average (75%). Only four towns in the Region have less than the average state or regional percentage of owner-occupied homes: Hartford (71.8%), Randolph (71.7%), Bradford (69.7%), and Royalton (59.5%). These towns all have downtown core areas, and, in the case of Royalton, a glut of rental housing opportunities for the Vermont Law School student and faculty population.

The construction of rental units has not kept pace with the construction of homeownership units in the Region. According to Census data, twelve towns in the Region have seen a decrease in the number of rental units available. High percentages of owner-occupied units and decreasing supplies of rental units make transition from rental to ownership difficult. As a consequence of this and the aforementioned prices of available housing stock in the Region, it is not often easy for prospective homebuyers to climb the property ladder, particularly when attempting to purchase property at an affordable price.

Home Aesthetics

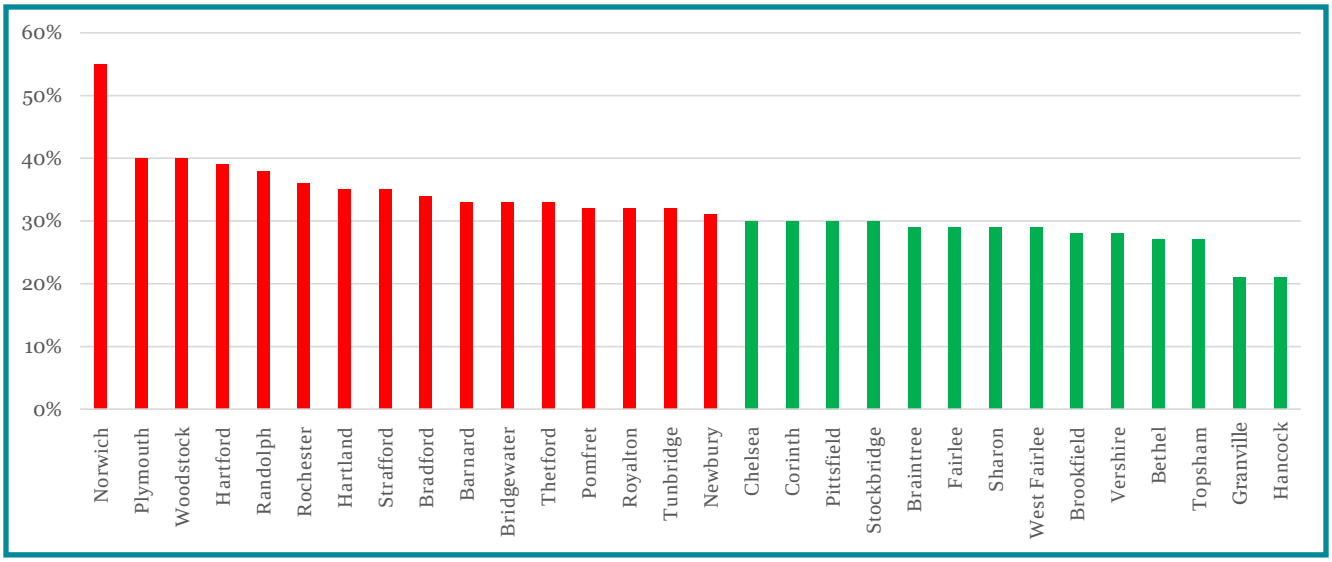
Aesthetic considerations of homes pose another housing hurdle in permitting. People may not want new housing to be constructed in their towns if the homes look unattractive. With a few exceptions, such as design control districts, homes do not go through permitting that addresses aesthetics. This problem can be addressed through good design. This may also include more screening by landscaping, increased setbacks, and placing multistory buildings against hills to encourage higher density while lessening the visual impact of the building height. Such efforts increase cost. Larger projects that trigger Act 250 or that involve conditional use approval at the town level do look at aesthetics.

C. Affording a Home

Whether someone can afford a home is measured based on the percentage of income that an individual pays toward housing, including rent and other associated housing-related expenses. Housing is no longer considered affordable when a household spends more than 30% of its income on housing and related expenses, be that electricity, heating, fuel, or other ancillary expenses. As can be seen in Figure 8-6, the average home in half of the Region's towns is unaffordable by this measure. Thirty percent is the commonly employed HUD-defined affordability threshold in housing data analysis and in financial and banking transactions, such as determining mortgage eligibility requirements. When housing costs exceed this threshold, the excess housing costs place strain on other financial decisions in both the short and long term, creating burdened households.

As the retirement-age segment of the Region's population living on a fixed income increases, so does the need to consider housing provisions that allow older generations to age in place without the need to move out of their community.

Figure 8-5: Average Housing Costs as a Percentage of Income in TRO Towns



Source: HUD Location Affordability Index, 2014

Further, a large portion of the Region's population is comprised of younger people who often only have access to lower-wage jobs, and they are precluded from entering the property market as a direct result. These population groups rely on access to housing that is affordable within their income brackets. It is also important that this affordable housing be near compact growth centers so that both the elderly and younger low-wage workers have access to transit, public services, and health centers. Both younger and elderly populations are best served by increasing the numbers of apartments, condominiums, and small starter homes, and assisted living and other care home opportunities in and around these compact center areas.

The cost of land and housing is a function of access as well as travel time to key service, retail, and employment centers. One major consequence of the housing shortage in the Region has been the continued increase in commute times from towns in the Region to larger employment centers, which are often outside of the TRO Region. While some housing development has occurred in traditional growth centers, notably projects in Hartford recently, most of the single-family development has occurred in the towns that border these centers, as land and homes are more favorably priced in outlying towns. But there are direct costs associated with longer commutes—the clearing of undeveloped land, road construction, and construction of private water and septic systems—as well as more indirect costs such as poorer health from more driving and more pollution. A study of 2010 Census transportation data by TRORC found that over 20% of individuals are traveling 50 or more miles to work. Lengthy commutes cost the average resident of Windsor and Orange Counties $13,030 per year in transportation costs alone, based on data from the Department of Housing and Urban Development's Location Affordability Portal (https://www.hudexchange.info/programs/location-affordability-index/). This is more than many people should be paying for their homes!

When viewed in terms of affordability for the median-income resident in the Region's towns, most of the housing stock is valued in excess of residents' financial grasp, particularly in the towns of Hancock, Strafford, Pittsfield, and Norwich (see Table 17, Appendix F). Spending such a large percentage of income on housing has repercussions that trickle throughout the economy.

Within the TRO Region, it is common to find towns where a large percentage of residents are living well in excess of the HUD-defined level of housing affordability. Indeed, according to HUD's Location Affordability Index, neither Windsor County nor Orange County qualifies as being affordable when housing and transportation are considered together.

In recent years, the cost of housing throughout Vermont has increased along with increases

East Topsham | © *John Knox*

in food, fuel, and transportation costs. These housing costs have outstripped increases in income that ordinarily absorb the shock of rising costs associated with inflation. Lack of affordable housing across all socioeconomic sectors means that financially burdened households (paying at or in excess of 30% of their income on housing) make sacrifices, including lowering fuel consumption in colder months, decreasing visits to medical professionals, delaying necessary home repairs, and failing to adhere to retirement planning needs and investments in education. These decisions affect the residents' quality of life, but residents also decide not to go out to dinner, buy a new jacket, or replace worn tires and make myriad other decisions that result in lower total economic activity.

According to the 2019 update of "Out of Reach," produced by the National Low Income Housing Coalition, Vermonters earning an annual wage of $47,375 ($22.78/hour) can afford the Fair Market Rent (FMR) for a two-bedroom apartment.[7] Coupled with rising costs of goods and services that produce a small decline in real income, fewer residents are able to afford living in Vermont.

A further complication in assessing the true cost of properties is the issue of housing development in rural areas that lack public sewer and water. Only eight of our Region's thirty towns have both municipal sewer and water facilities (Chelsea, Randolph, Bethel, Rochester, Royalton, Woodstock, Hartford, and Bradford). Lacking both of these, or even lacking one, places logistical and practical restrictions on property lot sizes by requiring more land and putting in on-site water and waste treatment, raising the initial cost of a house by at least $15,000. Smaller lots (e.g., parcels of one acre or less) that would be more affordably priced for low- and moderate-income households may not be adequate to build on if the landowners are required to install on-site water and septic systems for a property, assuming such lots are even available in towns. Consequently, when a town lacks these services, it may limit the number of future residents as they cannot afford larger parcels of land to build on.

Regional Housing Concepts, Fair Share Housing, and Fair Housing

Low- and moderate-income households, and even households making well above the median income, continue to have difficulty finding affordable housing in desirable locations. This situation does not meet the goals set out in statute for Regional or Town Plans.

All towns are responsible for providing a realistic opportunity for the construction of their share of the Region's affordable housing supply, which would be affordable to people making 80% of the median income or less. The "fair share" housing concept originated from the *Mount Laurel* legal decisions of 1975 and 1983, wherein the New Jersey Supreme Court declared that municipal land use regulations that prevent affordable housing opportunities are unconstitutional.[8] Therefore, a municipality cannot use its zoning to foreclose the opportunity for any class of people, especially low- and moderate-income families, to acquire affordable housing.

Mount Laurel's principal argument in support of its zoning plan was that limiting affordable housing was a good fiscal move, designed to limit an increasingly heavy burden on homeowners for local taxes and school costs. While the Court was sympathetic to the need to control costs, it found that the municipality could not legitimately accomplish this end by restricting certain types of housing (i.e., mobile homes and multiple housing dwellings). Vermont planning statutes echo this intent.

The Vermont Municipal and Regional Planning and Development Act (24 VSA Chapter 117) places responsibilities and requirements on municipalities and regional commissions. Essentially, the *Mount Laurel* concept discussed above has been integrated into the Act in several places. Exclusionary zoning practices are expressly prohibited. All types of housing must be allowed in towns, including accessory dwelling

units, multi-unit residences, mobile homes, mobile home parks, modular or prefabricated housing, and residential care or group homes.[9] Additionally, as stated in §4382 of the Act, all municipal plans must include "A housing element that shall include a recommended program for addressing low- and moderate-income persons' housing needs as identified by the regional planning commission pursuant to §4348a(a)(9) of this title."[10] Regionally approved Town Plans must work to ensure the availability of safe and affordable homes, and both mobile homes and multi-family homes cannot be shunted off to far corners of the town but be able to locate in areas similar to single-family homes.[11] It is not necessary or even proper to debate if a town or the Region wants affordable homes; that issue has been settled by the Legislature. What this Plan tries to offer, and what is needed in local plans and bylaws, are ways to meet these goals.

It is in the Region's interest to affirmatively advance the concept of fair share housing. Towns should be aware that a new section of statute was added several years ago requiring the attorney general or a designee to "investigate when there is a complaint that a bylaw or its manner of administration violates subdivision 4412(1) of this title, relating to equal treatment of housing and adequate provision of affordable housing." If the violations continue after a town has been told to correct them, the court shall order the municipality to grant all requested permits and certificates of occupancy that were wrongly denied.[12]

A little-known provision of state law allows for the creation of municipal housing commissions. These commissions can take some of the workload off of planning commissions and can also work in areas outside of planning and regulation on solving the dilemma of providing homes that are affordable. Subsection 4433(5) of Title 24 lists the powers and duties of housing commissions. An abbreviated list of those powers and duties is as follows:

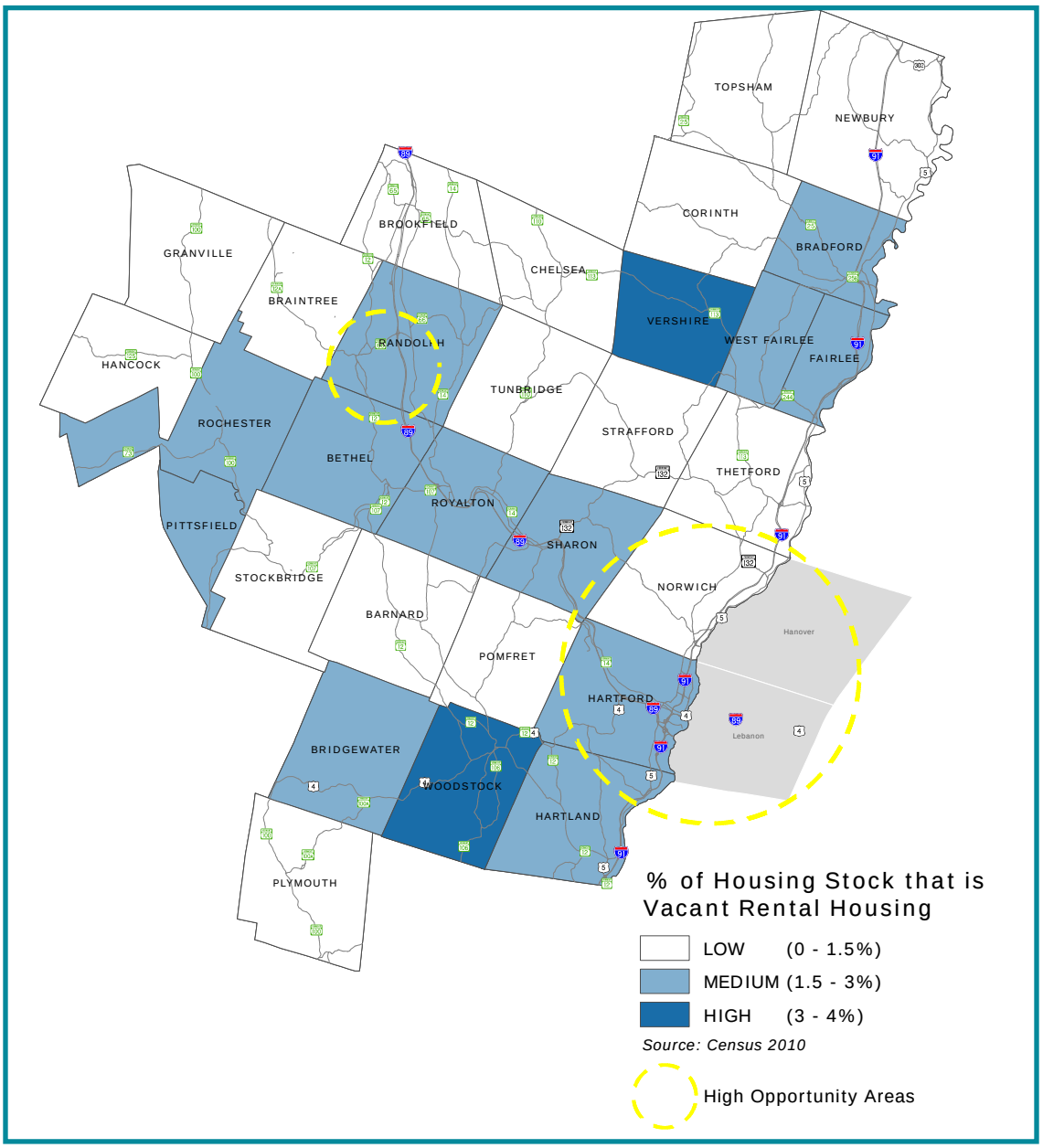
- Make an inventory and identify any gaps.
- Review municipal regulations and make recommendations, such as increasing allowable densities to increase the possible number of affordable housing units.
- Assist appropriate municipal panels and district environmental commissions by providing testimony on the housing needs in town when there is a pertinent application before them.
- Cooperate with the legislative body, planning commission, zoning board of adjustment, sewer or water commission, road foreman, or other organizations on affordable housing.
- Collaborate with not-for-profit housing organizations, government agencies, developers, and builders in pursuing options to meet the housing needs of the local residents.

Federal law prohibits people from refusing to sell or rent homes on the basis of race, color, national origin, religion, sex, or familial status (having children). In addition to these characteristics, Vermont law extends protection and prohibits housing being denied on the basis of sexual orientation, age, marital status, income level, survivors of domestic or sexual violence, or because a person receives public assistance.

Status of Existing Programs in the Region Supporting Fair and Affordable Housing

Subsidized housing is any housing that is publicly funded or supported. This public support can come in a variety of forms, including public housing, subsidies, nonprofit sponsored housing, cooperative housing schemes, and rent supplements. There are two basic approaches to reducing housing costs for low- and moderate-income families, the elderly, and other groups through subsidies. The first involves interest subsidies that reduce interest on mortgages to a level well below market interest, thereby reducing total costs required to cover homeownership or rental costs. The second approach involves direct

Figure 8-6: Percent of Housing Stock That is Vacant Rental Housing



Map Source: TRORC

subsidies to either a housing authority, a private developer, or a tenant to cover the difference between 30% of a tenant's income and rent.

In the State of Vermont and within our Region, there are numerous types of organizations that promote the availability of and access to affordable and fair housing:

- Two Rivers-Ottauquechee Regional Commission
- Twin Pines Housing Trust
- Randolph Area Community Development Corporation
- U.S. Department of Housing and Urban Development
- Housing Vermont
- Vermont Affordable Housing Coalition

- Vermont Housing Finance Agency
- Upper Valley Housing Coalition
- Vermont State Housing Authority
- Vermont Housing and Conservation Board

D. Housing Needs and Planning Implications

Density and the Location of the Region's Housing Opportunities: From Sprawl to Smart Growth

As detailed above, the Region needs significantly more homes to rent and buy in order for the market to be functioning well. We need not only more units but also units of a type and price to fit our current needs and those of people we wish to move here. Historically, our Region's development was characterized by growth focused around compact neighborhoods, central services, and a village green area at the heart of the community since there were no cars. Rural homes, scattered throughout the hills and valleys, were largely farms. Today, with vehicles commonplace, much growth occurs outside of town centers in a largely scattered fashion that runs counter to many town's policies directing growth in a way that preserves these denser historic settlement patterns around compact villages. Directing growth back toward village and hamlet centers, where there is most often municipal infrastructure in place to support growth, is key to a sound regional housing policy that is both viable and sustainable for our Region.

Such growth has the support of the Vermont Legislature, which passed a growth center statute in 2006 (24 VSA § 2790), emphasizing the economic, social, health, and other benefits of strong downtowns. The statute promotes growth that reflects Vermont's traditional settlement patterns and seeks to avoid sprawl. "Sprawl" can be defined as rapid and uncoordinated growth that is largely auto dependent and outside of compact growth areas. It is not dense. In Vermont, sprawl has increased dramatically over the past half-century or more. Sprawl increases our dependence on vehicular travel, and by extension fossil fuels, in order to access regional job centers, shopping districts, schools, and other services and recreational facilities. Further, sprawl has other economic and environmental impacts. Scattered development fragments the natural landscape that is so highly prized throughout the Region and State by obstructing open space, fragmenting wildlife habitats, and removing farms and woodlands from working use. (See Land Use chapter: Rural Areas, Forest-Based Resource Areas). Businesses in historic downtown areas can feel the financial impacts of this growth as people living farther afield from downtown areas rely increasingly on larger shopping areas that provide access to box stores and malls.

Smart growth redirects growth toward compact centers with a view to social, economic, and environmental sustainability for towns, the Region, and residents alike. It involves expanding the range of housing stock in rural areas in proximity to designated downtowns, villages, hamlets, and growth centers throughout the Region, with more equitable distribution of housing and employment opportunities and the necessary transportation links to connect these interests. Smarter, dense growth decreases burdens on municipal services, concentrating housing growth in areas that have access to public water and sewer and are within closer range of emergency services. This growth creates healthy, vibrant communities where natural and cultural resources are enhanced and the public health and welfare of residents is considered in development efforts.[13] Cleaning up brownfields, encouraging infill, and allowing for mixed uses in historic downtown areas will increase density and help apply smart growth principles.

Compact settlement principles, key to smart growth, are reinforced by the state planning and development goals (24 VSA § 4302), which seek to plan development in compact village and urban centers, as typified by historic settlement patterns. TRO Region communities can directly

further this goal through local regulations by promoting the use of density bonuses and clustered development incentives. One way to aid such growth is to target specific, suitable locations for development or expansion of existing village and hamlet centers, especially those that have municipal water and sewer systems and capacity for growth.

Inclusionary zoning, whereby a municipal ordinance requires that a given share of new construction be affordable housing units within reach of low- and moderate-income households, is one tool that towns may utilize to expand housing options in the Region. These units would exist alongside units that are available at the standard market rate. This practice is advantageous to property developers who may receive a density bonus, allowing a greater number of overall units to be built on-site and potentially boosting overall earnings. Within our Region, such ordinances could serve as an effective policy measure toward creating workforce housing and reducing economic segregation.

Another way to augment affordable housing stock, as mentioned above, is by creating more accessory dwelling units (ADUs). ADUs are currently permitted uses by right across the State; however, they are an underutilized feature of the local housing market in the Region. While the initial outlay of funds to convert or create a space suitable for an ADU may discourage homeowners from creating ADUs, their long-term benefits, namely as a revenue stream, may make them a viable and lucrative option. The advantages for towns are manifold as well: increasing the overall local housing supply; increasing the number of affordable housing units for young professionals and the elderly; preventing further sprawl; and increasing the tax base for towns, to name but a few.

Town Plans do not build houses, but they must seek to address the local need for additional housing. Plans need to contain language that support housing on a scale that meets the rough dimensions of the need. The placement of the homes is also important.

E. Emerging Issues/Solutions

Tiny houses, which are often considered to be 400 square feet or less, are rapidly growing in popularity around the country as an alternative to traditional housing. People who live in tiny homes are often attracted to the simpler lifestyle, minimal environmental footprint, and relatively lower cost that these homes offer. Tiny homes are still expected to adhere to regulations of regular-sized homes, so zoning and building codes may present legal challenges.

Housing co-ops and homeshares are emerging affordable options that are alternatives to traditional home occupancy. Limited equity housing cooperatives are owned by the residents and offer below-market buy-in for people with low or moderate incomes. Homeshares are formal programs that match owners with people needing housing. Homeshare Vermont is a service that helps to match homeshare hosts and guests.

Airbnb and other online marketplaces for short-term rental of homes have become popular alternatives to hotels and bed and breakfasts. Airbnb allows people to list their homes (or a room within their home) online, and guests can book the home or room through the online service. Because renting out homes on Airbnb is profitable, some homeowners choose to do short-term rentals aimed at temporary visitors instead of putting the home on the rental market. This can result in raised rents and a shortage of rental housing opportunities for town residents. In other cases, people or corporations buy up residences as they come on the market and convert previous primary dwellings to short-term rentals. Towns are grappling with this new trend.

Goals, Policies, and Recommendations: **Homes in the Region**

Goals

1. Sufficient decent and affordable primary homes (both rental and owned) are available now for residents and for needed newcomers.
2. Planning, design, and construction of homes minimize energy consumption and environmental impacts.
3. The existing housing stock for year-round occupancy is preserved.
4. New construction of homes is primarily centered in regional growth areas and, when possible, does not increase parcelization and fragmentation of productive or ecologically important farm and forest lands.

Policies

1. Increasing the availability of homes (both rental and owned) that are affordable to our residents is an urgent, high regional priority. Municipalities' plans must reflect their role in supplying the Region's housing stock as identified in the Regional Housing Needs Analysis and in ways that focus growth around historic settlement patterns.
2. When reviewing Town Plans and housing, TRORC will look for consideration of:
   - Aging in place
   - Accessible, safe housing
   - Low-income housing
   - Workforce housing
   - Fair housing that advances integration and inclusion
   - Energy efficiency
   - Connection to transit routes or walkability to services
3. Multi-family housing, assisted living facilities and group homes (including single room occupancy facilities), and senior housing are encouraged in close proximity to services in village, hamlet, and town centers and along public transport routes, especially in areas with adequate public sewer and water service.
4. Vermont should create additional state housing credits to supplement the limited supply of federal credits, which can finance the creation of senior housing units.
5. Housing projects of 10 or more market rate units must include an affordable component. Affordable housing developments are encouraged to have a mix of units so that some are market rate.
6. Innovative construction and renovation design techniques that enhance affordability, energy efficiency, occupants' health, and environmental suitability are encouraged.
7. Towns should plan so that most new residential development is near employment, transportation lines, and/or service centers.
8. Newly developed or rehabilitated housing that has been subsidized with public funds (such as grants, loans, or subsidies) should remain affordable for a period of at least 30 years.
9. Land trusts and other similar organizations must consider whether compatible residential development can take place on farm and forest parcels when drafting conservation easements.
10. Perpetuation and development of properly managed and sited mobile home parks to meet the need for housing in communities are encouraged.
11. New housing projects subject to Act 250 must minimize additional financial burden on municipalities and taxpayers by not locating on Class 4 roads, on steep slopes, or in remote areas.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Homes in the Region**

Policies (continued)

12. New housing developments shall not be located in NFIP floodways or in mapped special flood hazard areas outside of downtown, village, and hamlet centers and are discouraged from all areas at risk from flooding.
13. Mitigation measures to address the vulnerability of existing mobile home parks from hazardous events—such as flooding, fire, hazardous material spills, and other severe weather events—are encouraged.
14. Towns are encouraged to have state-designated Neighborhood Development Areas to trigger housing incentives for developers.
15. Towns are encouraged to serve core areas with public sewer and water improvements to enable more dense housing.
16. Towns should assess the impact of short-term rentals on their housing needs.
17. Programs such as homeshares, co-op housing, and land trust housing are encouraged.

Recommendations

1. TRORC will continue to assist nonprofit housing organizations in the development of affordable housing projects and programs when such efforts are consistent with the policies of the Regional Plan.
2. TRORC will continue to provide professional assistance to member municipalities in the identification of housing needs and implementation of local housing assistance programs, including revising regulations to encourage more housing to meet town needs and minimize development costs while still protecting community values and to qualify for a Neighborhood Development Area designation.
3. Community leaders within the Region will work with state housing agencies, nonprofit organizations, and lending institutions to ensure the availability of loan or grant funds for Vermonters to purchase, acquire, or improve their primary homes.
4. TRORC will continue to work with the State and towns on regulatory efforts to make quality construction happen.
5. Towns within the Region should actively cooperate with local and regional nonprofit housing trusts to develop and preserve new and existing housing, with mechanisms to ensure the perpetual affordability of that housing.
6. Community leaders, housing advocates, and TRORC must work to retain Vermont's innovative publicly financed home mortgage lending and housing assistance programs.
7. TRORC will assist towns in writing strong housing components in Town Plans that are based on current data that address proven needs. TRORC will actively help identify land that is suitable for development so that towns may work with developers and existing property owners to promote mutually beneficial partnership opportunities.
8. TRORC will educate communities on density allowances in towns, encourage communities to allow for ADU approval at the municipal staff level, and enhance local awareness of the need for workforce housing in the Region through community forums.
9. TRORC should offer assistance to towns to address aesthetic concerns about housing in ways that reduce permitting obstacles while resulting in quality projects.
10. TRORC will facilitate discussions with local land developers, bankers, and community leaders to better understand the structural and institutional impediments to providing new housing throughout the Region.
11. TRORC will work with housing providers and adjacent regional planning commissions to understand our neighbors' growth pressures and increase housing production that meets our joint needs.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Homes in the Region**

Recommendations (continued)

12. Towns and the State should provide incentives to property owners to rehabilitate existing vacant structures for housing in town, village, and hamlet centers that are compatible with existing neighborhoods. Towns should incentivize affordable housing through a variety of methods, including regulatory bonuses, easier permitting, and minimizing lot size, parking, and other requirements.
13. TRORC will represent the Regional Plan's housing policies to the Vermont State Legislature.
14. TRORC will support the public awareness campaign of the Vermont Housing and Finance Agency and facilitate the education of our towns on the Federal Fair Housing Law.
15. TRORC should work with towns facing pressure for short-term rentals so that they retain housing for residents while allowing such a business model to produce income for residents.

Homes in the Region Endnotes

1. Casey Klyszeiko, "Housing and the Needs of Vermont's Aging Population," Vermont Housing Finance Agency, September 2007.
2. Ibid
3. Ibid
4. "High-Performance Manufactured Homes Offer Comfort, Affordability to All," Vermont Energy Investment Corporation, http://www.veic.org/our-results/success-stories/high-performance-manufactured-homes-offer-comfort-affordability-to-all.
5. "Manufactured Housing Innovation Project," Vermont Housing & Conservation Board.
6. "Out of Reach," National Low-Income Housing Coalition, 2019.
7. Ibid
8. *So. Burlington Cty. N.A.A.C.P. v. Tp. of Mt. Laurel*, 336 A.2d 713 (1975); *So. Burlington Cty. N.A.A.C.P. v. Tp. of Mt. Laurel*, 456 A.2d 390 (1983).
9. 24 VSA § 4412(1).
10. 24 VSA § 4382(a)(10).
11. 24 VSA § 4302(b)(11).
12. 24 VSA § 4453.
13. "Downtowns, Villages and Historic Settlements: An Idea from the Past That Strengthens Our Future," Vermont Natural Resources Council, 2013.

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UTILITIES, FACILITES, AND SERVICES

9

Ice Harvesting in Brookfield | © John Knox

A. Background

The communities in our Region depend on a system of public, nonprofit, and private utilities, facilities, and services. These are needed to maintain the health and welfare of our citizens, as well as support a sound economy.

While TRORC currently does not have a direct role in maintaining these systems, it does have the ability to provide municipalities with guidance and technical assistance; to take a regional approach to prioritization of future investments, particularly investments by the State of Vermont; and to look forward at ways to improve our services. Compact regional land use patterns may generally improve the efficiency of such systems, such as identifying areas where future investments might have a regional benefit in these areas. Conversely, expansion of infrastructure and services to new areas may lead to unsustainable patterns of land use.

Nearly all services and facilities benefit from greater density and intensity of land development within a given area. More people can be served by fewer water lines, sewer mains, etc., if they are not spread out. Rural areas have many advantages, but they are inefficient for physical infrastructure.

Vermont's land use goals seek "to maintain the historic pattern of compact village and urban centers separated by rural countryside" (24 VSA §4302). While most would agree that this pattern is desirable, it is also challenging for communities to implement without the necessary infrastructure. Continued increases in density and development in many of our villages will eventually be unsustainable without water and wastewater facilities. In a number of our communities, space to develop new systems is limited due to geography.

Long-range planning for infrastructure investments and maintenance is essential to reduce fluctuation in annual tax rates. State statutes enable communities to create a Capital Improvement Plan (CIP) for the purposes of

planning and investing in long-range capital facilities. This is different from the Capital Budget and Program (24 VSA §4443), which is adopted annually following a hearing by the selectboard. The CIP is a schedule of capital investments over a number of years. Although most communities have some form of a capital savings account, many do not have a CIP. The CIP includes estimated costs and a proposed method of financing those costs. Also outlined in the program is an indication of priority and the order in which these investments will be made. Any CIP must be consistent with the Town Plan. An adopted CIP should be drafted with assistance from TRORC to ensure consistency with the Town Plan. The given town's selectboard has the ultimate decision as to whether or not such a budget and program is adopted.

From a regional standpoint, investments in municipal infrastructure must be made based on the population they will serve and on the most pressing needs. For communities with existing infrastructure and stable population numbers, capacity is not a significant issue, therefore priority for future investments is in modernizing or replacing aging infrastructure. This will make these systems more sustainable and affordable and will protect against loss of service. In addition, any opportunities to make improvements to existing systems that increase their energy efficiency should be implemented.

Vermont's population growth has flattened substantially over the past decade, and our Region is at a standstill. While population *growth* can influence the need for improved utilities, facilities, and services, so can changes to the *makeup* of a static population. An increased number of residents within a community can require additional roads, whereas an aging population can increase the need for health care. To ensure that essential systems are able to handle changes, long-range planning is needed.

Goals, Policies, and Recommendations: **Overall Utilities, Facilities, and Services**

Goals

1. The expansion, maintenance, or construction of new facilities and utilities will be financially sustainable for governments and taxpayers.
2. Investments in utilities, facilities, and recreation enhance the desired pattern of development which is compact village and urban centers surrounded by open countryside.

Policies

1. Public investments in governmental and public utility facilities, services, and lands should support existing and future development.
2. The scale, type, and design of major public utilities and facilities shall be undertaken so as to complement the future land use settlement patterns recommended in this Plan and relevant municipal plans. Public investments in municipal, regional, and state facilities should be located within existing or planned Regional Growth, Industrial, and Mixed-Use Areas.
3. Public facilities such as solid waste disposal facilities, correctional facilities, and wastewater treatment facilities shall be situated in an area where they best serve their purpose while minimizing negative impacts on the surrounding area.
4. TRORC supports the acquisition of future public and quasi-public utility sites, properties, or interests, when they advance the goals and policies of this Plan and relevant local plans.
5. The construction of primary educational facilities, health-care facilities, emergency facilities, post offices, libraries, and other public facilities should occur in or adjacent to existing or planned Regional Growth and Mixed-Use Areas, so as to maximize their convenience and accessibility to people, to minimize additional infrastructure improvement costs, and to contribute to the vitality of communities.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendation: **Overall Utilities, Facilities, and Services**
Policies (continued)
6. TRORC supports the development of innovative and stable sources of public facility funding to supplement traditional funding resources.
Recommendations
1. TRORC will foster partnerships between public investment planning and implementation activities and the private sector in a manner that advances the goals and policies set forth in this Plan. 2. TRORC should look into developing a capital budget for the Region.

B. Water Sytems

The TRO Region is largely a rural region, with a majority of water supply handled through individual on-site wells. Only a fraction of municipalities have public water systems, and in those municipalities, the systems serve a limited area—generally downtown or village areas. Additional community systems may serve a large development or neighborhood.

For villages and downtowns, water supply systems are a vital piece of infrastructure. Water systems allow communities to create greater population density than would be possible without them. Well-maintained public drinking water infrastructure is critical for public health, strong businesses, and a clean environment. Municipalities are required by law to create Source Protection Area (SPA) plans, which ensure that drinking water supplies will remain safe and untainted.[1]

There are 15 municipal water systems in 12 municipalities in the TRO Region. Most of the supply lines are in need of repairs or upgrades. Some systems suffer from inadequate storage or from poor line pressure. Many systems have poorly mapped lines due to their age (50 to 100 years old).

Potable water may be lost through leaking pipes due to age, damage from frost, or other causes. Losses can go undetected for years if the water gauges are not properly installed or functioning. Large leaks in water mains can and have caused damage to roads in our Region. During Tropical Storm Irene, several communities experienced damage to water lines that passed under the river, resulting in a loss of drinking water that was difficult to identify.

To increase the long-term sustainability of existing water system infrastructure, municipalities can implement water efficiency programs. These programs include installation of water meters, which can help identify areas of unusual loss or use, and water-saving devices. Water efficiency programs can reduce operating costs and reduce the need for additional sources of water or water storage facilities. Reductions in water usage can also lead to less energy usage to treat, heat, and dispose of water. Financial savings from these efficiency upgrades can be set aside to build cash reserves for future system investments.

C. Wastewater Treatment Systems

There are 12 wastewater treatment facilities in 9 communities in our Region. The bulk of these systems were originally built in the 1970s and 1980s, with periodic improvements being made in response to aging equipment or increasing demand. As time goes on, the cost of necessary upgrades for these facilities increases.

Wastewater treatment facilities suffer from sewer pipe leakage as well as older built connections that funnel stormwater from impervious surfaces such as rooftops, roadways, and parking lots into combined sewer and stormwater lines.

The majority of systems in our Region have at least 45 percent available capacity. Given that population growth rates have flattened substantially, it is likely that the design capacity of the systems in most communities will be sufficient, as long as they are maintained.

Wastewater treatment facilities and/or public water supplies will eventually be necessary in all communities' core areas if they desire to grow, create more housing, or attract businesses. Currently, the towns of Norwich, Hartland, Sharon, Strafford, and Fairlee are the highest priority for wastewater treatment facilities to achieve the State's goal of "densely populated villages and downtowns surrounded by open countryside." Hartland and Norwich are the largest communities in the TRO Region without wastewater treatment facilities. Fairlee and Strafford both have viable village centers that would benefit, both economically and in overall health, from the ability to concentrate more development within those areas.

Goals, Policies, and Recommendations: **Water and Wastewater Systems**

Goals

1. Municipal water and wastewater systems are secure, financially sustainable, well-maintained and energy efficient.
2. Municipal water and wastewater systems take into account the water quality of drinking water and watersheds.

Policies

1. Municipalities should create capital budgets and reserve accounts for utilities and facilities management and operations.
2. TRORC will support proposals to install, upgrade, and improve existing public water supplies and wastewater treatment facilities that serve Regional Growth, Industrial, and Mixed-Use Areas as designated in this Plan, as well as affordable housing in Rural Areas.
3. Proposals for upgrades, improvements, or expansion of water and wastewater treatment infrastructure that promote sprawl, strip development, and scattered land uses are not compatible with this Plan.
4. When systems are extended to service a new development, careful consideration must be given to the impacts of additional hookups along the length of the extension. The allowance of new hookups must not promote sprawl or strip development.
5. TRORC will encourage the location of community water supplies and wastewater treatment facilities primarily in Regional Growth, Industrial, and Mixed-Use Areas; however, systems designed specifically to supply appropriately scaled cluster housing projects in rural areas may be consistent with this Plan.
6. Land development within existing or planned Source Protection Areas that poses a reasonable threat of contamination to public water supplies is not compatible with this Plan.
7. TRORC will support water conservation measures to reduce demand for water and to promote the life span and efficiency of water and wastewater facilities.
8. TRORC will encourage installation of community wastewater treatment facilities and/or water supply systems in areas of existing concentrated settlement where conventional on-site septic systems and wells are inadequate for public health and development.
9. New water and wastewater systems should be designed to be as energy efficient and secure as possible.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Water and Wastewater Systems**

Recommendations

1. Municipal plans, per Vermont statute, shall identify and prioritize future capital improvements and major repairs, as well as estimate costs and financing for maintenance and future capacity.
2. TRORC will assist communities with the identification and prioritization of future capital improvements and repairs.
3. TRORC will offer capital budgeting workshops throughout the Region.
4. Water efficiency programs and codes should be adopted at the state or local level to reduce demand on municipal water systems.
5. TRORC shall seek grant opportunities to map water and wastewater systems throughout the Region.
6. When funding is available, municipal plans should inventory water and wastewater systems to identify current and projected capacity gaps.
7. Municipalities should conduct periodic auditing of all water and wastewater distribution systems to calculate infiltration and losses.
8. Municipalities are encouraged to adopt regulations or amend current regulations to promote dense development in areas with public sewer and water.

D. Solid Waste

All Vermont municipalities, either individually or as part of a solid waste district or an inter-municipal association, are required by Vermont law to adopt a Solid Waste Implementation Plan (SWIP). The SWIP documents town or district waste management facilities and articulates how solid waste will be managed over the next five years. All solid waste districts and inter-municipal SWIPs must be in compliance or consistent with the goals outlined in the statewide Materials Management Plan (MMP), which came into effect in June 2014 (Act 148). All waste districts and inter-municipal associations must, therefore, revise or rewrite their existing SWIPs to conform to the new MMP, stemming from Act 148.

In addition to being in conformance with the state plan, all SWIPs must be in accordance with any Town or Regional Plan.

The TRO Region is served by a total of six waste management districts, as well as one inter-municipal association. The Greater Upper Valley Solid Waste Management District covers a ten-town area, which contains a third of the Region's population, based on 2010 U.S. Census Bureau figures. The second largest service area is the Hartford Community Recycling Center, which covers 18 percent of the Region's population. It currently operates a solid waste/recycling transfer center on a 19 acre site (the former town landfill). The third largest waste management district is the White River Alliance, which covers eight of the Region's towns and roughly 17 percent of the regional population.

As of 2014, there are 25 active solid waste facilities throughout our Region that have been certified by the State. Presently, the Region has 7 recycling facilities, 4 composting facilities, and 11 transfer stations. A third of the Region's towns lack any waste management facility, and are instead reliant on their neighboring municipalities for waste disposal. In some instances, these towns find themselves two to three towns removed from a landfill or transfer station.

While the Greater Upper Valley Solid Waste Management District has transfer stations and recycling centers within its region, it is currently reliant on a landfill outside its region, in neighboring Lebanon, New Hampshire.

Universal Recycling Law

According to the Agency of Natural Resources (ANR), the average Vermont resident generated 5.18 pounds of waste per person per day in 2014. In 2012, Vermont adopted Act 148, commonly known as the Universal Recycling Law, to promote the universal recycling of solid wastes and keep more waste out of landfills. The law works by phasing in a required separation of waste materials over six years, giving municipalities and waste management districts time to establish necessary collection services and accompanying waste processing facilities for residents. Following this, the Secretary of the ANR implemented rules in the form of the Vermont Materials Management Plan (MMP), which came into effect in June of 2014.

Four goals serve as the basis of the state Materials Management Plan (MMP) vision:

1. To prevent waste from being generated;
2. To promote sustainable materials management, with a preference for efficient and best uses;
3. To minimize reliance on waste disposal (landfilling and incineration); and
4. To conserve resources, minimize energy consumption, and reduce greenhouse gas (GHG) emissions and other adverse environmental impacts.[2]

© Agency of Natural Resources

The biggest task ahead of solid waste management entities is providing residents, businesses, and municipal governments with education and guidance about their role in these new waste management requirements. Conducting this necessary outreach is a critical task to ensure proper compliance with the statewide MMP.

The MMP sets out eight implementation objectives:

1. Expanded education and outreach to schools, businesses, and the general public.
2. Extended producer responsibility and product stewardship.
3. Reduction in the statewide disposal rate (pounds per person per year).
4. The reuse, recycling, and composting of materials to reduce the amount landfilled.
5. Reduction of toxicity in the waste stream.
6. Improved availability of statewide infrastructure and services for waste reduction and diversion through convenient, consistent, and cost-effective services.
7. Improved measurement and progress of performance standards.
8. Development of sustainable financial structures to manage materials.[3]

The most obvious role for TRORC regarding solid waste is to provide outreach and education to our communities. As the ANR continues to implement the requirements of the Vermont MMP, TRORC can help guide our communities through those requirements, ensuring that the plan is implemented. Additionally, TRORC can continue to support our Region's solid waste districts when seeking permits through Act 250 or when renewing solid waste plans. Towns can consider consolidating solid waste services to cut costs; TRORC is able to assist communities with writing agreements.

Goals, Policies, and Recommendations: **Solid Waste**

Goals

1. Solid and hazardous waste generation in the TRO Region is reduced.
2. Reuse, recycling, and composting in the TRO Region is increased.

Policies

1. Solid waste collection systems should be coordinated to lessen costs and increase efficiency.
2. Products that are fully recyclable are encouraged.

Recommendations

1. TRORC will continue to assist member towns, alliances, and the Greater Upper Valley Solid Waste Management District in the update and implementation of municipal and regional solid waste plans.
2. TRORC will support and participate in any future discussions regarding the development of regional waste management services.
3. TRORC should assist towns in meeting the Universal Recycling Law requirements through outreach and education, with assistance from the Agency of Natural Resources.
4. All towns or districts of this Region are encouraged to contact TRORC offices regarding their current planning activities and determine if their SWIP revisions meet the overall goals and policies of this Plan.
5. TRORC should study the affordability of solid waste services in the Region.

E. Educational Facilities and Services

Access to a system of quality education is required to achieve social and economic goals throughout the TRO Region. According to Vermont statute, the right to public education is key to guaranteeing political and civil rights to constituents. Indeed, "to keep Vermont's democracy competitive and thriving, Vermont students must be afforded substantially equal access to a quality basic education."[4]

Sustained regional and economic development will be impossible in the Region unless financial and geographic access to education is affordable and convenient. Without a well-educated work force, the Region's residents, like the rest of Vermont residents, will be unable to compete with other states for well-paying jobs. Further, education and child care are necessary to community vitality.

Elementary and Secondary Schools

Sound planning for educational facilities and programs is necessary to support the social, economic, and cultural welfare of a community. Increased levels of higher education correlate with higher earnings, lower unemployment and poverty rates, decreased reliance on social welfare programs, and higher levels of civic engagement.[5] Furthermore, higher levels of education positively correlate with improved health, well-being, and lower crime rates.[6] A quality education provides the foundation for a child's productive future, enabling the child to make positive contributions to business, civic affairs, and family life.

All public schools are governed by a district school board elected by the voters of their respective municipalities, and administrative support to the district board is received from supervisory unions. In the 2016–2017 school year, there were a total of 44 public and private educational facilities within, or serving,

the Region. Total enrollments amounted to approximately 8,372, covering grades K through 12 and special programs.[7, 8] Some school districts and municipalities accept, on a year-to-year basis, tuition-paying students from neighboring communities that do not provide elementary or secondary education, or that lack adequate facilities.

Declining enrollments have brought staffing, programmatic, and financial planning challenges to schools throughout the Region, resulting in the closure of several schools.

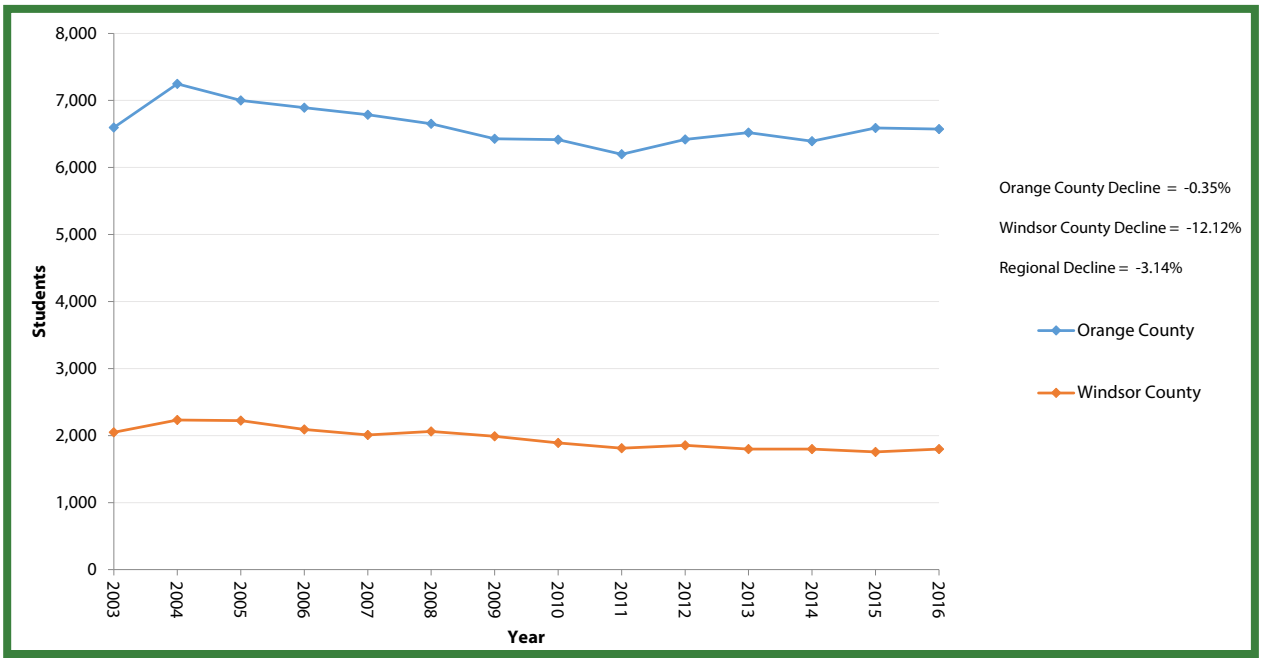
In the years 2003-2016, schools in the TRO Region saw a 3.14 percent decline in the number of enrolled students. There were 8,650 students for academic year 2003–2004 and 47 educational facilities, and then just over 8,372 enrolled students in 2016, with a loss of three schools. The decline in student enrollment was most pronounced in Windsor County, which has seen student numbers fall by over 12 percent since 2003. The largest gains and declines in individual school enrollment numbers were seen in Orange County schools. The student body at Vermont Academy of Science and Technology in Randolph, a school that provides specialized and advanced courses for students from other area schools, increased by 862 percent. Meanwhile, enrollment at Potter's House in Hartford declined by 87.5 percent. In Windsor County, Barnard Central School enrollment numbers increased by over 22 percent, and the Rochester School's student numbers declined by nearly 43 percent. Sustained levels of decline may have untold social and economic impacts for towns in the TRO Region, and are, therefore, an area of vigilance and concern for the future well-being of the Region.

A table of schools in the Region and their average daily membership can be seen in previous versions of the Regional Plan or on the Vermont Department of Education website.

Homeschooling

Not all children in the Region attend public or private schools; some are homeschooled. As of the 2014 school year, 5 percent of students in the Region were homeschooled. More recent numbers on this are not available. While homeschooled children do not require educational provisions from school districts, there are still considerations that towns and

Figure 9-1: School Enrollment Figures for the TRO Region, 2003-2016



Source: Vermont Department of Education

local organizations should make for the well-being of these children. For instance, there are several organizations and programs in the Region, such as Artistree in Pomfret, that provide extracurricular activities to supplement class learning.

Quality educational facilities are expensive investments to construct and maintain, and per pupil tuition rates are increasingly steep. As a result, schools require careful and diligent long-range planning by school officials, administrators, and citizens.

Poverty and Education

It is important to note that the Region's school system provides the main avenue of support for children living in poverty. In Orange County, 17.5 percent of children under 18 live in poverty, and in Windsor County, 13.3 percent of children under 18 live in poverty, according to the 2016 American Community Survey. Children who are homeless have the same access to a free public education that other children do. In the 2013–2014 school year, 1,145 homeless children in Vermont were enrolled in school.[9] (There is no regionally specific data available.) It is important to realize that many students may not be classified as homeless but may be staying with friends and other family or be housed in a motel. The summer, when school is off, is concerning for those that are homeless and living in poverty, as schools can be the main source of food for children in these conditions.

Vocational Training and the Region's Youth

In recent years, promoting educational opportunities that support the acquisition of professional skillsets allowed students to better understand local employment sector opportunities. Act 77, more commonly known as the Flexible Pathways Initiative, was passed by the Vermont Legislature in 2013 with the intention of expanding educational opportunities, including more work-based learning and access to career and technical education.[10] This initiative is intended, in part, to help students align their interests and abilities with professional prospects within the context of their academic curriculum. Many trades are an integral part of our economy and can supply a good living wage.

Both students and prospective employers from local enterprises stand to benefit substantially from the formal connections between students and the working world, both within and outside of the traditional classroom. These connections serve as an enriching supplement to traditional academic course offerings. Providing opportunities for the Region's youth to see, experience, and learn about local jobs may serve as an incentive, convincing many youth to stay in our communities well beyond high school.

Higher Education

There are several higher education options located in the Region that include the following:

1. Vermont Technical College – Randolph
2. Vermont Law School – South Royalton
3. Center for Cartoon Studies – White River Junction
4. Community College of Vermont – Wilder

Nationally, Vermont is ranked lowest in higher education funding.[11] This can drive up the costs for students seeking degrees.

Adult Education

The availability of adult education services is critical to the social and economic well-being of the Region and its residents. The Vermont Agency of Education defines adult learners as "persons 16 years of age and older, who may or may not be enrolled in school, and lacking essential skills or a credential equivalent to high school completion." The Agency funds adult and continuing education through its Adult Education and Literacy Program. The Agency of Education funds three adult learning centers in the Region: the Vermont Adult Learning Center in Hartford and the two Central Vermont Adult Basic Education Centers in Randolph and Bradford.

These centers offer classes free of cost to adults in basic skills, General Educational Development (GED) certification, English as a second language, college transition skills, and work readiness skills, including WorkKeys (ACT) certification. Additionally, The Family Place, a family support center, offers courses to young mothers with the aim of helping them earn their GED and acquire basic employment skills.

Both of the Community Action Agencies covering the TRO Region (Southeastern Vermont Community Action and Capstone Community Action) have adult education and job skills programs. Capstone Community Action has two locations in our Region: Bradford and Randolph. Southeastern Vermont Community Action's physical location is in Westminster, with an additional office in White River Junction. Other than these options, participants are required to travel outside the Region for these educational opportunities. This is a limiting factor to the Region's lower-income residents who wish to use these services.

Continuing Education

As Vermont's senior population significantly increases, and adults of all ages continue to seek learning opportunities for economic or personal reasons, the State will be confronted with the need for both new educational and recreational activities. There are a number of continuing education programs for seniors throughout the Region; however, the distance, lack of safe and reliable transportation, lack of access to high-speed Internet, and a lack of understanding of the basic facets of information technology may prevent them from enjoying the opportunities available. Currently, with respect to in-person instructional classes, residents can participate in classes at the following institutions:

- Artistree in Pomfret
- Vermont Technical College in Randolph
- Dartmouth College in Hanover, NH
- Riverbend Career and Technical and Oxbow High School in Bradford
- Bethel University in Bethel
- Community College of Vermont in Wilder

The Future of Education in the Region

Many of our Region's communities have a school. Schools are often seen as the center of a community, or at the very least, a location that brings the townspeople together. Unfortunately, declining enrollments and an aging population are making the traditional model of "one school in every town" less sustainable. The cost of publicly educating children places a significant financial strain on many municipalities. Surveys in many of our communities show a growing frustration with the cost of education in Vermont. As a result, many communities continue to work on ways that they can collaborate together to decrease costs and maintain the quality of education desired by everyone.

Ensuring all students have access to high-speed Internet will extend our students' academic offerings beyond the brick-and-mortar classroom setting and put students on an equal footing with those from more developed regions of the nation. Lack of access to high-speed Internet in portions of the Region can hinder access to education materials.

Apple Orchard at Vermont Technical College | *© First Light Studios*

With the adoption of Act 46 in 2015, many schools in the Region have begun consolidating with other districts, considering closing several schools, or reducing the number of grades.

Some communities (Hancock, Granville, Bridgewater, Rochester, Stockbridge, Chelsea, Tunbridge, and Plymouth) have opted to close their schools or to merge schools with other communities. If the trend toward smaller classes and fewer children in many towns continues, more communities will need to engage in these consolidation discussions. However, the closing or merging of schools is not a simple decision. For towns with no defined community center, a school often acts as the central focal point for the community. In many communities, the academic institutions are the largest employer(s) and the metaphorical center of the community. Downsizing or closing of schools also means, in many instances, laying off neighbors and friends.

Considering the cost of repairs is also important when determining whether schools ought to be consolidated. In the event that communities choose to close or merge schools, how to manage the vacated infrastructure should be part of the discussion.

For many communities, the closure of a school can present new opportunities. Because schools are often located within villages or town centers, they can become prime locations for reuse in areas that are otherwise built up. Possible options for reuse of existing school buildings could include:

- Town offices and other municipal services
- Inclusive, mixed age and income housing opportunities
- Senior centers
- Light industrial development
- Business incubators or office parks

In addition to the existing school building, facilities that had land for athletic purposes may now be available for new development.

Goals, Policies, and Recommendations: **Educational Facilities and Services**

Goals

1. Accessible and affordable educational facilities and services are available throughout the Region that meet or exceed statewide standards, including life-long learning opportunities.
2. Students have access to quality vocational and workforce training opportunities to prepare them for future careers.

Policies

1. The construction of primary educational facilities should occur in or within close proximity to existing or planned Regional Growth and Mixed-Use Areas, so as to maximize their accessibility to people and infrastructure, as well as contribute to the vitality of communities.
2. Expansion of continuing education and vocational education opportunities is encouraged.
3. Adaptive reuse of vacant school facilities that occurs in a manner that enhances villages and downtowns and stimulates the local economy is supported.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Educational Facilities and Services**

Recommendations

1. Town and school authorities should create and maintain safe pedestrian access and transit opportunities to educational facilities, in line with Safe Routes to School efforts.
2. Towns must assess and incorporate the needs of disabled children and staff into educational facility and budgetary planning efforts to ensure the provision of free and appropriate education for all children.

F. Child Care Services

The availability of high-quality and affordable child care is an important factor in the appeal and sustainability of our Region. Child care fulfills many roles within the Region. For example, the child care industry contributes to the regional economy as a business and employer in its own right. It also functions as a service industry that provides crucial support to employers and employees. Without access to affordable, high-quality child care, one parent would likely leave the labor force to care for young children. Good quality child care helps prepare children for schooling or may even supplement a child's school curriculum, and it provides them with opportunities for socialization

There are long-term benefits of high-quality child care as well. Research conducted by a regional economic analyst demonstrated that investment in early childhood development programs brings a real (adjusted for inflation) public return of 12 percent and a real total return, public and private, of 16 percent.[12] The State of Vermont invests in making high-quality child care affordable through its child care subsidy, available to working families on a sliding scale, and through offering prekindergarten programs to all three- to five-year-olds for 10 hours per week.

Child Care Services in the Region

According to the 2010 U.S. Census, approximately 56,000 people live in the TRO Region. The number of children aged 0-14 is a relatively small percentage of the Region's population: just over 16 percent, or 9,015 individuals. There are 154 regulated child care and early education programs (47 in Orange County and 107 in Windsor County), comprised of after-school child care programs (ACCPs), center-based child care and preschool programs (CBCCPPs), and family child care homes (FCCHs).[13] Comparatively, there are 1,269 regulated child care and early education programs in the State of Vermont.

Hartford has the highest number of regulated child care programs in our Region. Otherwise, child care providers are, for the most part, reasonably spread across the Region. Five towns are without any type of licensed or registered child care: Bridgewater, Granville, Pittsfield, Pomfret, and Vershire. It is important to note that the number of private (unregulated), in-home child care providers in our Region is unknown, but it is likely that this type of provider makes up a significant portion of the child care providers.

There are a few larger employers in the broader Region that offer child care for their employees. These employers have sliding fee scales, but costs still remain high. Such employers include Dartmouth-Hitchcock Medical Center and Dartmouth College. The Gifford Medical Center in Randolph has a child care center that provides child care to Gifford Medical Center employees and the public. There are also some employers in the area who offer child care to their employees at a reduced rate, but also have slots open to the public. Regardless, it is critical for the quantity and quality of child care providers to meet the needs and expectations of parents and guardians living and/or working in the Region. With several of our regional centers of jobs in manufacturing and hospitals, it is especially important to have child care outside of the traditional work-day hours for those who work weekends and nights.

Other Forms of Child Care and Early Learning Programming

After-school programs and summer camps provide child care options for parents with children old enough to attend public or private school full time. Both help to keep children engaged in enriching activities, while also allowing parents to feel comfortable that their children are safe if they are working past school hours or during summer vacation. There are approximately 20,000 children in after-school programs in Vermont.[14] However, the number of children attending after-school programs in the TRO Region is unknown. There is no data on after-school program attendance outside of the K–12 system, yet the State of Vermont recognizes this and has commissioned a study to determine how many children are in this type of care.

There are many varieties of summer camps that parents may choose to send their children to, from adventure camps to nature camps, summer camps at local recreational centers, and art or music camps. Depending on the program, children may only attend camp during the day for a specific number of days, or they may remain at the camp for an extended period of time.

There are a few vocational schools in the Region that have training programs to teach interested high school students to care for infants and preschool-age children. One vocational school to offer such a program is the River Bend Career and Technical Center in Bradford in their "Education and Human Development" curriculum. The Randolph Technical Career Center and the Hartford Area Career and Technology Center both have similar programs in their "Human Services/Teacher Preparation" curriculum and "Human Services" curriculum, respectively. CCV offers a degree in Early Education, along with several other related degrees, and an option to obtain a certificate. In addition, there is ongoing professional development offered through Northern Lights at CCV for those who are in the field and seek training or additional qualifications.

Barriers to Child Care Services: Cost, Affordability, and Family Structure

Barriers associated with child care in Vermont include an inadequate amount of infant/toddler care available and insufficient financial assistance to cover the cost of high-quality services (despite the financial help from some child care providers). Searching for child care is often difficult for parents in the Region, as the availability of child care providers, especially for infant and school-age children, is limited.

Over the past decade, the cost of child care in Vermont has risen substantially. The market rate for preschool-age children in regulated child care facilities rose from $200 a week in 2012 to $250 a week in 2017.[15] In Windsor County, parents can expect to pay $165 to $250 a week. Comparatively, in Orange County, parents can expect to pay $150 to $225 a week.[16] It is more expensive to place an infant or toddler in a regulated child care facility. In conjunction with high costs for child care, workers often receive wages below Vermont's livable wage, and early childhood educators (child care workers, preschool teachers, and preschool educators) do not have pay parity with positions of similar skills and educational requirements in the public education systems. It is also expensive to provide quality child care, as young children need a high staff-to-child ratio.

To help families pay for child care, the State of Vermont provides financial assistance through the Vermont Child Care Financial Assistance Program (CCFAP). Vermont's CCFAP helps families who meet certain work, education, and income requirements afford child care. The program also provides child care financial assistance for children in foster care and children and families who meet certain health criteria.

CCFAP makes payments directly to a child care provider on behalf of a family. The amount of the payment is determined by the age of the child, the income and size of the family, the type of child care program, the child care program's quality

designation in STARS (STep Ahead Recognition System, Vermont's quality recognition and improvement system for regulated child care and early learning programs), and the number of hours of care needed. Assistance is provided on a sliding scale fee that gradually reduces the assistance as family income rises. Families pay a co-payment directly to providers to make up the difference between what the State pays and what the provider charges. Due to chronic underfunding, the program's reimbursement rates have not kept pace with how much providers charge for quality care, leaving a gap that creates economic challenges for families and providers.

According to the 2016 American Community Survey, families living in poverty with children comprise 13.6 percent of the Region's population.

Families living in poverty with children comprise 13.6 percent of the Region.

Given the high costs of child care, it can be difficult for these and other low- to moderate-income families to afford placing their children in child care. As a potential consequence of this situation, a family member may decide to provide care to the child or children instead of working and supplementing the family income.

Of approximately 32,000 households in the TRO Region, 3,838 of them are classified as "single-head-of-household" with children 18 years old or younger. It is very important for single parents to find child care so that they are able to work and provide for their families. The parent may have another family member or trusted adult care for their child or children while at work, or they may seek out a child care provider. Women are often the ones filling the role of the primary caregiver for young children. A national statistic states that 74 percent of women with a minimum of a bachelor's degree who left their job voluntarily reported child care as their primary decision factor.[17]

Let's Grow Kids is a statewide campaign looking for more high-quality, affordable child care in Vermont to better support our children, families, women, communities, and economy. More than 70 percent of Vermont children under age 6 have all of their parents in the labor force, meaning they're likely to need care. Yet half of those infants and toddlers don't have access to any regulated care, and nearly 80 percent don't have access to high-quality programs. Vermont's child care shortage disproportionately impacts women, who are three times more likely to leave their careers than men when families can't find child care. It also has a negative ripple effect on our businesses, schools, communities, health-care system, and economy as a whole.

In our Region, there have been two major reports that focus on child care. The Blue Ribbon Commission on Financing Child Care, published in 2016, looked into the real cost of child care and found that "the estimated cost of high quality early care and learning is currently unaffordable for almost 90% of Vermont families." The second report was Stalled at the Start, published in 2018 and produced by Let's Grow Kids, which analyzed the supply and demand of child care.

One available program that could benefit families is the Child Care Financial Assistance Program (CCFAP). This is a government program that helps eligible families cover some of the cost of child care. There is also a federal scholarship program for child care center teachers that are trying to earn credentials/degrees. Through the T.E.A.C.H. Early Childhood Vermont program, up to 80 percent of tuition can be covered, along with other benefits.

Goals, Policies, and Recommendations: **Child Care Services**

Goals

1. An adequate supply of safe and affordable child care services and facilities is available.
2. A regional network of high-quality child care programs fulfills the needs of families and employers.
3. Major employers (employing more than 35 employees) provide child care services on site or create a partnership with a local child care service.

Policies

1. TRORC supports initiatives to develop child care facilities where a need has been proven and the location conforms to this Regional Plan.
2. TRORC should work collaboratively with child care providers and towns to help them locate into convenient and safe areas.

Recommendations

1. TRORC should work with towns to address identified needs for child care facilities or services by:
   - Identifying publicly owned buildings throughout the Region; and
   - Evaluating and prioritizing their suitability to serve as child care facilities after considering Vermont regulations.
2. Towns should review their zoning regulations (if adopted) to determine the ability of the regulations to allow child care providers to be located in the town.
3. Develop business "how-to" guides for providers to navigate local permitting.
4. Conduct a child care needs assessment in the Region.

G. Telecommunications

Information technology (such as broadband Internet and wired/wireless telecommunications) has become essential to residents and businesses in the Region. Our economy now relies on ubiquitous availability of data and communications for our Region to remain economically competitive with more urban areas of the State.

In the 2014 Vermont Telecommunications Plan, the Public Utilities Commission set the following goals:

- Every address in Vermont should have available broadband Internet access with the minimum technical requirements of 4 megabits per second (Mbps) download and 1 Mbps upload. By year end 2020, a majority of addresses in Vermont should have access to the Internet at speeds of at least 100 Mbps symmetrical (download/upload), and every address should have access at speeds of at least 10 Mbps download.
- Every address in Vermont should have access to wired and wireless broadband Internet access service.
- Broadband service should be affordable to all members of every customer class.
- Universal adoption and use of broadband service at home and at work.
- Universal availability of mobile service along roadways and near universal availability statewide.
- Reliable, economical telephone service in all areas of the State, including rural areas. All residents, regardless of income or location, should have access to basic telephone service.

In the TRO Region, access to broadband is provided via a number of mediums, including cable, DSL (digital subscriber line), fiber-optic cable, cellular, wireless, and satellite. This access varies from town to town, with the highest concentration of availability generally being in villages and downtowns. Broadband providers tend to locate their infrastructure in areas with high population density to maximize the subscriber-to-infrastructure ratio. The farther away from a community center, the fewer options for broadband connectivity; this makes the "last mile" homes and businesses the least likely to have access.

Importance to the Economy

On average, Vermont businesses report that 74 percent of their workforce utilizes email and seventy percent utilize web sites. Fifty-seven percent of businesses statewide indicate using mobile telecommunications. Broadband and mobile telecommunications and data access are essential to the Region's businesses.

Hospitals utilize broadband for "telemedicine," which is considered extremely important in rural areas such as ours. More accessible health information, products, and services provide real economic benefits in rural communities. Rural businesses with strong access to broadband can use the Internet to expand market reach. Farms, for example, can utilize the Internet to sell products online that would otherwise be sold only to local residents, expanding their market.

Efforts to improve broadband coverage in the TRO Region are ongoing. Between 2000 and 2012, the State of Vermont invested a substantial amount of funding in an effort to bring broadband to all Vermonters. One such project was the Vermont Digital Economy Project (VDEP), which developed as part of the State's goal to create more resilient communities after the damages caused by Tropical Storm Irene in 2011. In an effort to speed disaster recovery, spur economic and job growth, and improve community resilience after disasters, the VDEP project was tasked with building digital infrastructure in communities that had been hardest hit by the storm.

VDEP built free village Wi-Fi zones in the communities of Bethel, Royalton, and Rochester. These investments provide residents who lack access in their homes with a reliable place to connect to the Internet. In East Barnard, there is also a community-funded Wi-Fi zone for residents. Village-wide access is a boon to businesses who can take advantage of the additional customers who are drawn to the village for Internet access.

The East Central Vermont Fiber-Optic Network (EC Fiber) is a consortium of 24 towns (including 21 TRO Region towns) that is working to expand access to high-speed Internet. The list of towns EC Fiber is working with can be viewed here: https://www.ecfiber.net/member-towns/.

Major cellular providers are continually working to expand coverage, particularly along major transportation corridors, such as Interstates 89 and 91.

Use of cellular phones in day-to-day activities has skyrocketed over the past decade. The availability of broadband cellular data has increased the use of cellular phones to the point that they are essential to businesses and citizens alike. In a 2014 Vermont Telecommunications survey, 57 percent of businesses reported that they subscribed to cell phone services for their organization. The average number of cell phones

per household in Vermont is 2.39, further supporting that these devices have become common. Many U.S. households no longer have a "landline" phone, but Vermont is the state with the lowest percent of households that have gone wireless.[18] The lack of cell coverage is a major deterrent to both attracting businesses and younger families.

Cellular access is determined in great part by a region's topography in relation to the placement of cellular transmission towers. While coverage in the TRO Region is reasonably good along main travel corridors, it is spotty in more rural areas. In some instances, there are entire communities (such as Barnard) that have virtually no access. In most cases, residents support improved cell phone access, but are less supportive of having the necessary facilities located in their communities. When residents object to proposed facilities, it is almost always due to the potential for aesthetic impacts.

Wireless telecommunications facilities (primarily cell towers) are permitted under one of two state options—Section 248a or Act 250—depending on the facility. Projects may also be subject to local permitting. The 248a process was created to enable a faster permitting process in order to achieve greater wireless coverage, and it specifically exempts projects that achieve this wireless coverage from local zoning or Act 250. It is limited to facilities that are part of a network, and this permitting authority currently expires in 2020.

Under the Section 248a permitting process, the Public Utility Commission must review the environmental, economic, and social impacts associated with a particular project prior to issuing a Certificate of Public Good. The project is reviewed against the Act 250 criteria and both Regional and Town Plans, and even relevant parts of zoning that would otherwise apply, are accorded "substantial deference" in such reviews, "unless there is good cause to find otherwise" (30 VSA section 248a(c)(2)). Even when substantial deference is not granted, the 248a process must give due consideration to the recommendations of municipal planning commissions, selectboards, and regional planning commissions based on their respective plans. Accordingly, it is appropriate that this Plan address these land uses and provide guidance to town officials, regulators, and providers.

Wireless telecommunications towers over 50 feet tall, or more than 20 feet tall if placed on an existing structure, are regulated by Act 250 if not exempted through the 248a process. If such a tower is regulated, then the ancillary developments such as roads and structures that go with it are also regulated. Towers subject to Act 250 are also able to be regulated by municipalities, as are towers and facilities under the height limits. Towns cannot regulate telecommunications facilities in such a manner as to have the effect of excluding them and cannot regulate emissions of electromagnetic radiation.

Separately from state and local permitting, the Federal Communications Commission (FCC) retains jurisdiction over public airwaves and the telecommunications industry in general. Additionally, the Federal Aviation Administration (FAA) exercises control over the location and height of towers and similar structures to prevent interference with airport operations.

Transmission towers are necessary telecommunications facilities, but as land uses, these towers have emerged as planning concerns, primarily for aesthetic reasons. To ensure adequate transmission of signals in mountainous areas such as ours, towers and related facilities need to be located on hilltops or high elevation points. One of the Region's principal scenic qualities is its ridgelines and mountainsides. These areas are significant contributors to the rural character of the Region. The ridges are predominately undeveloped and provide an unbroken skyline viewed from the valley floor. The use of the Region's ridges for telecommunication towers and related facilities

needs to be undertaken in a manner that will not unduly detract from, nor adversely affect, these scenic values. Protection of these areas from insensitive developments is a matter of public good. Thus, due to transmission towers' higher visibility from multiple vantage points, conflict with scenic landscapes has become an issue.

While broadband and cellular service expansion was not in TRORC's traditional purview, it is an essential public service. It can support opportunities for free access such as the village Wi-Fi zones developed through the Vermont Digital Economy Project.

Goals, Policies, and Recommendations: **Telecommunications**

Goals

1. Universal broadband access using fiber is available throughout developed areas in the TRO Region.
2. Universal availability of mobile cellular service is available throughout developed areas in the TRO Region.
3. Speeds and pricing for residential broadband are on par with national urban areas.
4. The enhancement of telecommunications networks is supported, when such facilities do not have significant adverse environmental, health, or aesthetic impacts.

Policies

1. Public and private efforts to expand telecommunications access is supported, when done in a manner that does not have an undue adverse impact on the rural character of our communities.
2. Efforts to provide free public broadband access in places such as village centers and public buildings is supported.
3. Telecommunications facility development shall be excluded from the following areas:
   - Floodways shown on FEMA Flood Insurance Rate Maps.
   - Wetlands as indicated on Vermont State Wetlands Inventory maps or identified through site analysis.
   - Rare, threatened, or endangered species habitat or communities.
4. All new telecommunications facilities and related infrastructure must be sited and designed to avoid or, if no other reasonable alternative exists, to otherwise minimize and mitigate adverse impacts to the following:
   - Historic districts, landmarks, and sites.
   - State or federally designated scenic byways and municipally designated scenic roads and viewsheds.
   - Special flood hazard areas identified by National Flood Insurance Program maps.
   - Necessary wildlife habitat identified by the State or through analysis, including core habitat areas, migration, and travel corridors.
5. New telecommunications facilities and related infrastructure (this includes access roads, site clearing, on-site power lines, lighting, and off-site power lines) must be sited to avoid the fragmentation of large priority and high priority forest blocks.
6. Telecommunications facilities development shall minimize site clearing and highly visible roadways.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Telecommunications**

Policies (continued)

7. The developer shall make reasonable efforts to minimize the aesthetic impact of the telecommunications facility or infrastructure on the surrounding landscape. This includes options such as the utilization of "stealth towers," camouflage through paint scheme, or designs that blend into the surroundings, such as asymmetrical mono-poles disguised as pine trees.
8. Telecommunications facilities shall be designed to be the minimum height necessary to achieve coverage.
9. All new facilities shall incorporate reasonable options for sharing space on proposed towers. Applicants for new towers must demonstrate that there is no reasonable opportunity for co-location on existing towers.
10. To support resiliency, applicants shall make space available on towers for municipal communication systems to enhance or expand road and emergency service communication networks.
11. To minimize conflict with scenic values, facility design and construction shall employ the following principles:
    - In rural locations, be located in forested areas or be sufficiently landscaped to screen the lower sections of towers and related ground fixtures from public vantage points, such as trails, roads, or water bodies;
    - In more developed areas, utilize materials, architectural styles, color schemes, lighting fixtures, size, and other design elements to promote aesthetic compatibility with surrounding uses and to avoid adverse visual impacts; and
    - Be located downgrade of the ridge so as not to exceed the elevation of the tree line as seen from public highways.
12. Consideration shall be given to the environmental limitations of any given site. Impacts on wildlife habitats, soil erosion, forestry and agricultural lands, and similar resources should be carefully addressed. Projects that materially impact these resources are discouraged.
13. The clearing of land associated with site development for tower and facility construction should not negatively impact the scenic views present.
14. Towers or facilities that are designed to resemble trees or natural features shall not be placed conspicuously higher than the tree line.
15. Permits must require removal of facilities that are no longer used.

Recommendations

1. TRORC should continue to participate actively in the Section 248a permitting process.
2. Communities should seek out funding to implement new or sustain existing Wi-Fi zones in villages and downtowns.
3. The State should continue to support programs that achieve universal broadband and cellular communication access.

H. Municipal Buildings and Properties

Towns own a variety of public buildings. Every town has a town office building. Nearly every town has a town hall where they hold town meeting and other events. Sometimes the town offices are also located in this building. Towns with their own road crews also own town garages and a site for salt and sand storage. Some towns own their own sand and gravel pit, but most contract this function out. Nearly all of the town halls and offices are in older structures, many of which need substantial maintenance or improvements, but several have been renovated to create better working space and improve energy efficiency. Town offices, like other civic functions, help to create a sense of community and give energy and importance to town and village centers. Town garages are usually not located right in developed areas, as they are noisy, semi-industrial areas by their nature, but they still must be somewhat central in the town to efficiently maintain roads. Several town garages have been replaced with much more spacious and useful buildings, but some are still woefully inadequate for their function.

Public libraries play an important role in providing materials to inform, challenge, and inspire the Region's residents. In some towns, public libraries are privately owned entities that still provide an essential public service to residents.

The services they provide are changing, partly to meet the changing needs of users and also because of developments in technology and the availability of information. Statewide use of national online databases and the Internet has increased dramatically for libraries in the past few years. According to the Vermont Department of Libraries, the demand for electronic information services has come from rural and remote areas of the State. This presents a challenge to the Region's libraries to find ways to ensure that all citizens have access to books, information, and worldwide resources, similar to the access opportunities at urban libraries. The onslaught of information technology and the number of new formats, coupled with the vast number of books available, will promote increased resource sharing among the Region's libraries.

Goal, Policies, and Recommendations: **Municipal Buildings and Properties**

Goal

1. The Region has adequate municipal buildings to serve town needs.

Policies

1. Town buildings should be carefully sited and designed to meet the future energy efficiency needs of the town and built with both construction and operating costs in mind.
2. Towns are encouraged to rehabilitate historic buildings that are located in existing developed areas for their offices.
3. The State should only construct new office buildings in Regional Growth Areas.

Recommendations

1. Towns should assess expected maintenance and upgrades for town buildings and create reserve funds to cover these so that these buildings remain in good condition.
2. TRORC should assist towns with planning, public dialogue, and grant writing, if requested, when considering constructing new buildings so that they meet community needs and are located wisely.
3. The State must consider effects on the Region and our towns if they are considering siting new buildings so they fit well with the Region's needs.

I. Recreational Facilities

Many recreational opportunities are available to the Region's residents and visitors. These range from organized, structured prospects at state and federal parks to more informal opportunities in municipal parks and forests. Recreational opportunities attract new residents, tourists, second homeowners, and retirees to the Region and contribute to the quality of life of current residents. The Region's recreational resources include elements of the built and natural environment. Many of our outdoor recreational opportunities are on public lands, but access to private lands is also important and available through agreements brokered by groups such as the Vermont Association of Snow Travelers (VAST) and other local groups. As large landholdings are subdivided and become less available for public uses, the need for publicly owned land for recreation is critical.

Public Recreational Opportunities

The Region has one national park—the Marsh-Billings-Rockefeller National Historic Park in Woodstock. Associated with the Park is the privately owned Billings Farm and Museum, which offers farm educational programs. The western part of our Region is also home to a portion of the Green Mountain National Forest and the Long Trail corridor. The Appalachian Trail corridor goes through the central part of the Region. Additionally, outdoor recreation opportunities are available at the Suicide Six ski area, many rivers and lakes, public and private forests, and Class 4 roads. Indoor recreational opportunities include ice rinks, the Upper Valley Aquatic Center, and the Montshire Museum of Science.

Several state parks can be found in the Region, including the Calvin Coolidge Historic Site in Plymouth, the Quechee Gorge State Park, and several other historical sites. The Department of Forests, Parks and Recreation, and the Department of Fish and Wildlife's several state forests, wildlife management areas, and lake or river access points offer additional outdoor recreational opportunities.

Many towns throughout the Region also have town forests that are available for recreation; these forests also offer unique educational opportunities for local school children and residents about forestry and landscape practices. Twenty-three towns in the Region have town forests: Barnard, Bethel, Bradford, Brookfield, Chelsea, Fairlee, Hancock, Hartford, Hartland, Newbury, Norwich, Plymouth, Pomfret, Randolph, Rochester, Royalton, Sharon, Strafford, Thetford, Tunbridge, Vershire, West Fairlee, and Woodstock. Currently, there are public and private statewide initiatives studying and encouraging town forest development and use.

Green Mountain Bike Tours in Randolph | *© First Light Studios*

Several towns also offer town recreation programs through their recreation departments. These may include ski programs in conjunction with local schools in the winter, camps and track and field programs in the summer, and various events year round. These recreation departments may also manage a modest network of town parks.

Many towns also have excellent trail networks linked to their road networks, and portions of these networks include Class 4 roads. Town selectboards have the authority to develop a policy that regulates use and maintenance of town trails and Class 4 roads, and several towns have developed policies for these public rights-of-way (ROWs) based on the users' needs.

The Region's rivers and lakes offer opportunities for swimming, fishing, and boating, all of which require public access areas for parking or boat launching. Scenic waterfalls, cascades, and gorges are also destinations for tourists and residents.

There is a need for access areas to water resources in the Region.

Only 15 percent of all land in Vermont is publicly owned, which means many of the outdoor recreational resources in the Region rely on the willingness of landowners to allow access to private land.

Several large private landowners allow access to their land. Notable examples include the owners of the Wilder Dam facility in Hartford and its associated Kilowatt Park, the Montshire Museum lands in Norwich, and lands owned by the Vermont Land Trust and the Nature Conservancy. Other private facilities such as local ski areas and golf courses provide recreation opportunities. Facilities in the Region include the ski centers of Bear Creek, Middlebury Bowl, Northeast Slopes, Nordic Centers, Quechee, and Suicide Six; the Quechee Club; golf courses; and exercise/fitness clubs.

Goal, Policies, and Recommendations: **Recreational Opportunities**

Goal

1. The Region is home to a variety of indoor and outdoor recreational opportunities.

Policies

1. The maintenance and development of recreation trail networks (e.g., Appalachian and Long Trails, Cross Vermont and Cross Rivendell Trails, regional and state snowmobile networks, and cross-country ski trails) is encouraged.
2. New development and land subdivisions that have an undue adverse impact on the enjoyment or continued use of recreational uses are inconsistent with this Plan.
3. Consistent with property rights, ownership and management practices that maintain or enhance public access to and uses of recreational amenities on privately held land are encouraged.
4. Where development interacts with the Appalachian or Long Trails and other related side trails, design plans and construction must maintain the predominant scenic character and the primitive qualities of the trail corridor.
5. TRORC supports the development of multipurpose trails using abandoned railroad beds and other public rights-of-way.
6. TRORC encourages federal, state, and local acquisition of land and facilities well-suited for outdoor recreation, provided that adequate financial and management plans and arrangements are made with involved local governments.

Goals, policies, and recommendations continued on next page

Goal, Policies, and Recommendations: **Recreational Opportunities**

Recommendations

1. TRORC will assist communities with the establishment of Conservation Commissions and will support existing Conservation Commissions when possible.
2. TRORC should help towns develop highway policies that address recreation needs and should encourage the adoption of walkable communities programs within the Region.
3. TRORC should assist towns with establishing and managing town forests.
4. TRORC should work with the State, White River Partnership, and the Vermont River Conservancy on increased river access.

J. Opportunities for Shared Services/Infrastructure

As is the case in much of Vermont, our Region is generally low-density with a limited population as compared to more urban locations.

While they may not be so readily apparent, opportunities exist in our rural communities, as well as in our more urban downtowns, for inter-municipal cooperation. State statute enables communities to join into inter-local contracts or union municipal districts for the purposes of performing "any governmental service, activity, or undertaking which each municipality entering into the contract is authorized by law to perform."[19] TRORC also now can provide a mechanism for shared services; common existing examples among communities include shared police services and municipal aid agreements. Communities may also share staff or equipment. Under certain forms of cooperative agreements, they may purchase property together. Engaging in well-planned and well-organized cooperative efforts can ensure that services are provided more efficiently and more effectively.

Goal, Policy, and Recommendation: **Shared Services/Infrastructure**

Goal

1. Services are provided efficientlty and effectively.

Policy

1. TRORC encourages communities to seek opportunities for shared staffing, services, and infrastructure with other municipalities in an effort to reduce costs and improve quality of service.

Recommendation

1. TRORC will assist communities with the development of inter-local agreements, union municipal districts, and other cooperative agreements whenever possible.

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EMERGENCY MANAGEMENT 10

A home in Rochester sits destroyed after Tropical Storm Irene in 2011

A. Background

Disasters have happened and will happen again. However, the impact of expected but unpredictable natural and human-caused events to the Region can be reduced through proper emergency management. Emergency management is commonly misunderstood as simply emergency response, which is more accurately termed *incident command*. Emergency management is a much more comprehensive field that is generally broken down into four areas—preparedness (getting ready), response, recovery, and mitigation (lessening the impacts next time)—but it also actually includes education and anticipation as well. These two additional areas create a broad understanding of the relative risk we face and a rational foundation for what emergencies we feel we will face. TRORC's strengths are in planning and administration, and therefore it is appropriate that our main attention is focused on assisting towns and the State in preparing to meet the challenges that disasters will bring. We can also best assist our towns post-disaster through mitigation efforts designed to lessen the future risks residents may face in a subsequent disaster, as well as through supporting local recovery operations that can take months or years and require substantial administrative capacity.

Preparedness covers those actions that individuals, businesses, and communities take in order to prepare themselves for the effects of a disaster before it happens. Preparedness generally focuses on emergency personnel acquiring suitable equipment, creating response plans, and conducting training and exercises. Most emergencies of any scale will require towns to work together and often to work with state or federal agencies. Practicing with all of these partners before an actual emergency is critical to smooth emergency operations. Preparedness is also a responsibility of residents, business, and government to prepare themselves for the effects of a disaster before it happens. The more prepared we all are, at all levels, for disasters, the less loss of life and damage to property there

will be when a disaster occurs, and the quicker our communities will bounce back. TRORC assists our communities in preparedness by helping them to get proper training, develop and maintain local emergency operations plans, and conduct exercises; and we work to increase coordination amongst towns, the State, nonprofits, and businesses.

Response is the immediate effort by emergency response agencies and the general public during and after a disaster to save lives and property. Besides the neighborly acts of people assisting each other in times of disaster, most response activities are carried out by our local response agencies, with state and federal resources called in during severe and extended disasters.

Recovery is the more long-term process of getting life back to normal, preferably in a manner that does not merely rebuild but creates more resilience than we had. Recovery includes many state and federal agencies, especially the Federal Emergency Management Agency (FEMA) in large disasters. Recovery can take from a few days to several years. Recovery will be least painful where mitigation steps have already reduced the extent of damage and effective preparedness has resulted in fast response that limits the toll on lives and property. Recovery efforts are also helped by thorough and prompt documentation of losses, good media outreach communicating the assistance that is available, and interim provision of basic services. TRORC works on recovery efforts by assisting the State and FEMA with outreach, helping towns navigate federal reimbursement programs, and writing and managing grants to rebuild better.

Mitigation actions should be the cornerstone of emergency management.

Hazard ***mitigation*** means any sustained action that reduces or eliminates long-term risk to people and property from natural or human-caused hazards and their effects. Mitigation planning begins with an assessment of likely hazards and then targets activities to reduce the effects of these hazards. Given that the largest threat in Vermont is flood related, good mitigation measures include proper road and drainage construction as well as limiting development in flood-prone areas. Mitigation actions should be the cornerstone of emergency management. Actions can be simple educational efforts, such as awareness campaigns about smoke detectors; smarter land-use regulations that lessen risky behavior in unstable or flood-prone areas; or actual construction projects tied to a rational vulnerability assessment. TRORC works with member towns to develop their own freestanding Local Hazard Mitigation Plans. These plans are an essential ingredient in state and federal grant programs and should be meshed with Town Plans. Many of the concepts of mitigation have been included in the Regional Plan, since how and where we develop has important implications for how vulnerable we are to predictable disasters. TRORC helps towns undertake mitigation projects such as floodplain

restoration projects, including buyouts of damaged structures.

B. Emergency Services

Law Enforcement

The primary law enforcement for most of the Region is the Vermont State Police. State Police from the Royalton Barracks serve eastern central Vermont, and the force from the St. Johnsbury Barracks serves eight of the Region's municipalities located in the northern part of Orange County. Pittsfield is served from the Rutland Barracks. State Police levels are generally sufficient to handle routine incidents, but nighttime coverage is very low. Since they are also often the only law enforcement that may respond to a crime, response times can be over thirty minutes during the day depending on location, and considerably longer in the middle of the night. Vermont DMV and game wardens also possess statewide police powers.

The other large law enforcement agencies in the Region are the Sheriff's departments that cover county areas. The bulk of the Region is covered by the Windsor and Orange County Sheriffs, with Pittsfield served by Rutland County, and Hancock and Granville by Addison County. Though Sheriff's departments have the full ability to enforce the law, they have minimal funding outside of town contracts. Many towns in the Region contract with their Sheriffs for police coverage, especially for speed enforcement.

Several towns or villages in the Region have taken the additional step of creating a paid local police department, sometimes even sharing a department with a neighboring town. However, most towns have no police, but rather just town constables, who are appointed or elected, and who may or may not have any law enforcement training. In some towns the constable is close to being a full-time police officer. For constables to assume full law enforcement powers, they are now required to be certified through the Police Academy.

Fire Protection

The Region is served by a network of local fire departments, some of which are actual town entities, while others are separate volunteer services largely funded by a town. There are no county departments. All towns have at least one local fire department, with the exception of Braintree, which contracts for this service from Randolph. Only one town, Hartford, has a full-time paid department. Although there are a variety of service arrangements, local governments have the responsibility to provide fire protection services.

All of the Region's fire departments are members, formally or informally, of at least one Mutual Aid System, which provides backup assistance from neighboring fire departments when necessary. Towns bordering the Connecticut River often are involved in mutual aid with nearby New Hampshire towns. Despite the resourcefulness of many departments, many departments struggle with the costs of providing fire protection at a level that taxpayers will support. Insurance for firefighters and equipment maintenance are large annual costs, and replacement costs for fire engines can be $400,000 or higher. These sums require careful budgeting so that they do not come as a shock to residents. However, the greatest difficulty facing departments tends to be attracting enough volunteer members, the extensive training needed, and in having members that are in town during the day for daytime calls. Lack of members close by can lead to delays in responding to calls.

Ambulance and Rescue

Ambulance and FAST (first aid stabilization team) squad services provide emergency medical services (EMS) to the Region and are regulated by the Vermont Department of Health, which coordinates and licenses them. FAST squads stabilize patients, are largely volunteer based, and serve a single town. Ambulance services can treat and transport patients, have at least some paid staff, and serve one to several towns. Only three

EMS services in the Region are full time: Hartford Emergency Services, Upper Valley Ambulance, and White River Valley Ambulance. Both Upper Valley and White River are the contracted ambulance service for several towns each and are supported by town funding. Air ambulance is provided to the Region through Dartmouth-Hitchcock Advanced Response Team (DHART) and their two helicopters. The nineteen EMS services in the Region are located in four state EMS districts (Newbury in #5, Topsham and Corinth in #2, 14 towns in the northwestern part of the Region in #8, and the remainder in #9). As with fire departments, lack of volunteers, particularly for daytime coverage, is a pressing problem for FAST squads especially. The high cost of equipment and the amount of time needed to meet licensing standards has been cited as another problem.

Related Services

In addition to the usual three emergency disciplines above, town highway crews (though not typically categorized as first responders) are a critical part of the local response system, often needed so that responders can simply get to the emergency scene in times of winter weather, downed trees, or washed-out roads. Town staff rely on state VTrans staff for assistance with road damage. Local response operations also rely on specialized teams, such as Swift Water Rescue; Urban Search and Rescue; the Vermont Hazardous Materials Response Team; K-9 teams, the bomb squad, tactical team, and dive team of the Vermont State Police; ANR Spill Response; Vermont National Guard Civil Support Team; American Red Cross; CERT and other volunteers; as well as federal assets.

Bradford FAST Squad and Fire Dept. | *Source: Kevin Geiger*

The emergency field also relies on a communications system that includes dispatch centers, 911 Public Safety Answering Points (PSAPS), 211, RACES (radio amateur civil emergency service) ham radio operators, and VTAlert and the Emergency Alert System (EAS). Finally, municipal governments may communicate information using a number of avenues including the municipal website, listservs, and social media. All of these communications systems require backup power and redundancy so they do not fail during disasters. Radio, cellular coverage, and even high-speed Internet remains lacking in some areas in the Region, creating dangerous coverage holes in the communications system. FirstNet is a nationwide system being built to ensure cellular and data coverage for responders throughout the nation.

State and Local Emergency Management

Vermont's state emergency management duties are performed by Vermont Emergency Management (VEM) within the Department of Public Safety. VEM is a small agency that largely supports state and local emergency planning and coordinates state resources during disasters. VEM houses the State Emergency Operations Center and should be the primary place for towns to request assistance if they are being overwhelmed by any type of event. VEM coordinates the several state agencies (as well as federal resources) under the State Emergency Operations Plan, as well as serving as the primary point of public information in a widespread event.

Local emergency management in the Region historically has largely rested with fire departments, since they are present in nearly every town and have emergency vehicles and radios. However, there has been a general increase in awareness over the past several years that there are a wide variety of hazards, such as floods, in which the fire department's statutory powers are limited, and their response role may be other than what they train for. Effective emergency management may be improved by having first responders primarily in operational roles so they can best perform what they are trained and equipped for, while other people can fill emergency management roles.

All towns now have Local Emergency Operations Plans and have designated an Emergency Management Coordinator or Director to help get local planning done and coordinate preparedness, response, and recovery activities. Selectboards are also increasingly realizing that they have an important role in managing many types of emergencies, and they are consequently attending training sessions in such subjects as Incident Command System (ICS) or taking part in emergency exercises. Additional people are needed in local emergency response staffing who do not already have operational roles in order to adequately cover the planning, logistics, and finance parts of disasters.

Planning for preparedness and mitigation efforts must be grounded in the rational evaluation of hazards to the area and the risks these hazards pose.

Local Emergency Planning Committees (LEPCs)

Local Emergency Planning Committee (LEPC) #12 (www.LEPC12.org) covers all of the towns in the Region except for Hartland, which is part of LEPC #3. LEPCs are organizations whose responsibilities are established by state and federal law to help provide emergency planning

Meeting of LEPC #12 at White River Valley Ambulance | Source: Kevin Geiger

for responding to chemical accidents and to work with local government emergency services, VEM, and the managers of facilities with hazardous chemicals on facility emergency plans. Though LEPCs' statutory responsibilities are largely related to hazardous materials, they take an all-hazards approach to emergency planning. TRORC has assisted LEPC #12 in providing a critical venue for cross-discipline dialogue, various trainings, and a chance for different agencies to meet before having to work together in an emergency.

C. Hazards Assessment

To be most effective, planning for preparedness and mitigation efforts must be grounded in the rational evaluation of hazards to the area and the risks these hazards pose. This can be thought of as the anticipation phase and is usually done through a formal or informal Threats Hazards Inventory and Risk Assessment (THIRA), which in essence asks and answers three basic questions: What bad things can happen? How likely are they to occur? How bad could they be? A summary of the regional THIRA below evaluates expected frequency and severity of hazards to help towns prioritize the types of emergencies they should prepare for, since any community only has limited resources and cannot prepare for all types of events, no matter how remote. For this plan, hazard frequency was classed as follows:

Rare: May never have occurred; annual probability of 1/100 or less.

Unlikely: Has occurred; annual probability of 1/25–1/100.

Unusual: Has occurred in the area; annual probability of 1/10–1/25.

Frequent: Occurs often, although in varying degrees; annual probability of 1/2 or greater.

Each hazard was also assigned a level of severity. These are designated as follows:

Minor: Minor injuries or illness, less than 10% of properties damaged, minimal disruption of quality of life, within local ability to handle.

Serious: Limited major injuries or illnesses that do not permanently disable, 10–25% of properties damaged, shutdown of critical facilities for more than a week, mutual aid systems activated and state resources needed, possible federal resources needed.

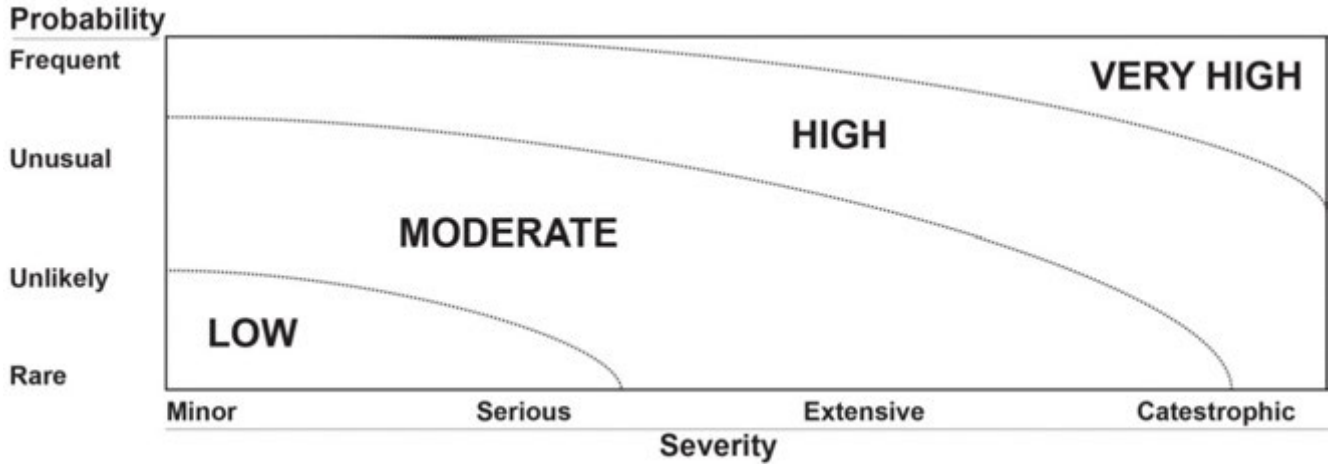
Extensive: Multiple severe injuries or illnesses, few fatalities, 25–50% of properties damaged, critical facilities shut down for more than 14 days, state resources activated, federal resources needed.

Catastrophic: Multiple fatalities, widespread injuries, greater than 50% of properties damaged, critical facilities shut down for more than 30 days, state and federal resources needed.

The product of the combination of hazard frequency and severity creates a level of risk for each type of hazard. It is the sense of risk that motivates people to take action to avoid the hazard and prepare for what cannot be feasibly avoided. However, the sense of risk should be an informed one, not one driven by hysteria or popular misconceptions. As you will see from the graphic below, in determining what level of risk to assign, the likelihood of an event is rated slightly stronger than its severity. Consequently, a frequent but minor event is a high risk, while a rare yet catastrophic event is rated only a moderate to high risk. This is because these frequent events are more well known, can be anticipated with greater accuracy, and can be mitigated against with fewer resources. Luckily, we live in a state that has no very high risks.

This regional scale analysis can also be augmented by towns at more detailed levels by considering hazards from the point of view of what they would affect locally in terms of exposure, sensitivity, and adaptive capacity. For example, people along streams are more exposed to flooding than those outside of flood-prone areas. People with poorly insulated homes

Figure 10-1: Level of Risk



and no backup power or heat source are more sensitive to power outages in winter. People or towns with less wealth cannot adapt as easily to threats as those with more resources.

Discussion by Hazard Type

Fifteen types of hazard were reviewed and ranked by risk to the Region. This information is summarized below. Locally specific versions of this process are done when local Hazard Mitigation Plans are developed. Many Internet links about each hazard can be found at http://www.trorc.org/programs/emergency/specific-hazards/.

The greatest risk to the Region and the State is from flooding. Flooding has hit the Region in the past and it will again in the future.[1] Extreme storms have become more frequent and this trend is expected to continue. FEMA flood maps are a good indicator of flood risk, but severe damage also occurs along upland streams outside of mapped flood hazard areas, as well as along road drainage systems that fail to convey the amount of water they are receiving. In addition, FEMA maps are focused on inundation and do not take into account lateral movements of rivers and streams, which have undermined homes and businesses. (Note: Additional information, policies, and actions on floods can be found in the Flood Resilience section of the Land Use chapter.)

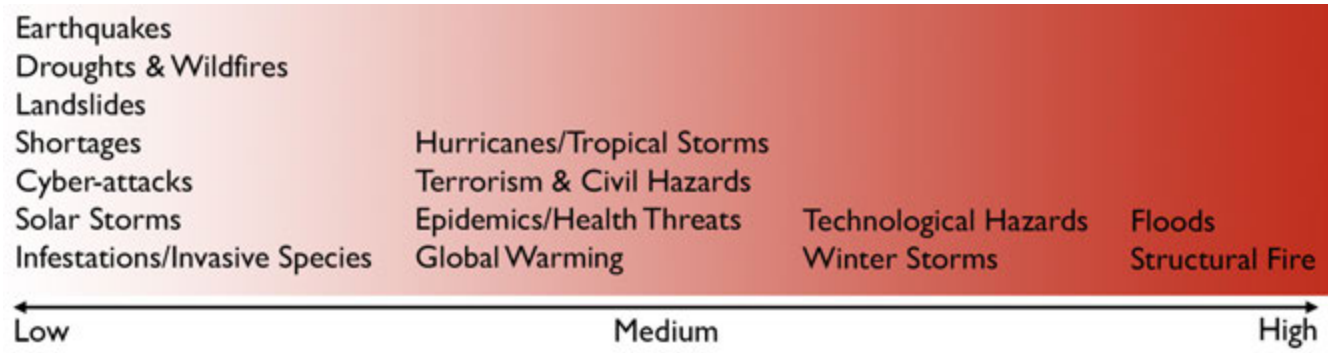
The second greatest risk to the Region is from structural fire. Vermont has one of the highest per capita death rates from fire in the nation. Towns generally do not have or require fire suppression systems (sprinklers) in older buildings that predate fire code and are not substantially renovated, and sprinklers are not required in new residential construction. Sprinklers can prevent significant loss of life by increasing the time for residents to escape blazes. Less frequent than individual structure fires are major downtown fires that can destroy entire blocks of town centers as have occurred in South Royalton, Bradford, and Randolph.

Severely Damaged Culvert, Stockbridge
| Source: Chris Sargent

"Technological hazards" and winter storms are moderate to high risks in the Region. Technological hazards are those unintentional hazards created by man-made substances, facilities, or actions that threaten people or property. This includes train derailments, hazardous materials spills or leaks, explosions, dam failure, and structure collapse. Among these, hazardous materials incidents, primarily involving petroleum products, are the most common. These events are difficult to predict, but they will certainly threaten parts of the Region again. The most memorable, and luckily not injurious, of these events was a rail car propane explosion in Fairlee in the 1970s.

Winter storms (snow or ice) are a regular occurrence in Vermont. However, severe winter storms can cause serious damage, including collapse of buildings due to overloading of roofs, brutal wind chills, and power outages due to downed trees and power lines. The January 1998 ice storm was the most recent widespread severe winter storm, but severe events will occur and ice storms appear to be increasing. The October 2005 early snow event downed trees and power lines in higher elevations in the Region, ice storms hit southeast Vermont in 2008 and

Figure 10-2: Summary of Hazards and Their Risks



northwest Vermont in 2013, and a heavy wet snow in December 2014 caused many outages.

Other hazards that are moderate risks to the Region include high winds, hail, and tornadoes. Hailstorms generally occur about twice a year in Vermont, and a small tornado is almost an annual occurrence.

Lower moderate risks include terrorism and civil hazards, contagious human disease, and climate change. Thankfully, terrorism and civil hazards are unlikely occurrences in Vermont. These hazards include actions that people intentionally do to threaten lives and property. The prime concern in this area is someone with a weapon in a school.

Contagious diseases, especially pandemic influenza due to a novel flu strain will occur some year, and it is estimated that 20–30% of the population will become ill, with a portion of those cases being serious or fatal.[2] Since the flu is a virus, there are antiviral drugs that can lessen its effects, but antibiotics have no effect, and it is the body's immune system that is the main agent against the virus. Vaccines tailored to a specific viral strain are effective but have to be created several months in advance. The annual flu vaccine is based on estimates of the upcoming strain(s), so if a novel strain emerged, that vaccine would not be ready before it arrived in Vermont.

While many types of emergencies are under local authority, pandemics are a federal and state emergency. Extensive planning has been done at these levels and such plans emphasize measures to slow the spread of the disease while a vaccine is being developed. It is assumed that the traditional health-care system would be overwhelmed and basic mass care would likely be administered at temporary regional facilities to protect hospitalized populations and leave hospitals available for other needed emergency medical care. Extensive public outreach would be implemented to dispel rumors and provide the best advice, including handwashing and staying home when sick.

Climate change is not a traditional disaster type, as it is more of a disastrous cause of disasters—a meta-disaster. It is affecting us now, but its worst effects will occur over decades, and the severity of its effects are difficult to fully anticipate, as it has not happened to us before. However, the predicted changes range from simply severe if greenhouse gases are quickly lowered to catastrophic if emissions continue unabated.

Earthquakes, landslides, extreme temperatures, solar storms, cyber-attacks, droughts, wildfire, shortages/outages, and invasive species/ infestations are lower risks due to estimated rarity or lack of expected severity, but still warrant emergency planning.

Goal, Policies, and Recommendations: **Emergency Management**

Goal

1. There is minimal loss of life, physical and emotional injury, financial loss, and property damage and loss resulting from all hazards.

Policies

1. Response plans and capacities need to reflect an all-hazards approach and be coordinated between towns, the State, and federal agencies.
2. Mitigation must be part of all recovery efforts in order to increase resilience.
3. Information on expected disasters and causes of injury or property damage should be as accurate and up-to-date as possible in order to properly gauge hazards.
4. Agencies or organizations expected to respond in a unified manner should train and exercise together.
5. Towns, individuals, and businesses should all be prepared for predictable disasters.
6. New or rebuilt development shall not increase disaster risk and should take reasonable steps to reduce risk.
7. Mitigation actions should:
    a. Seek to avoid impacts of a hazard first, then reduce impacts that cannot be reasonably avoided;
    b. Recognize the connections between land use, development siting, drainage systems, building standards, and road design and maintenance and the effects of disasters on the Region;
    c. Be mindful of the natural and human resources of the area;
    d. Be part of a larger systematic effort at disaster reduction; and
    e. Seek to permanently avoid damages when feasible.
8. Additional telecommunications towers should be built to increase radio and cellular coverage for emergency responders, including FirstNet.
9. Critical facilities, including emergency service buildings, substations, medical facilities, town offices, and town and state garages, must be constructed to be disaster resistant and able to withstand expected 100-year return events with minimal impacts.

Recommendations

1. State and federal governments must continue funding and operation of warning systems, including the National Weather Service's Emergency Alert System, NOAA weather radio, and USGS river and precipitation gauges.
2. Towns should pursue the use of capital programs and reserve accounts to properly budget for emergency vehicles and other large capital costs, as well as coordinate and share services to achieve overall efficiencies.
3. Towns should encourage sprinkler systems in residential structures to reduce loss from fire.
4. TRORC will continue to work with all communities to annually update Local Emergency Operations Plans, ensuring that these plans take into account the varied needs of people with disabilities, pets, and those without access to transportation.
5. TRORC will continue to work with all communities on hazard mitigation efforts, including updating mitigation plans, enhancing road and bridge standards for resiliency, and addressing flood resilience in Town Plans.

Goals, policies, and recommendations continued on next page

Goal, Policies, and Recommendations: **Emergency Management**

Recommendations (continued)

6. TRORC will continue to work cooperatively with local emergency response organizations, VEM, LEPC #12, social service agencies, long-term recovery organizations, community resilience organizations, and others to help improve emergency planning, response, and recovery.
7. The federal and state governments should increase funding for preparedness and mitigation planning and actions at the local level in order to reduce escalating response and recovery costs.
8. FEMA should modernize flood maps, especially in Orange County and in unnumbered A zones, and incorporate newer flood frequency predictions into maps.
9. TRORC should assist towns and VT ANR in refining river corridor maps.
10. TRORC should work to ensure that new hazard assessment data from the state and federal levels is disseminated to the public and local officials so that capacity is risk based.
11. Communities should work to ensure that important local facilities that provide emergency services, water, food, and gas or that act as emergency shelters are able to function during power outages.
12. TRORC should work with towns and other organizations to coordinate land use, transportation, and energy policies and actions to result in more resilient communities.
13. TRORC should assist towns in response and recovery stages through damage documentation assistance and navigating federal and state grants.
14. TRORC will continue to do outreach on preparedness by individuals and continuity planning for businesses so they are better prepared for expected incidents.
15. Vermont should look into statewide building codes for residential wood heating systems.

Emergency Management Endnotes

1. Huanping Huang, Jonathan M. Winter, Erich C. Osterberg, Radley M. Horton, and Brian Beckage, "Total and Extreme Precipitation over the Northeastern United States," *Journal of Hydometeorology* 18, no. 6 (June 2017), https://doi.org/10.1175/JHM-D-16-0195.1.
2. U.S. Department of Health and Human Services, *Pandemic Influenza Plan: 2017 Update*, 2017, https://www.cdc.gov/flu/pandemic-resources/pdf/pan-flu-report-2017v2.pdf.

Willard Bridge, Pomfret | © John Knox

ENERGY

11

White River Junction Solar Farm | © *Advanced Energy*

A. Introduction

The energy goals, policies, and recommendations in this chapter are intended to direct future development and to describe how energy development and generation shall occur in this Region in support of Vermont's 2016 Comprehensive Energy Plan (CEP). It is also intended to ensure that the TRO Region maintains a safe, efficient energy system that encourages energy conservation and the generation of renewable resources in a manner that does not negatively impact the rural nature of our communities. The primary purpose of this chapter is to identify a path to implement the VT 2016 CEP at the regional level. As the CEP goals, federal and state policies, and energy technologies change, this chapter will need to be updated. Regional energy planning has benefited from technical support from the Vermont Department of Public Service, the Vermont Energy Investment Corporation (VEIC), the Energy Action Network, Green Mountain Power, Washington Electric Corporation, and other organizations.

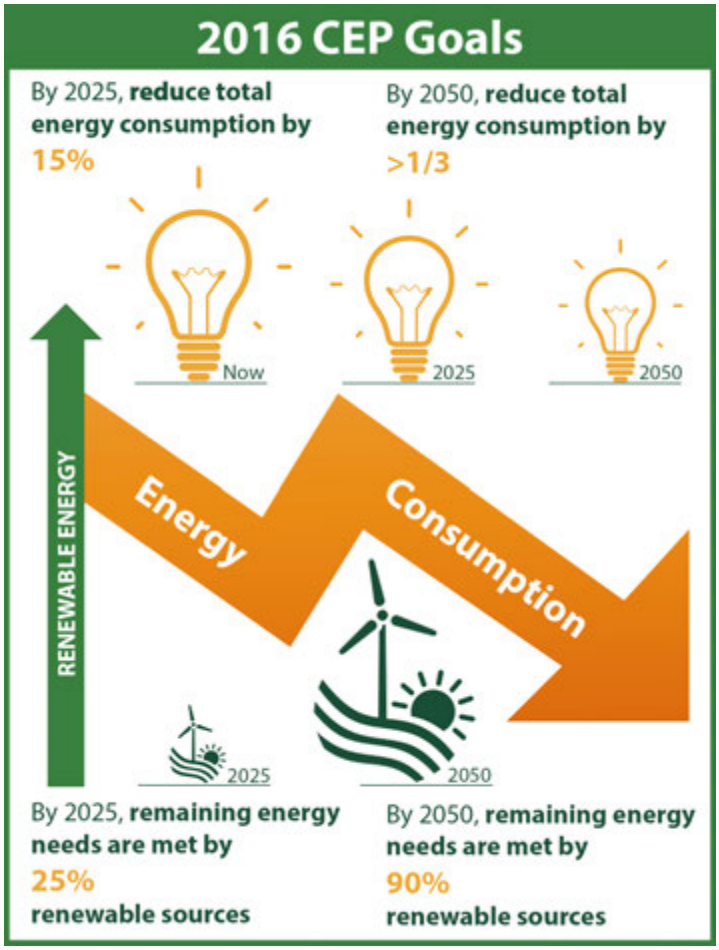
B. Background

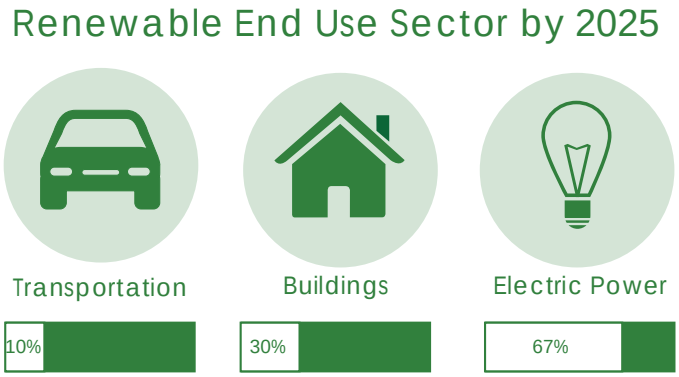
Vermont's energy planning began in the 1970s following the oil crisis at that time. The first comprehensive state energy plan was created in 1991 and required periodic updates. Vermont's energy policy, as codified in 30 VSA § 202a(1), establishes these state goals:

- To assure, to the greatest extent practicable, that Vermont can meet its energy service needs in a manner
  - that is adequate, reliable, secure, and sustainable;
  - that assures affordability and encourages the state's economic vitality, the efficient use of energy resources, and cost-effective demand side management; and
  - that is environmentally sound.

Energy adequacy, reliability, security, and affordability are essential for a vibrant, resilient, and robust economy.[1] Environmentally sound and sustainable energy use ensures that we

Figure 11-1: 2016 CEP Goals





Source: VT DPS, 2016

are responsible stewards of Vermont and our children's future.

Expanding upon the statutory goal of 25% renewable by 2025 (10 VSA § 580(a)), the 2016 CEP established the following set of goals:

- Reduce total energy consumption per capita by 15% by 2025, and by more than one-third by 2050.
- Meet 25% of the remaining energy need from renewable sources by 2025, 40% by 2035, and 90% by 2050.
- Sectors that need to be renewable by 2025: 10% transportation, 30% buildings, and 67% electric power.

Vermont statutes related to energy—requiring greenhouse gas reductions, renewable energy generation and building efficiency—are outlined below.

Greenhouse gas reduction goals (10 VSA § 578)

- "It is the goal of the state to reduce greenhouse gas emissions . . . from the 1990 baseline by 25% by 2012; 50% by 2028; and, if practicable by using reasonable efforts, 75% by 2050."

25 by 25 state goal (10 VSA § 580)

- To produce 25% of energy consumed within the state through renewable energy by 2025.

Building efficiency goals (10 VSA § 581)

- To substantially improve the energy fitness of at least 20% of the state's housing stock by 2017 (more than 60,000 housing units) and 25% of the state's housing stock by 2020 (approximately 80,000 housing units);
- To reduce annual fuel needs and fuel bills by an average of 25% in the housing units served;
- To reduce total fossil fuel consumption across all buildings by an additional 0.5% each year, leading to a total reduction of 6% annually by

2017 and 10% annually by 2025;

- To save Vermont families and businesses a total of $1.5 billion on their fuel bills over the lifetimes of the improvements and measures installed between 2008 and 2017;
- To increase weatherization services to low-income Vermonters by expanding the number of units weatherized and/or the scope of services provided, as revenue becomes available in the home weatherization assistance trust fund.

Renewable energy goals (30 VSA § 8001-8014)

- To support the development of in-state renewable energy resources;
- To include renewable energy plants in the state's energy portfolio.

C. Energy Defined

Energy, as used in the 2016 CEP and this Plan, is not the same as electricity. Energy includes all forms of energy used by people for transportation, thermal (heating), and electricity. Energy can be expressed in British Thermal Units (BTUs). Charts in this Plan will be shown in BTUs, including thousand million BTUs (TMBTUs). A BTU is a measure of the energy content in fuel and is a helpful unit of energy when comparing different energy sources.

D. Key Energy Issues

Environmental Protection

The consequences of our current pattern of energy use are increasingly alarming and urgent. National and international experts agree that if humanity does not immediately and dramatically reduce the use of fossil fuels, the negative

Table 11-1: Power and Energy Unit Defitions and Energy Unit Conversions

Power and Energy Unit Definition	
BTU	Unit measure of the heat content of fuels
kW	Unit measure for power equivalent to one thousand watts
kWh	Unit measure of power use as a function of time. One kWh is using one hour of electricity at a rate of 1,000 watts.
MW	Unit measure of power equivalent to 1,000 kW
MWh	Unit measure of power use as a function of time. One MWh is using one hour of electricity at a rate of 1,000 kilowatts.
Energy Unit Conversions	
1 kWh	3,412 BTUs
1 MW	1,000 kW
1 MWh	1,000 kWhs
1 gallon heating oil	138,500 BTUs
1 gallon gasoline	120,429 BTUs
1 pound wood pellets	8,400 BTUs
1 gallon propane	91,333 BTUs

consequences of climate change will alter human civilization.

"Climate change is the defining issue of our time – and we are at a defining moment. We face a direct existential threat. Climate change is moving faster than we are. If we do not change course by 2020, we risk missing the point where we can avoid runaway climate change with disastrous consequences for people and all the natural systems that sustain us."

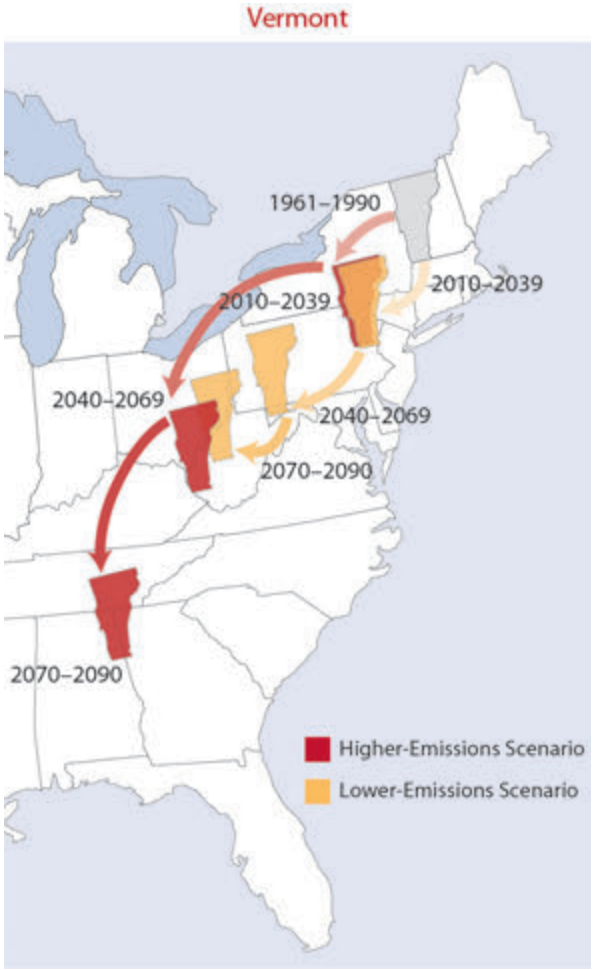
-UN Secretary-General António Guterres, September 10, 2018

An Intergovernmental Panel on Climate Change (IPCC) special report on the impacts of global warming was released October 8, 2018.[2] The 91 authors and review editors from 40 countries found that if greenhouse gas emissions continue at the current rate, the atmosphere will warm up by as much as 2.7 degrees Fahrenheit (1.5 degrees Celsius) above preindustrial levels by 2040, resulting in inundated coastlines, intensifying droughts, flooding and wildfires, increasing loss of ecosystems, greater poverty, and an increase in climate refugees. The report stated that to prevent 2.7 degrees F of warming, **greenhouse pollution must be reduced by 45 percent from 2010 levels by 2030, and eliminated completely (100 percent) by 2050.** The report also estimated the financial impact of the effects of climate change. The estimated $54 trillion in damage from 2.7 degrees of warming would grow to $69 trillion if the world continues to warm by greater than 3.6 degrees. The report concludes that the world is already more than halfway to the 2.7-degree mark and that humanity has only an estimated twelve years to keep temperatures contained to a maximum of 2.7 degrees before climate catastrophe occurs. Limiting global warming to 1.5 degrees C would require "rapid and far-reaching" transitions in land, energy, industry, buildings, and transportation.

Similarly, the Fourth National Climate Assessment issued by 13 U.S. federal agencies on November 23, 2018, presents the stark warnings of the consequences of climate change for the United States, including rising temperatures, extreme heat, drought, wildfires, heavy downpours, challenges to livestock health, declines in crop yields, and changes in extreme weather events that threaten rural livelihoods, food security, and price stability.[3]

According to the Vermont Department of Health's Vermont Climate and Health Profile Report (September 2016), without a sharp reduction in greenhouse gas emissions, Vermont's climate will change substantially. By the end of the century, these changes may include:

Figure 11-2: Higher vs. Lower Emissions Scenarios



Source: Union of Concerned Scientists

- An increase in average annual temperatures of between 4 degrees F and 7 degrees F
- Increased dangerously hot days from 5 to more than 30 per year
- Lengthened tick and mosquito activity by about 40 days
- More frequent heavy rainfall events

Energy Security

The TRO Region's dependence on fossil fuels is significant. The primary use of these fuels is for space heating and transportation. According to the U.S. Energy Information Administration, about 3/5 of Vermont households use fuel oil, kerosene, or propane for heating.[4] In the TRO Region, roughly 13,000 households rely on oil for heating, which means a substantial portion of the Region is subject to oil price and availability fluctuations. Of the total $885 million spent on residential energy in the State of Vermont, just over 50 percent ($445.8 million) was spent on fuel oil, kerosene, or light propane gas.

Where the Region's energy is generated is also a concern. Vermont currently obtains much of its electricity from hydroelectric facilities located out of state, primarily in Quebec. While these sources of electricity currently provide the Region with low-cost, renewable generation, the prospective construction of high-capacity transmission lines from Quebec to southern New England may create increased competition for electricity between Vermont and other New England states that are seeking electricity from renewable sources. Reducing or maintaining current levels of the Region's reliance on imported energy will make the State and Region more energy secure, especially in a future where electricity demand is anticipated to increase as the use of fossil fuels decreases.

The demand for electricity across residential, commercial, and industrial sectors grew rapidly during the second half of the twentieth century but has leveled off in recent years. A variety of aggressive energy conservation programs implemented through the State's energy efficiency utility, Efficiency Vermont, contributed to slowing the growth of electricity demand. The need for electricity conservation and efficiency improvements will continue and become more important with increases in electricity demand due to the switching away from fossil fuel energy use for transportation and space-heating needs. Electricity provides the most viable path toward meeting the State's energy goals in several key areas. Electrification of passenger vehicles will dramatically reduce energy use in the transportation sector through use of more efficient vehicles. Similarly, the easiest transformation in space heating of existing residential buildings is to weatherize the structure and install highly efficient electric cold climate heat pumps and/or modern wood heat systems.

Vermont and the TRO Region can be more energy self-reliant. Energy conservation and efficiency, coupled with in-state renewable energy generation, will decrease energy security concerns.

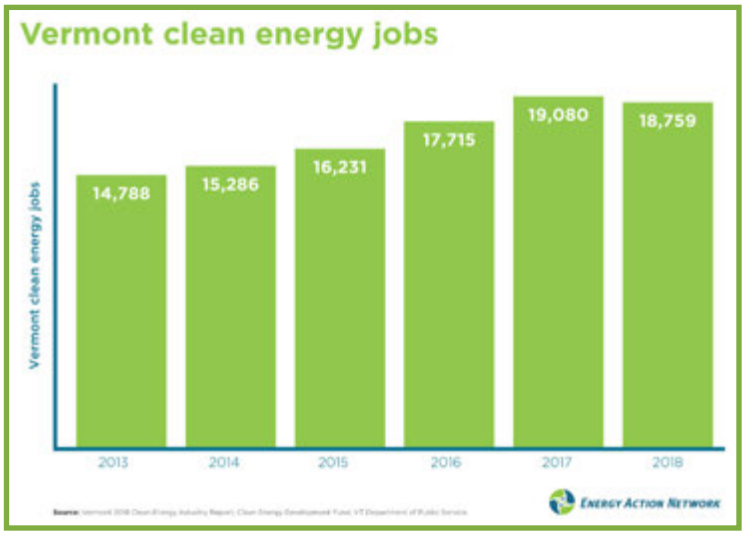
Economic Needs and Opportunities

Vermont spends nearly $2.4 billion[5] and the TRO Region approximately $160 million annually on energy, with the vast majority of those dollars

Air sealing a window frame with caulk
Photo Credit: Capstone Community Action

exported out of state as we buy gas and oil. This Plan, like Vermont's 2016 CEP, states that overall energy consumption will need to decline by about one-third by 2050 to meet our energy goals. That reduction can be accomplished through changes in land use patterns and the transportation system (by reducing the need for driving and by introducing more energy-efficient vehicle technologies); through extensive building upgrades and weatherization; and with energy conservation by means of more efficient appliances and devices, avoiding peak use, and by electricity storage technologies.

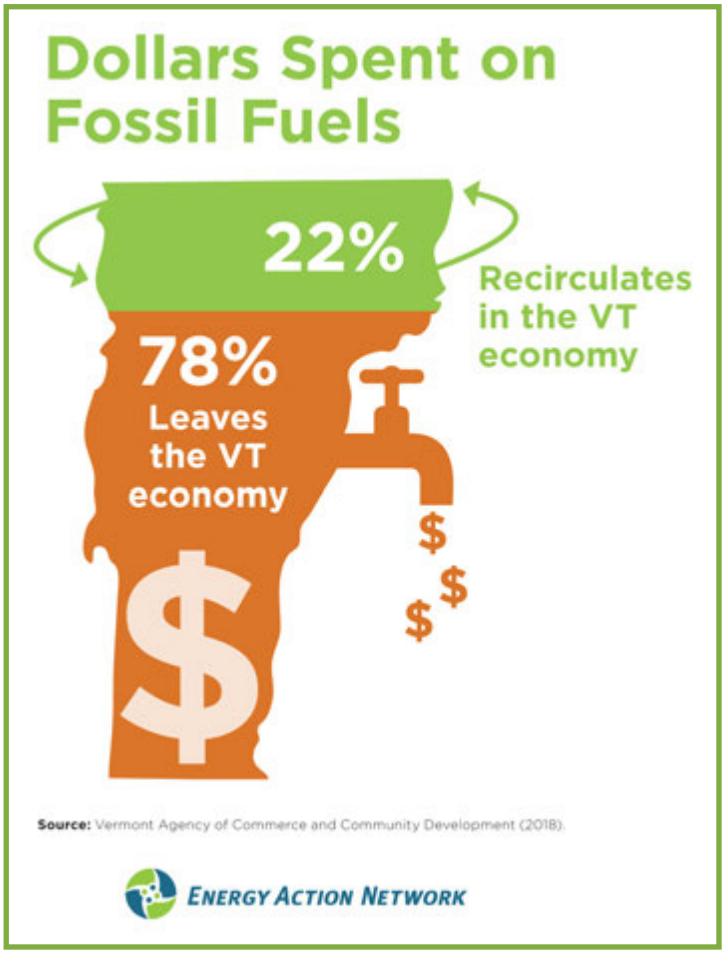
Figure 11-4: Vermont Clean Energy Jobs



These improvements will also keep more of the money we spend on energy in the Region, so that millions of dollars will be retained to circulate in local economies, supporting employment and social services, and improving the quality of life of our communities. The changes needed to reduce our energy demand and to produce local renewable energy offer a wide array of business and employment opportunities.

Weatherization of buildings, installation and servicing of new heating systems, procurement and delivery of biofuels such as wood pellets and cord wood, and constructing and servicing local renewable energy generation facilities offer new jobs and business development opportunities while providing opportunities for existing fossil fuel-based businesses to diversify using their existing capacity and customer networks. Economic growth in the renewable energy sector has been robust over the past five years. Vermont has seen a roughly 20 percent growth in clean energy employment sectors overall.[6] In 2016, 6 percent of Vermont's total jobs were in the clean energy sector. Clean energy jobs include those in renewable energy, energy storage, energy efficiency, and advanced transportation and heating.

Figure 11-3: Dollars Spent on Fossil Fuels



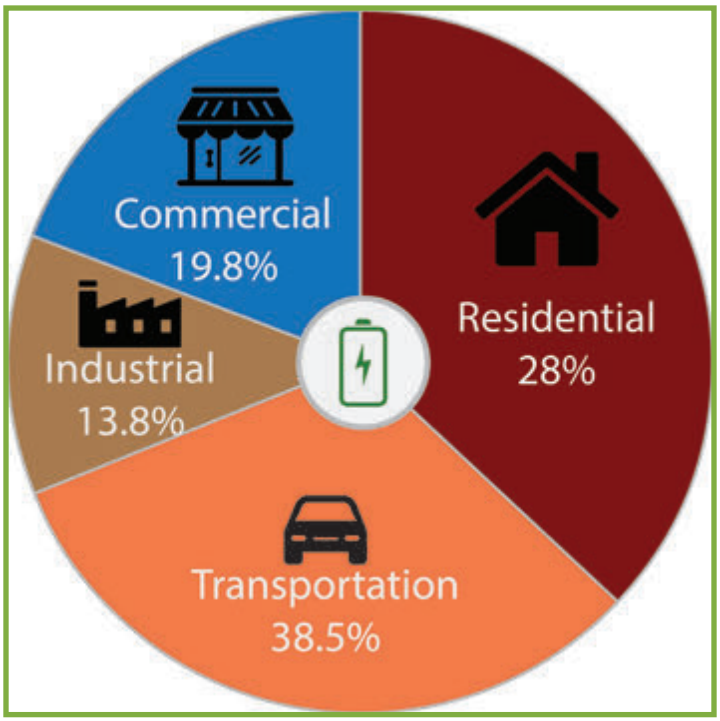
E. Regional Energy Supply, Demand, and End Use

Energy use in Vermont is dominated by the transportation (38.5%) and residential (28.0%) sectors. To meet the 2016 CEP goals, based on the Vermont Energy Investment Corporation modeling described in Appendix J of this Plan, the **TRO Region will have to reduce energy consumption nearly 50 percent — from 11,000 TMBTUs to 5,550 TMBTUs by 2050**. As seen in the Figure 11-7, in this model, overall energy use will decrease due to efficiencies; fossil fuel (non-renewable) energy use will dramatically decrease; and renewable energy will meet 90 percent of total energy demand.

The State's goal of getting 90 percent renewable energy from renewable sources by 2050 represents a substantial shift from our current energy portfolio. Sixty percent of Vermont's electricity currently comes from renewable sources, a majority of which is hydropower generated by Hydro Quebec. A growing percentage of energy is now coming from wind and solar sources, but most energy used in the Region today is still coming from fossil fuels (see Figure 11-6) and is used for transportation and heat. The Region does get some thermal energy from wood as well. To reach the State's renewable energy generation targets, more renewable generation will need to be developed and we believe most of this will be from solar.

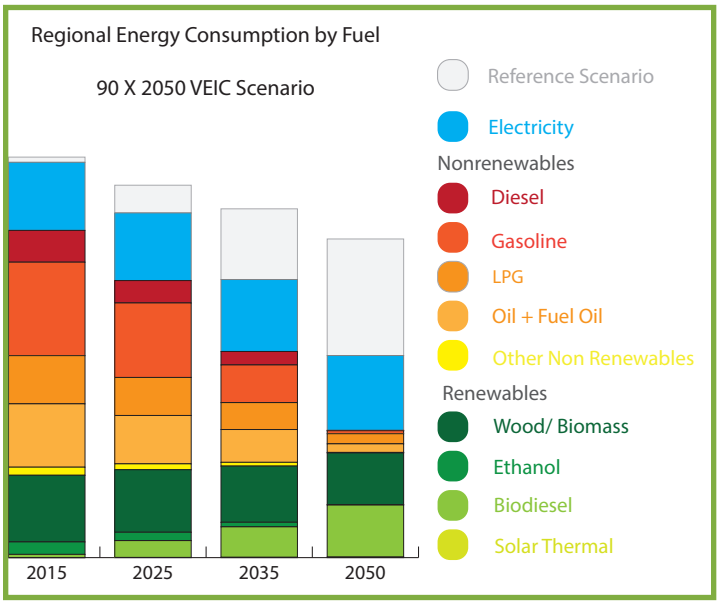
The growth of the renewable energy generation industry in Vermont over the last six years has been substantial. As of December 2018, Vermont generates roughly 361 MW of solar power—37 MW from the TRO Region. The proliferation of commercial wind energy generation in Vermont has been decidedly slower, primarily due to the costs of development and the complicated permitting requirements. Vermont generates roughly 151 MW of wind power and 634 MW of hydro power.[7] Hydro development has dropped off significantly since the early 1990s, due to a number of factors including the loss of economic incentives and stricter permitting requirements.[8]

Figure 11-5: Vermont Energy Consumption



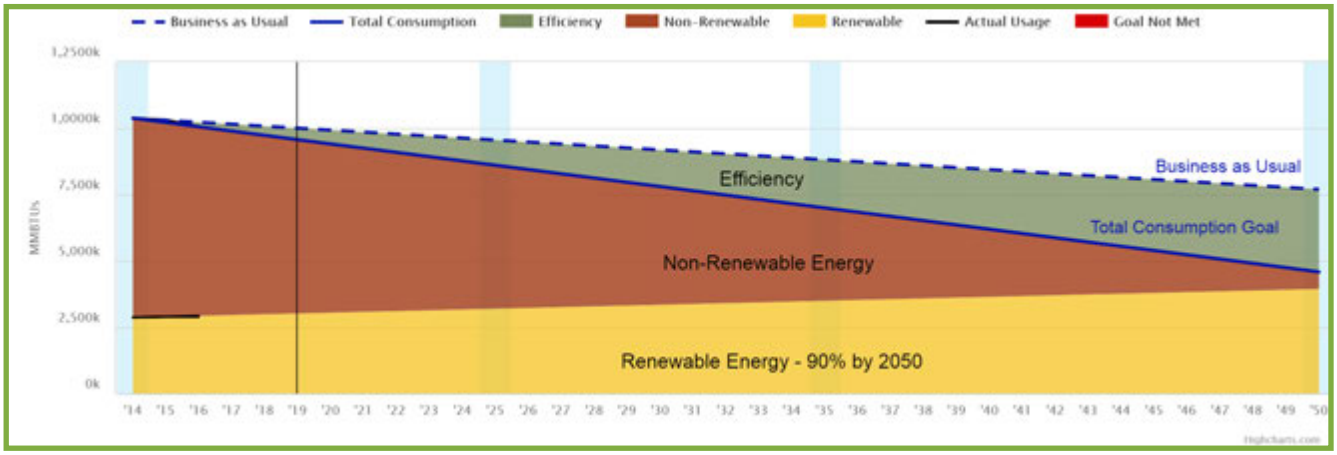
Source: U.S. Energy Information Agency, 2016

Figure 11-6: Regional Energy Consumption by Fuel



Source: VEIC

Figure 11-7: TRORC Energy Goals Time Table



Source: Energy Action Network, 2019

F. Electricity Conservation and Renewable Generation

The data modeling used to create the scenario that this Plan uses to achieve the goals of the 2016 CEP projects a 50 percent decrease in overall energy use in the TRO Region. The significant reduction in the use of fossil fuels ultimately requires an increase in our dependence on electricity. One possible path for the Region to achieve 90 percent renewable energy use by 2050 includes increasing electricity demand by roughly 10 percent (from 2015 levels) to offset decreases in fossil fuel use. The increase in electricity consumption will be due to the utilization of new electric technologies, such as cold climate heat pumps and electric vehicles. This fundamental change in the type of energy we use will require substantial changes at the utility scale.

Energy demand management is the lowest-cost option to help meet expected demand. Installation of energy efficient devices or equipment and improving building shells to reduce the need for building heat is essential to reducing our overall energy use. Proper load management can reduce demand during peak hours. Demand response techniques include time of use rates, smart rates, and energy use feedback. For example, water heaters can be timed to use power in the middle of the day when electric loads are less. Utilities can install advanced meter infrastructure (AMI), which increases system reliability and load management capabilities with two-way communications technology. AMI includes smart meters to enable utilities and customers to track and manage the flow of energy more efficiently, curb peak demand, lower energy bills, and integrate renewable energy sources and storage to the grid. AMI data and smart meter technology allow utilities to implement smart rates, which can vary the price of electricity to accurately reflect the cost of electricity: lower rates for low demand and higher rates during peak demand. This incentivizes lower electric use during peak times. But even with fully implemented demand-side management, fuel-switching to electricity will require new sources of renewable energy. Residential energy demand is seen in Figure 11-8.

New technology, demand-side management, gains in efficiencies in appliances, upgraded building codes, and renewable generation alone will not be sufficient to achieve the State's energy goals. People will have to alter their behavior to conserve energy and use less. Much of what we do depends, in one form or another, on energy. Where we live and work; how we get from place to place; how we design, build, and heat our houses; and how we use our land are all patterns of behaviors, controlled by social norms. Energy savings can be achieved by small behavior changes such as turning down thermostats,

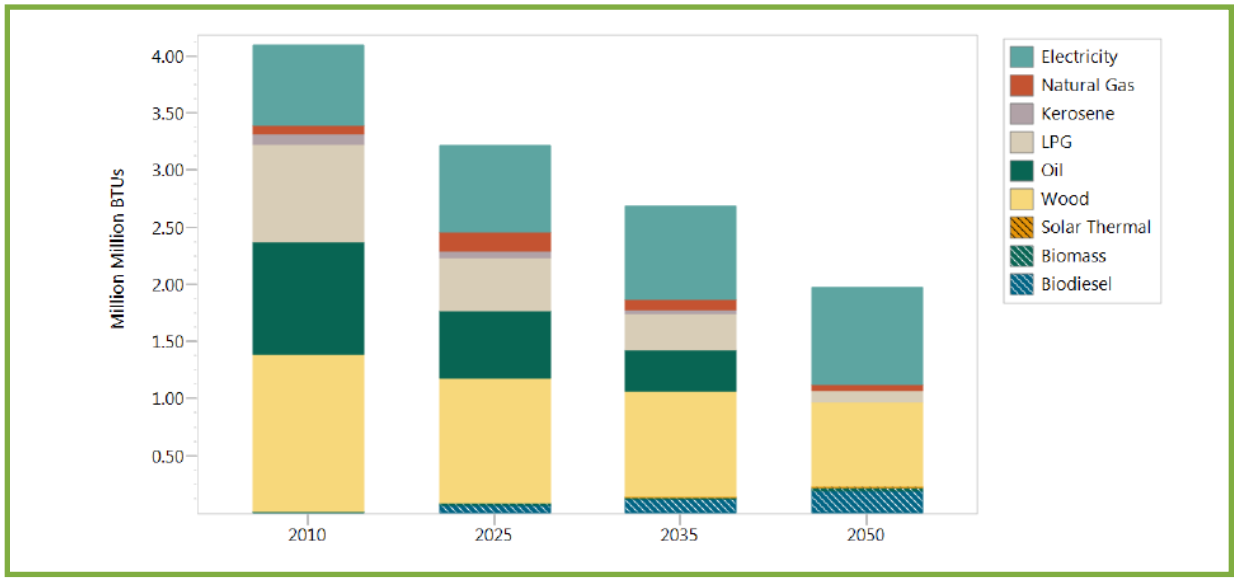
air drying clothes, and turning off electronic devices when not in use. Programs such as Efficiency Vermont (EVT), Go VT, and Button Up! are designed to educate people on ways they can change their behavior to reduce energy consumption and greenhouse gas emissions. If provided with good materials, local energy committees can successfully implement programs like these at the local level. Additionally, properly designed smart rates can either encourage or discourage usage at certain times of the day. Small changes in routine, such as shifting power-hungry activities to "off-peak" hours in the morning or evening, can help ease the load on the Region's power grid. Electrical storage can closely align customer loads with periods of lower electricity demand, store solar electricity to use during peaks or provide some backup during power outages. TRORC can only indirectly implement many of the strategies related to electricity conservation. These strategies require action from utilities; state, federal, and municipal governments; and individual citizens.

Meeting the goals of the 2016 CEP will mean that in the TRO Region, we will go from using 1.8 TMBTU of electricity to 2.1 TMBTU. Because 90 percent of our energy must be from renewable energy, new renewable energy generation facilities will need to be built throughout our Region. TRORC and its municipalities will need to clearly identify areas where and what kind of renewable energy generation facilities are appropriate.

The Vermont electric grid was developed to function as an importer of electricity. As with the rest of the United States, Vermont has depended on a small number of centralized power plants, the vast majority of which are located outside of the State. This classic model of energy distribution has a number of significant disadvantages due to inefficiencies and power loss over lengthy transmission lines.

Our existing electric grid is not yet fully capable of allowing the placement of small renewable energy generation facilities in every community in our Region. Currently in the GMP region, for example, parts of Hartford and Hartland have poor circuit ratings, while the Washington Electric territory has no remaining capacity. In addition, energy supply (generation) and loads (end uses) must be instantaneously kept in balance, even as customers change their end uses or renewable energy facilities respond to changes in generation. As the Region transitions

Figure 11-8: TRORC Residential Demand by Fuel



Source: Vermont Energy Investment Corporation, 2015

Figure 11-9: What will it take to reach 90% by 2050?

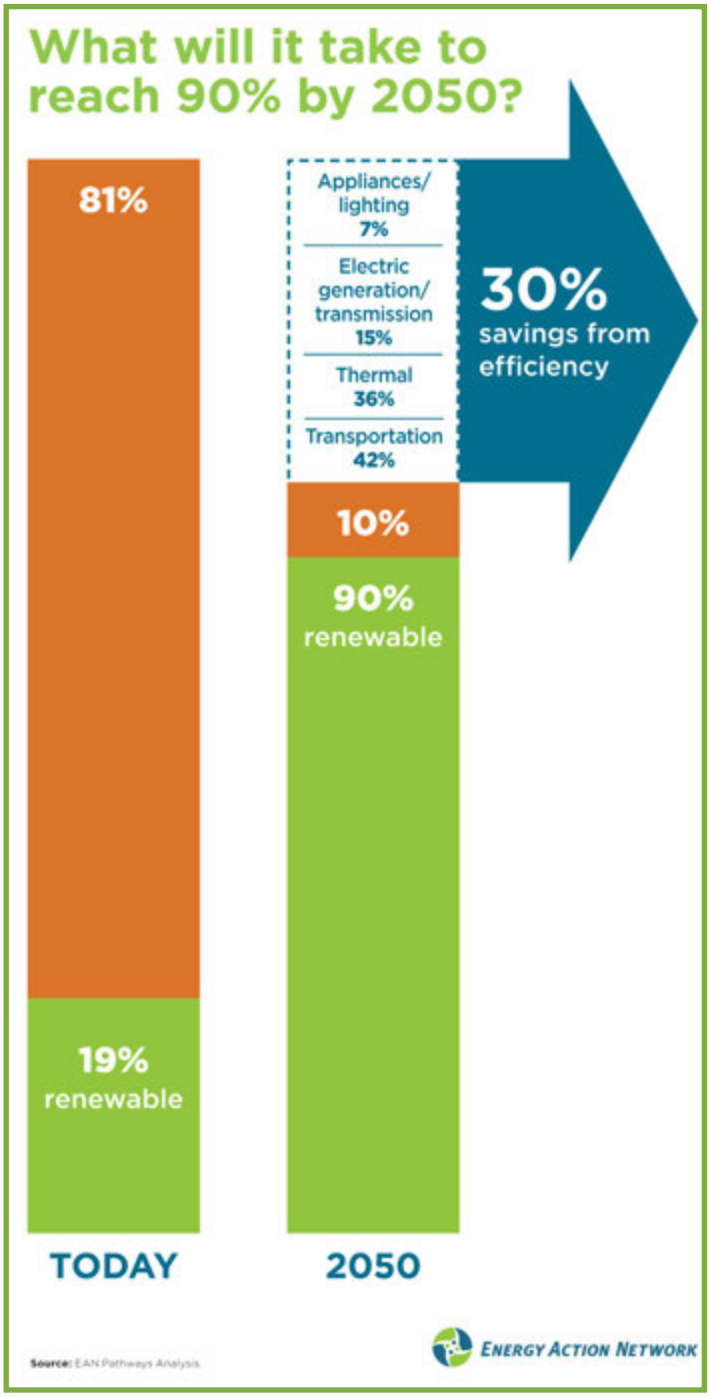
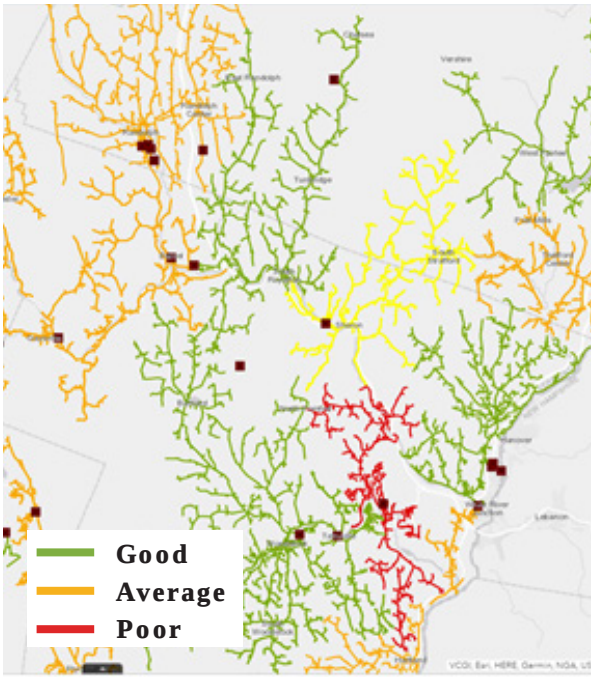


Figure 11-10: GMP Circuit Rating for Distributed Generation



to 90 percent renewable energy (with much of it produced in state), power companies and VELCO will need to increase the pace of system-wide upgrades. This will include line upgrades and, once the technology becomes readily available, the provision of storage technologies such as Tesla's new Powerwall battery system. Electrical storage can closely align customer loads with periods of lower electric demand, store solar electricity to use during peaks, or provide some backup during power outages.

New England states are required to meet state-mandated renewable energy requirements. When renewable energy generation facilities are built, the development gains renewable energy credits (RECs), which utilities throughout New England can purchase to claim the renewable attributes of generation that they do not own. In Vermont, many developers utilize the sale of RECs to help fund the construction of a project. The challenge is that RECs are often sold to utilities outside of Vermont. The energy generated by a renewable energy generation facility that has sold its RECs out of state does not count toward the state's energy goals. But it does count toward local and

regional targets. Changes in legislation have made it possible to retire RECs in state, thus allowing us to further increase our renewable energy portfolio. Act 56, which was passed in 2015, has increased the number of RECs that need to be retired in state. Efforts to increase that cap or encourage their retirement in state should continue in order to ensure that the goals of the CEP are reached.

Goals, Policies, and Recommendations: **Electricity Conservation and Renewable Generation**

Goals

1. Twenty-five percent of overall energy needs comes from renewables by 2025, 40 percent by 2035, and 90 percent by 2050. Sixty-seven percent of energy uses will be powered by renewable electricity by 2025.
2. The amount of renewable energy generated in the TRO Region increases from 2015 levels by 163 MW by 2050.

Policies

1. TRORC supports using demand-side management to manage the expected electric energy demand increase by 2050 in the TRO Region.
2. TRORC supports Efficiency Vermont and other incentive programs to reduce electric energy use and encourage the use of devices and equipment that perform work using less energy input than otherwise necessary, such as Energy Star or CEE2, CEE, or advanced appliances.
3. TRORC encourages state policy to adopt energy storage mandates and incentive programs.

Recommendations

1. TRORC will provide education and outreach to municipalities on energy generation.
2. TRORC will advocate for continued incentives that lead to the retirement of renewable energy credits in state.
3. TRORC will help interested towns meet the standards set forth in Act 174 for enhanced energy planning so that local preferences receive "substantial deference" in the Public Utility Commission's Section 248 proceedings. "Substantial deference" is a term used in statute but has not been further defined in proceedings or litigation.
4. TRORC should promote the use of programs such as eHome and Zero Energy Now! in conjunction with Green Mountain Power and the Building Performance Professionals Association of Vermont (BPPA-VT) through outreach and education.
5. The Department of Public Service (DPS) should work with BPPA-VT to encourage HVAC and weatherization providers to join the organization to provide holistic energy advice to the Region.
6. DPS and TRORC should support and provide outreach for Energy Action Network's Community Energy Dashboard and Efficiency Vermont's customer engagement web portal and home energy reports.
7. TRORC and DPS should support efforts to develop programs that encourage energy conservation through behavioral change by advocating for a roll-out of smart rates in the Region.
8. TRORC should fully integrate energy planning into the technical assistance it provides its member towns.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Electricity Conservation and Renewable Generation**

Recommendations (continued)

9. TRORC will work with partners to promote a wide variety of renewable energy generation types, including adding photovoltaic solar installations and wind turbines, optimizing existing hydroelectric dams, promoting sustainable use of biomass and bio-digesters, and encouraging passive solar building designs.
10. TRORC will develop easy to understand materials about the State's energy goals and how they interact with local and regional planning.
11. TRORC will maintain an enhanced energy compliant Regional Plan in order to play a stronger regional role in the Public Utilities Commission (PUC) permitting process.
12. TRORC will work with member towns on exploring possible shared energy program services aimed at improving efficiency and adoption of electrification and conservation measures, including hiring a multi-town energy coordinator.

F. Transportation and Land Use

This section addresses the intersection of transportation, energy, and land use. The Land Use and Transportation chapters in this Regional Plan complement this section and have additional relevant policies and actions.

Vermont uses more energy for transportation than for any other sector: 38.5 percent of the total energy consumed in Vermont. To reach the 2016 CEP goals, Vermonters will need to switch from petroleum powered vehicles to electric vehicles and vehicles powered with biofuels. It is also important to recognize that land use choices are inextricably linked to our transportation system. Vermonters travel far from their homes to jobs, services, and shopping. The 2016 CEP seeks to reduce transportation energy use by 20 percent from 2015 levels by 2025.

Progress toward the goal of changing 90 percent of Vermont's vehicles to electric vehicles may be slow at first since cars and trucks have long operating lives. An electric vehicle using the same amount of BTU energy as a gas car travels four times farther. To meet the 2016 goals for transportation, reducing the amount of daily driving would also be necessary.

Vermont's land use and transportation patterns are key reasons why transportation uses the largest portion of our energy. Where we work, go to school, shop, utilize services, and recreate is often not close to where we live.

Much of Vermont's appeal to homeowners is the ability to own a house in the country. While many communities have small villages or downtowns, residential development in our towns is mostly located outside of these areas on rural roads. The choice to live in a rural setting leads to longer commutes for work, shopping, and services.

The rural nature of our Region also means that there are limited locations for key centers of employment. Out of the 30 towns in the TRO Region, only seven could be considered centers of employment. These are Bethel, Bradford, Hartford, Norwich, Randolph, Royalton, and Woodstock. Further, a significant number of those who live in Orange and Windsor Counties work outside of the Region in the Hanover/Lebanon or Montpelier areas.

This dispersed pattern of development is currently furthered by the way we regulate development locally. Many communities allow residential development in much of their towns, and often at village-scale densities (one to two acre) in rural areas. In effect, this does not direct most growth to core areas, but spreads it throughout town. If this pattern of development

persists, these communities will need to improve roads in rural areas to serve new development, resulting in undue costs to taxpayers for road maintenance, increasing vehicle miles traveled (VMT), and making it more difficult to use transit.

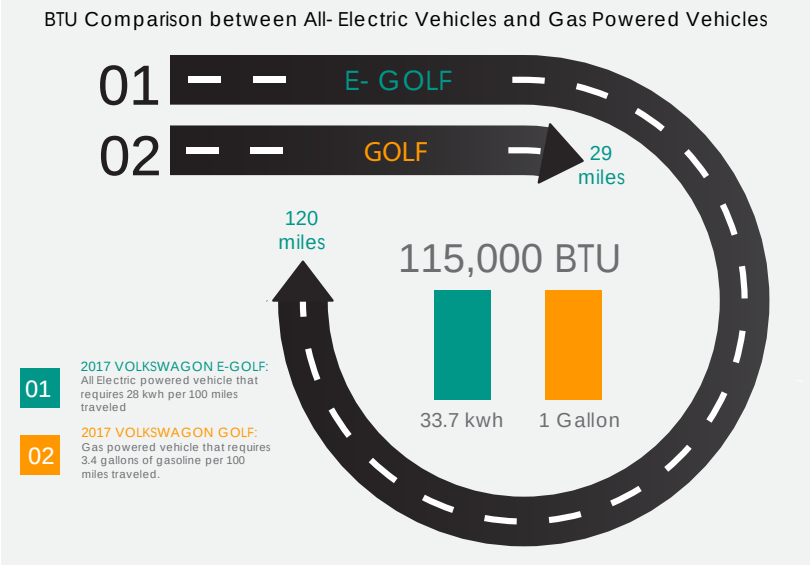
Another challenge for Vermont's transportation patterns is the lack of available public transit. The Regional Transit Network map in Figure 4-10 illustrates that access to public transit is currently difficult or nonexistent in many parts of our Region. Public transit provides less than 1 percent of the transportation in our Region. The rural character of the Region presents challenges for a traditional public transportation system. Long distances between homes and employment centers strain existing commuter bus routes, while the need for transportation in low population density areas presents a uniquely rural challenge to the system. However, transit systems could still replace many single-occupant vehicle (SOV) trips at a significant cost savings to drivers. The main impediment to greater transit is not that it costs more than cars; it is simply that we like to own cars.

The Region does have several public transportation services which are vital to our Region's population, and elderly and disabled transportation services give alternatives to people who wish to live independently but who are unable to drive themselves.

In areas where local transit services are available, other challenges exist. Commuter bus routes that stop at regular intervals along their routes extend the length of the trip, making it quicker for someone with a car to drive themselves instead. The impact of regular stops can also make it challenging to time arrivals and departures in an economic center with hours of employment. Capacity is also an issue. Buses could expand to hold 50 riders versus 24, but that would require transit stops to be reconfigured to accommodate larger vehicles.

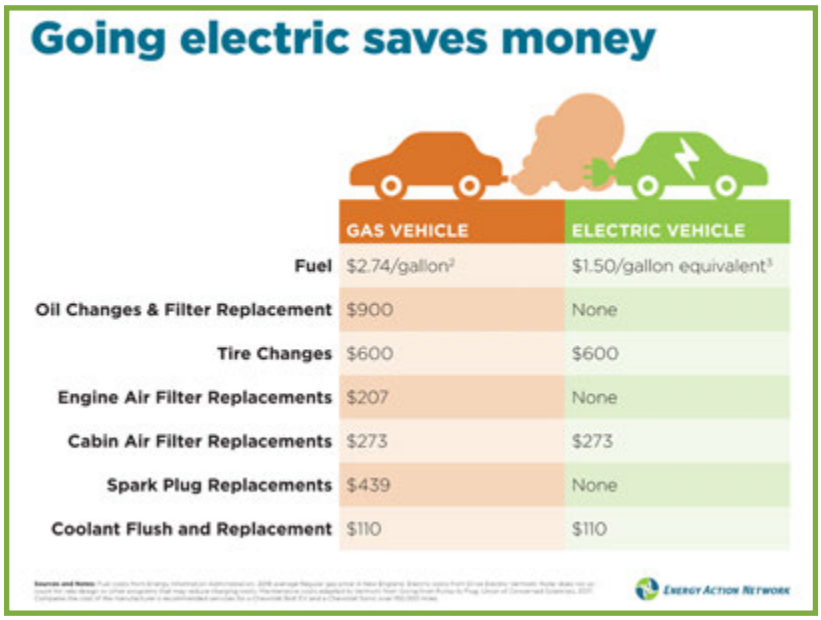
Developments that occur in areas that are either right on or nearby a public transit route are

Figure 11-11: BTU Comparison between All-Electric Vehicles and Gas Powered Vehicles



Source: Fueleconomy.gov

Figure 11-12: Going Electric Saves Money



Going electric saves money

	GAS VEHICLE	ELECTRIC VEHICLE
Fuel	$2.74/gallon[2]	$1.50/gallon equivalent[3]
Oil Changes & Filter Replacement	$900	None
Tire Changes	$600	$600
Engine Air Filter Replacements	$207	None
Cabin Air Filter Replacements	$273	$273
Spark Plug Replacements	$439	None
Coolant Flush and Replacement	$110	$110

Energy Action Network

sometimes planned without considering public transit. If not considered during the planning stage, it is difficult to integrate public transit services into completed site plans. In addition, the location of residential subdivisions away from transit lines limits public access. Diverting an existing route to a new location is expensive and can have negative impacts on existing services.

Act 250 considers public transit as part of Criterion 5 (Transportation), but at the local level, integration of public transit services into the development review process is less common. Public transit agencies are generally involved in the beginning of the planning or conceptual design process. This means that design standards for bus pull-offs, sufficient stopping distances and sight lines, bus shelter amenities, bike racks, and sidewalks are not included as part of the permitting process.

Regular fixed route services, such as those in Hartford and Norwich, could increase ridership by adding additional buses and increasing the frequency of service. But to do so requires additional buses and drivers, both of which require significant funding. Funding also limits the hours of operation. Fixed route services in our Region are currently limited to early morning through evening, which means potential riders who work shifts outside of the traditional 9-5 model cannot take advantage of most public transit.

Finally, there are perceptions that public transit is a service geared toward low-income citizens. While it is true that these demographic groups benefit from public transit, public transportation services are available and useful to everyone.

A significant portion of commuters drive alone to get to work. This could be lessened with more carpooling, but Vermont's commuter lots are currently insufficient. While the State has increased the number of park and ride spaces by 67 percent since 2012, and the Region has added seven new park and ride lots with over 200 more spaces in the last seven years, existing park and rides are struggling to meet demand due to space limitations. A number of existing areas could likely serve twice the population of commuters if they had adequate area for expansion. Many existing park and ride areas are not designed or sized to accommodate public transit services (allowing for bus circulation and efficient transfer of passengers). Additionally, there are very limited locations where new commuter lots could be built. New lots are needed at Exits #1 and #3 on I-89 and more spaces are needed at Exit #2 on I-89. In addition, as of 2017, only five state park and rides and three municipal lots provide EV charging infrastructure.[9]

The lack of EV charging station infrastructure is an impediment to reaching the State's ambitious EV goals. The range of an EV is currently limited to an average of 120 miles on a full charge, although a few models can travel as far as 200 to 300 miles. Given the distance between our communities and centers of employment, it is essential that the ability to recharge EVs is readily available to the EV owner. There are currently only six locations with public EV charging stations in the TRO Region. To support the State's EV goals, EV charging stations will need to become ubiquitous.

Transportation and Land Use Strategies

In order to achieve the CEP's goals, transportation energy use must be lessened by embracing smart growth that directs development into existing centers, providing cost savings for households and municipalities while creating vibrant communities and taking pressure off our natural resources.

Development that is more effectively directed within and adjacent to historic downtowns, villages, and neighborhoods will reduce the need for motorized transportation and make better use of transit. In 2006, via Act 183, Vermont codified its own detailed guiding principles for local and regional land use decisions based upon smart growth principles. Although communities are not required to plan, those that do are encouraged

to uphold planning and development goals that reinforce smart growth principles, such as Complete Streets. Complete Streets focus on multi-modal transportation, public transit, and pedestrian travel.

Encouraging economic development initiatives that enable individuals to work in their home communities, such as "maker" or "coworking" spaces and expanded high-speed Internet will reduce VMT. Likewise, communities can support infill development and concentrated commercial and institutional activities in our villages and downtowns.

Goals, Policies, and Recommendations: **Transportation and Land Use**

Goals

1. Statewide vehicles miles traveled (VMT) per capita does not exceed 2011 levels (11,402 VMT per capita).
2. The number of single-occupant vehicle trips is reduced by 20 percent by 2030 through carpooling and public transit.
3. The percentage of electric vehicles is increased to 5 percent by 2025, 38 percent by 2035, and 82 percent by 2050 in the Region.
4. Land use policy and regulation are designed to encourage daily use of EVs.
5. The use of sustainable biofuels increases.
6. The number of park and ride spaces triples in size. (In 2019, TRORC has a total of 18 state and municipal park and rides, totaling 558 spaces).
7. Public transit ridership is increased by 110 percent, to 1.9 million trips annually. (At the time of this writing, Stagecoach and Advance Transit together count for 950,000 trips annually.)
8. The number of Vermont based passenger rail trips is quadrupled annually.

Policies

1. TRORC supports efforts to provide the Region with opportunities to work closer to home and to require public transit opportunities for large scale development, likely to result in conservation of energy.
2. TRORC supports continued expansion of high-speed Internet to allow for telecommuting.
3. Developments that have a Substantial Regional Impact (as defined in the Plan) under Act 250 must demonstrate that they have consulted with transit providers about reasonable, accommodating transit.
4. All residential and large commercial land developments subject to Act 250 should evaluate the appropriateness of installing or reserving space for a transit stop.
5. TRORC will support new bike and pedestrian projects in the Region.
6. TRORC supports programs and planning initiatives that will reduce single-occupant trips throughout the Region.
7. TRORC supports community car sharing by promoting programs such as Go Vermont and CarShare Vermont.
8. Developments subject to Act 250 should demonstrate that they have taken or will take reasonable steps to incorporate parking with EV charging stations in order to meet regional goals.
9. TRORC encourages state policy changes to offer state buyer incentives for EVs.
10. TRORC supports investments and development of sustainable biofuels.
11. TRORC supports the Vermont Bioenergy Initiative in cooperation with the VT Sustainable Job Fund's Bioenergy Initiative to address on-farm biofuel production under Act 250.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Transportation and Land Use**

Recommendations

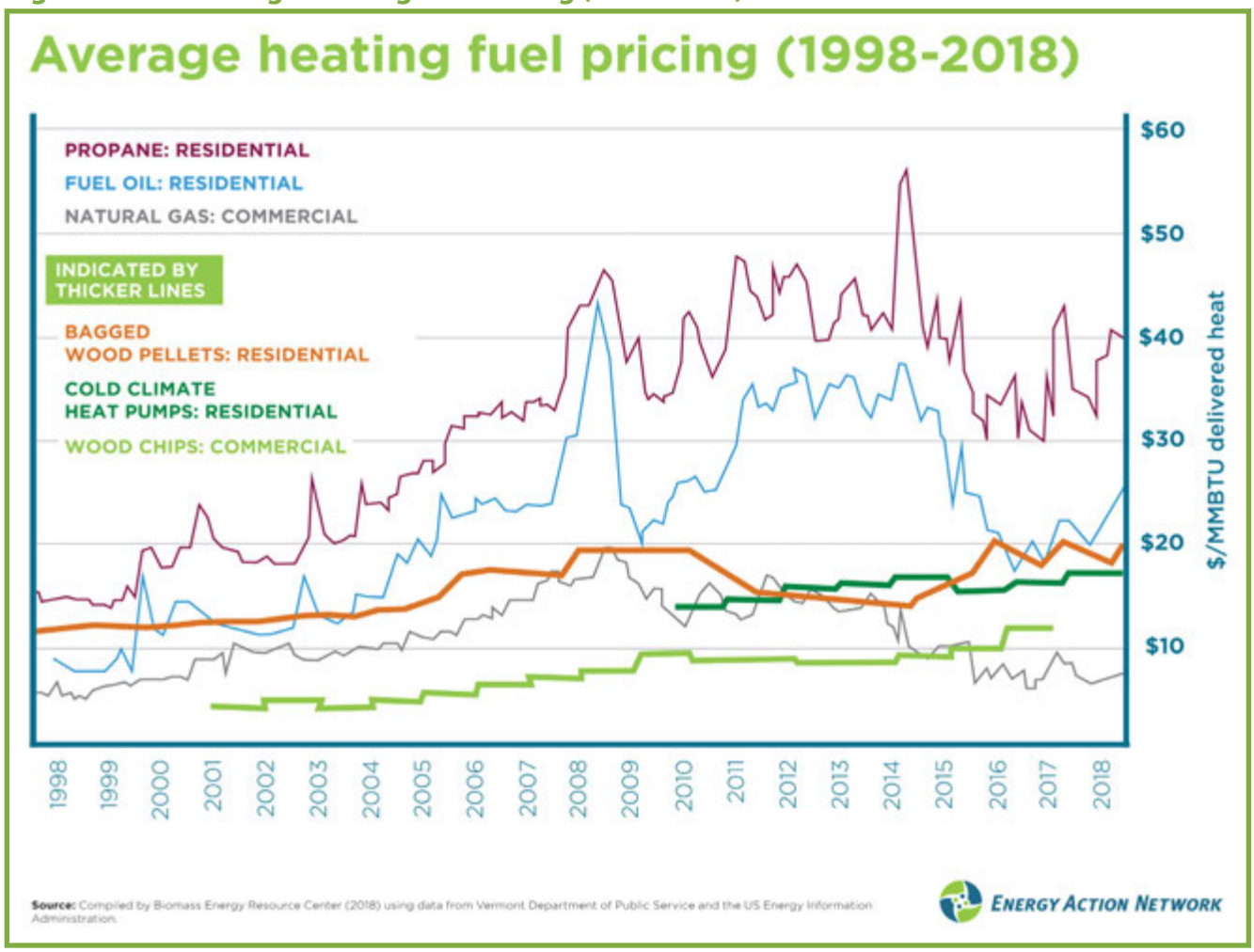
1. TRORC will encourage compact development, particularly housing, within town villages and downtowns and encourage a reduction of planned density in more rural areas.
2. TRORC will encourage communities to develop bylaws that allow for the development of co-working spaces as a way to reduce VMT.
3. Employers should invest in workplace incentives for carpooling, cycling, public transportation use, and telecommuting.
4. TRORC will work with groups such as the Vermont Bicycle and Pedestrian Coalition (VBPC), Local Motion, Green Mountain Bicycle Club, and towns to encourage safe bicycling as a transportation alternative in the Region.
5. TRORC will provide technical assistance to communities interested in implementing Complete Streets to increase density and mixed uses in compact settlements and to foster transit-oriented development along major roads in rural areas.
6. TRORC will continue to identify locations for additional park and rides (state and municipal) and work to expand existing park and ride infrastructure.
7. TRORC will push for increased capacity and continue to support local transit providers through technical assistance.
8. TRORC will work with VTrans and local transit providers to ensure a seamless regional transit system and to explore possibilities for additional buses or routes.
9. TRORC will work with VTrans to investigate the feasibility of commuter rail along the I-91 corridor.
10. TRORC will work with communities to incorporate the principles of smart growth into their municipal plans and bylaws and to support creative economic development concepts that allow residents to live and work in their communities.
11. TRORC will promote and share information provided by Drive Electric Vermont, including their video highlighting the costs and benefits of EVs.
12. TRORC should identify locations for alternative fuel stations (electric, biodiesel, etc.) in the Region and modify the Regional Plan to include them as allowed uses in appropriate locations.
13. TRORC should support efforts to switch municipal medium and heavy duty vehicles to biodiesel blends.

G. Thermal Energy

According to the 2016 Comprehensive Energy Plan, 28 percent of energy demand in Vermont is associated with heating fuels. The reliance on heating from non-renewable sources (fuel oil, natural gas, and propane) creates a challenge for Vermonters that extends beyond energy issues. Low-income residents may find it challenging to stay comfortable in their own homes due to fuel costs. In 2010, Vermont ranked 44th out of 50 states for energy affordability.[10] In 2010, low-income Vermonters spent an average of $1,870 more per family, per year, on energy bills than is considered affordable.[11]

The 2013 Thermal Efficiency Task Force's Report to the General Assembly notes, "Investing in thermal efficiency improvements – primarily air sealing, insulation, and heating system replacements – can dramatically reduce heating energy use in a building. At current fuel prices, thermal efficiency investments in a home can bring savings of approximately $1,000 per year over the lifetime of the investment. The value of these savings increases as fuel prices rise."[12] Converting to more efficient heating and improving thermal efficiency will have the effect of reducing financial impacts on communities and moving the Region toward 90 percent renewable energy by 2050.

Figure 11-13: Average Heating Fuel Pricing (1998-2018)



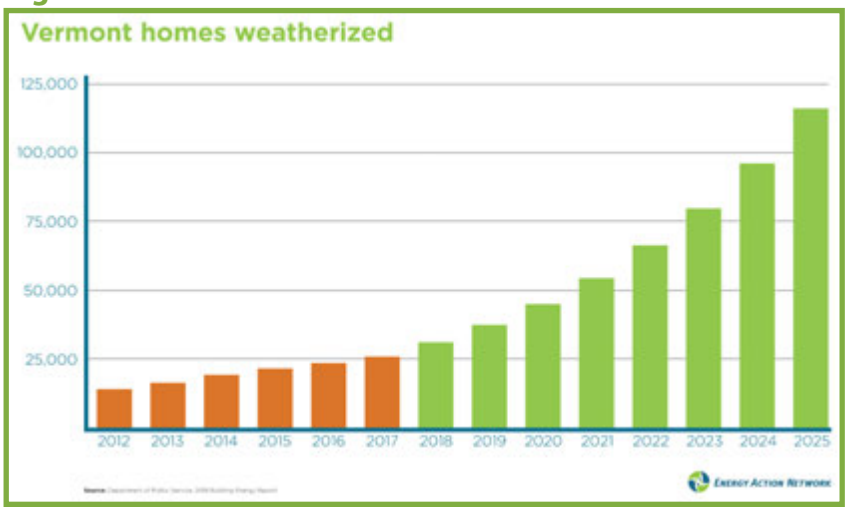
The CEP promotes efficiency and conservation as top priorities in all energy sectors. Retrofit investments in thermal energy efficiency by Efficiency Vermont and Vermont Gas have reduced energy demand in about 6,700 homes, and investments in thermal efficiency for low-income households eligible for weatherization assistance have reached more than 10,700 homes since 2008, equivalent to roughly $10 million in annual savings.[13] However, the current pace of weatherization improvements will need to increase exponentially to meet the State's goals.

In addition to thermal efficiency improvements, the 2016 CEP is seeking a statewide change in how we heat our buildings. This approach will focus primarily on the installation of cold climate heat pumps, which consume far less energy than electric resistance, propane, or oil heating systems. In order to contribute to the State's heat pump installation target (100,677 installed statewide by 2025), a total of over 9,000 will need to be installed in the TRO Region by 2025.[14] Because cold climate heat pumps are inadequate during extreme sub-zero days (-20 degrees F), homes may require a secondary heat source – preferably one that utilizes some form of woody biomass (wood, wood chip, wood pellet). Pellet stoves are fueled with pellets made primarily of sawdust and wood chips and can effectively heat a home 2,000 square feet and under.[15] Replacement of older wood stoves with advanced wood or pellet stoves may cost less than installing heat pumps and is a shorter-term solution that uses available low-grade wood resources.

Also worth considering are geothermal or "ground source" heat pumps. These systems are substantially more expensive than cold climate heat pumps but can result in significant energy savings. They are better suited to new development than retrofitting into existing buildings due to the technology's requirements. While cold climate and geothermal heat pumps will work for residences, they cannot adequately meet the demands of some large industrial and commercial users. These larger users could benefit from an automated wood heat system. Where they are located next to a concentration of other buildings, the CEP has recognized the need to identify locations for district heating and combined heat and power, which is a system for distributing heat in a centralized location.

New buildings will need to be built to a significantly higher standard than is provided for by the State's current Residential and Commercial Building Energy Code. Net-zero constructed buildings are highly efficient and save 30 to 45 percent on overall energy costs in comparison with standard buildings.[16] Efficiency Vermont's 2015 Net Zero Energy Feasibility Study determined that new construction of residential and office net-zero energy buildings is a cost-effective investment. These buildings cost less to own and operate than code buildings from the first year into the long term.[17]

Figure 11-14: Vermont Homes Weatherized



There are barriers to reaching the CEP's thermal efficiency goals. The purpose of this plan element is to begin to identify these barriers and to put forth policy and action steps that will effectively remove these barriers when properly implemented.

There are many challenges to improving thermal energy efficiency in Vermont. Residential houses constitute the majority of Vermont's built environment. Residential energy represents 30 percent of Vermont's total energy consumption (second only to transportation), with heating being the largest energy consumer.[18] Vermont's climate demands heating.

In Orange and Windsor Counties, 47 percent of homes were built before 1970.[19] These older homes were constructed before high energy costs made energy conservation a priority in the built environment. As a result, a substantial number of homes utilize wasteful amounts of energy and are expensive to maintain. According to the Massachusetts Zero Net Energy Buildings Task Force: "With buildings contributing close to 40 percent of greenhouse gas emissions and consuming 40 percent of energy in the United States, energy efficiency and renewable energy technologies must become central to the way we design and build."[20]

In the TRO Region, it is estimated that only 4.58 percent of houses built before 2000 have been weatherized. To achieve the State's goal of 25 percent of homes being weatherized, approximately 6,000 of the Region's housing units will need to be weatherized by 2025. By 2017, only 7.6 percent, or 25,409, of Vermont's homes had been weatherized. To achieve the statewide goal of 25 percent of homes being weatherized by 2025, 80,000 will need to be improved.

Another challenge to thermal efficiency is large home sizes and the costs of improvements. New homes have

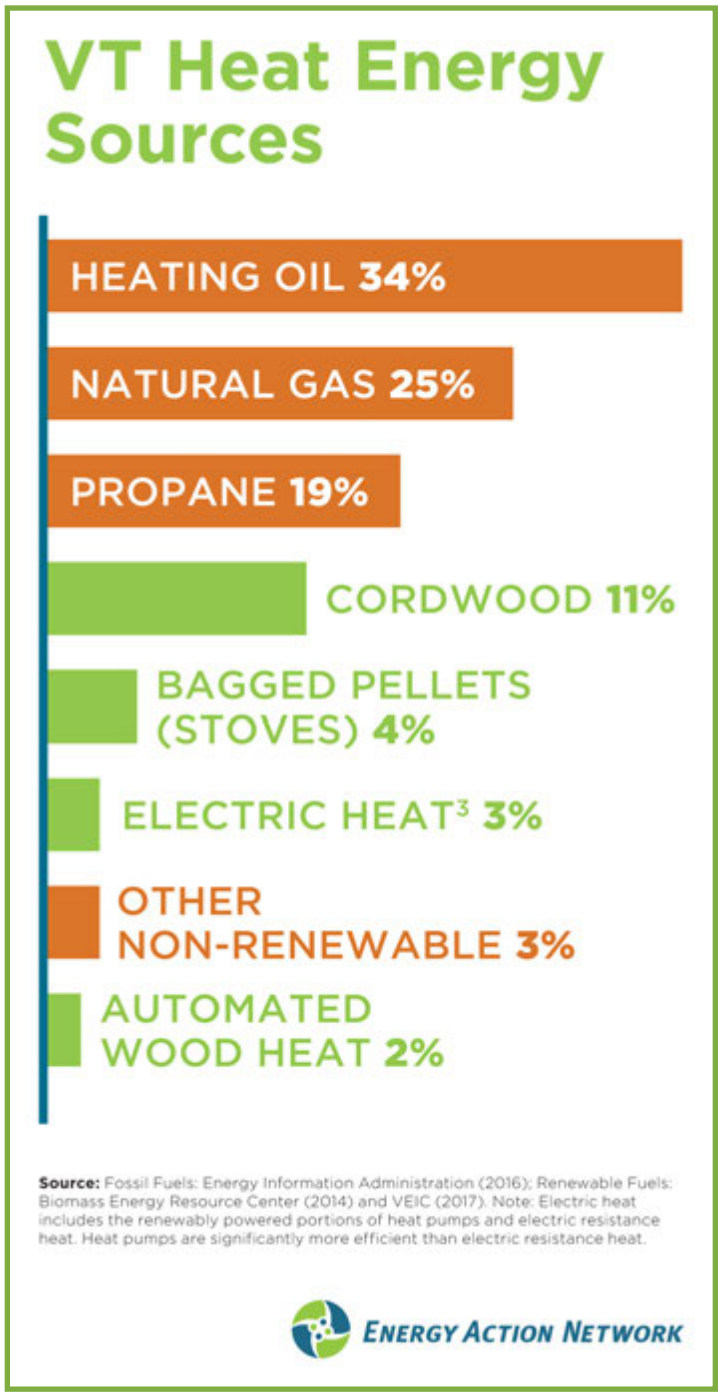
grown in size over the past 40 years. In 1973, the average home in the Northeast was roughly 1,700 square feet. In 2014, the size of homes in the Northeast had increased by 60 percent, to 2,600 square feet.[21] While homes are generally more efficient than in the past, more square footage requires more heating.

The upfront cost of energy efficiency improvements and building-scale renewable energy generation remains a challenge. Despite the demonstrated long-term savings benefits, the capital needed to significantly reduce energy consumption and add renewables is a significant barrier to implementation. When surveyed as part of the East Central Vermont Sustainability Project, 39.5 percent of those who responded indicated that they could not afford to make their home more energy efficient. Another 33.8 percent were unable to make energy efficiency improvements because they rent instead of own. Cost is an issue for all homeowners, but especially for low- and moderate-income homeowners.

At the commercial and public sector levels, capital and operating budgets are often set independently of each other, resulting in lack of awareness of financial incentives of energy improvements.

Vermont's system of energy code and energy efficiency standards enforcement is somewhat problematic. As of January 2019, both the Residential Building Energy Standards (RBES) and the Commercial Building Energy Standards (CBES) in Vermont are in the process of being updated. The DPS has outlined a pathway to increased energy code compliance in its Energy Code Compliance Plan of 2012. The State needs to follow this plan. Concurrently, the State needs to continue to improve and make more effective both commercial and residential building codes. Standards for achieving net-zero design must be incorporated. Some regional builders such as Prudent Living's Southscape community (http://southscapewilder.com/) and VERMOD (http://vermodhomes.com/) are currently constructing net-zero possible homes. TRORC can assist communities with continued outreach regarding code compliance. We can also support the DPS as they move forward on adoption of more effective energy efficiency codes.

Figure 11-15: VT Heat Energy Sources



Energy efficiency standards are one challenge,

while Vermont's Residential Building Energy Standards are another challenge for developers. Currently there are no state permits or code officials for energy efficiency. Energy efficiency is self-certified by the building contractor, with a requirement that a completed certificate be submitted to the municipality. However, some communities may be unaware of this requirement and how to track the submission of certificates. Towns with local code officials may enforce energy efficiency codes and towns with certificate of occupancy (COO) requirements must receive an energy code certificate before issuing the COO. Nearly two-thirds of TRORC's communities (19) have zoning bylaws, but just under half (9) of them require a COO.

To move toward net-zero energy use in the built environment, energy efficiency codes must be substantially improved and enforced, while contractors and homeowners must be educated about the codes' existence and purpose.

Thermal Energy Strategies

With upfront capital cost being a significant barrier to the implementation of thermal efficiency and renewable energy improvements, it is essential that programs that provide funding and financing grow. In particular, programs providing assistance to middle- and low-income households must increase in funding. Current financing programs include:

1. Vermont's Heat Saver Loan: http://heatsaverloan.vermont.gov/
2. Property Assessed Clean Energy (PACE): Available for towns that have adopted a PACE district. Repayment of PACE financing is tied to the property, not to the owner.
3. Neighborworks of Western Vermont Energy Loan: https://www.nwwvt.org/energy-loan/
4. Vermont State Employees Credit Union VGreen Energy Savings Solutions loans: https://www.vsecu.com/energy-savings/about/about-vgreen/what-is-vgreen
5. Vermont Economic Development Authority offers energy loans to commercial enterprises (http://www.veda.org/financing-options/vermont-commercial-financing/commercial-energy-loan-program/) and small businesses (https://www.veda.org/financing-options/vermont-commercial-financing/small-business-energy-loan-program/)
6. United States Department of Agriculture Section 504 Home Repair Program: https://www.rd.usda.gov/programs-services/single-family-housing-repair-loans-grants
7. Efficiency Vermont rebates for central wood pellet furnaces and boilers – $6,000 cash back: https://www.efficiencyvermont.com/rebates/list/central-wood-pellet-furnaces-boilers-residential

These financing programs offer key features such as great interest rates, flexible terms, and ease of application. The loans can also be combined with Efficiency Vermont incentives.

While fuel assistance programs are essential, increased funding to Vermont's Weatherization Assistance Program (WAP) is needed. Projects such as the Vermont Fuel Efficiency Partnership, which provides "deep-energy" retrofits in multi-family buildings whose tenants are income-eligible for the WAP, must be encouraged and supported. Fuel distributors must be encouraged to become energy service providers, expanding what they offer so that more homes can be weatherized and energy efficiency increased.

TRORC can support these programs and initiatives by communicating directly with energy providers, state agencies, and the legislature. We can provide input on state level initiatives and we can, if the opportunity presents itself, pursue federal funding to support these programs within our Region.

TRORC can provide education and outreach to our communities and support other statewide programs for weatherization and thermal

efficiency. If adequate funding was available, TRORC could develop a staff position that would focus specifically on energy assistance, education, and outreach. Without duplicating existing services, such as those that Efficiency Vermont, Vital Communities, Energy Action Network, and GMP offer, a TRORC Energy Planner could act as a clearinghouse of energy information for our communities. Through education and outreach at the municipal level, TRORC could ensure that our residents were aware of the opportunities available to them. We could work closely with active municipal energy committees and energy coordinators to continually update them on new programs, policies, or financing mechanisms for weatherization assistance or alternative heating improvements.

Ideally, a Regional Energy Planner would have a basis of knowledge grounded in implementation, so that this staff person would have experience directly related to the installation and implementation of thermal efficiency and renewable energy improvements. This skill set would be particularly valuable in working with builders and energy service providers to help educate them about their customers' needs, but would also provide homeowners with an independent voice that would help them understand weatherization and other energy efficiency options. Acting as a bridge between state-level service providers, contractors, and municipal organizations, TRORC would effectively move the Region toward meeting the CEPs goals relating to thermal efficiency.

Goals, Policies, and Recommendations: **Thermal Energy**

Goals

1. At least 25 percent of the Region's housing stock is weatherized by 2025.
2. By 2020, 30 percent of new buildings are built to net-zero energy use and 100 percent by 2030.
3. 7,280 efficient cold climate heat pumps are installed by 2025.
4. The Region has shifted away from fossil fuels as a source of heat.

Policies

1. TRORC supports state efforts to provide additional funding for weatherization improvements, especially for low- and moderate-income populations.
2. TRORC supports net-zero energy construction throughout the Region.
3. DPS should adhere to the Vermont Energy Code Compliance Plan and improve upon residential and commercial building codes.
4. TRORC supports the adoption of advanced wood and biomass heating systems for new construction as replacements for fossil fuel furnaces and backup heat systems for heat pumps.
5. TRORC encourages increased state incentives and rebates for advanced wood heating equipment, including woodstove change-out programs to lower heat costs and reduce particulate emissions.
6. Local energy committees and planning commissions should identify potential users of district heating and combined heat and power systems—schools, college campuses, apartment complexes, shopping centers, industrial parks, and village centers—and incorporate this information into local plans.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Thermal Energy**

Recommendations

1. TRORC will support programs such as Zero Energy Now!, Weatherize Upper Valley with Vital Communities, and GMP's eHome by providing outreach and education to local planning commissions and energy committees and their communities.
2. TRORC will support and promote the Energy Action Network (EAN) energy dashboard and educate towns as to its use and benefits.
3. TRORC will distribute information regarding the available financing mechanisms for weatherization assistance, including information about the financial advantages of energy improvements.
4. TRORC should seek funding for an energy planning staff person who can work with towns, homeowners, and businesses to implement weatherization, energy efficiency, and renewable energy projects.
5. TRORC will work with utilities to implement their Renewable Energy Standard (RES) Tier 3 fuel-switching mandates through education and outreach to help promote weatherization.
6. DPS should work with fuel dealers to encourage them to become energy service providers.
7. Local energy committees should work with owners of rental housing to educate them on the financial benefits of weatherization investments and should connect owners with contractors to complete weatherization projects.
8. DPS should support K-12, higher education, and vocational education initiatives to bring energy ideas and solutions into the classroom by working with organizations such as the Vermont Energy Education Program (http://veep.org/).
9. Local energy committees should work with Neighborworks Heat Squad, COVER, and community action agencies to promote their weatherization services.
10. DPS should work with local educational institutions such as Vermont Technical College to encourage continued technical training related to energy efficiency improvements.
11. TRORC and towns should support programs and initiatives that encourage the development of small homes (less than 1,000 square feet) as a way to reduce energy use.
12. TRORC will provide outreach to towns and contractors on the use and enforcement of residential and commercial building energy standards for all new construction.
13. TRORC will support statewide efforts to increase energy efficiency code standards and statewide energy code enforcement by communicating regional concerns about enforcement with the Legislature and encouraging communities that have zoning to include a certificate of occupancy when they revise their regulations if they do not already have one.
14. TRORC should provide outreach to communities with a COO to ensure that they are tracking submissions of the RBES certificate.
15. TRORC will partner with Efficiency Vermont, Green Mountain Power, HVAC contractors, and others to promote cold climate heat pumps.
16. DPS should coordinate all outreach efforts with fuel dealers and electrical contractors (potentially creating opportunities for electrical contractors to work with fuel dealers).
17. TRORC should provide communities with an analysis of potential areas that are suitable for geothermal ground source heat pumps when data is available.
18. Local energy committees should provide information to builders and developers regarding the benefits of geothermal systems (including heat pumps).
19. TRORC, towns, and relevant nonprofits, including the Northern Forest Center, should conduct outreach and education by coordinating with advanced wood heat system vendors and contractors to hold informational public forums.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Thermal Energy**

Recommendations (continued)

20. TRORC should provide outreach and education to communities to ensure residents are aware of existing incentives and rebates.
21. DPS should provide guidance to communities seeking to develop district heating systems.
22. DPS should conduct outreach efforts to public and nonprofit entities and housing organizations to provide information on biomass heating options.
23. Local energy committees should partner with project developers to promote the possibility of combined heat and power and district heating options.
24. TRORC will work to maintain forest health as a prerequisite to a sustainable wood energy fuel supply by updating the Regional Plan to protect forests and habitat.
25. The State should support woodstove change-out programs to lower heat cost and reduce particulate emissions.

H. Utility-Scale Renewable Energy Facility Siting

Background

The State of Vermont has spent a number of years analyzing the issues relating to energy siting. In 2012, Governor Shumlin formed the Energy Generation Siting Policy Commission. The Siting Commission was tasked with developing recommendations and guidance on best practices for the siting approval of large-scale renewable energy generation projects (those projects that exceeded the net metering threshold at the time), and for public representation in the siting process. Ultimately, one of the key components of the Siting Commission's final report was an "increased emphasis on planning."[22]

In 2015, in response to the rapid growth of solar development, the Legislature created the Solar Siting Task Force. In their report to the Legislature in 2016, the Solar Siting Task Force echoed the recommendations of the Siting Commission, acknowledging that "effective planning has the potential to shape the municipal, regional and state energy future."[23] One of the most important parts of such planning is mapping where projects should and shouldn't go.

Utilize Available Map Data

TRORC has generated map data that indicates where raw energy generation potential exists for solar, wind, and hydro.* This does not mean that they should go there, only that these are the areas where solar, wind, and hydro resources are present. This data should be the **starting point** for the local identification of where renewable energy generation should be located within your community.

Solar Siting

Sites with raw solar potential are flat to gently sloping and face east, south, or west. Significant growth in the solar energy production sector in Vermont has sometimes led to a backlash against proposed facilities. The primary concern is one of aesthetics. For some, it is challenging to reconcile the appearance of a solar farm with the traditional rural character of the Region. Residents may also perceive a loss of property value when a solar facility locates near their home, although there is no hard data available to support this perception.

Also of concern are the natural resource implications of solar farms. Often these facilities are proposed in areas that are being used for agricultural purposes on valuable prime

**A map of biomass land cover is included as well, but it is not a representation of potential beyond identifying what could be harvested for biomass energy production.*

agricultural soils. While it is possible to conduct some forms of farming on land occupied by a solar system (such as small ruminant grazing – see Appendix L), most agricultural uses become impractical. For those farmers that lease land for feed production, the removal of actively used farmland from the pool of available land has the potential to negatively impact their operation. On the other hand, solar generation on marginal lands may provide farming with needed income.

Wind Siting

Only certain ridges are tall enough and big enough to have raw wind potential. Wind energy generation, although not as prevelant as solar, also has opposition due to aesthetic and noise impacts. Because these facilities must locate on ridgelines in order to maximize production, they are visible from a much greater distance than solar. Additionally, residents neighboring a wind facility may experience negative effects from the noise and flicker of the spinning turbines.[24]

Large scale wind energy facilities can have environmental impacts as well. Much of the land on our ridges is undeveloped, making it prime wildlife habitat. The installation of wind energy generation facilities and the infrastructure needed to maintain them (primarily roads), leads to the fragmentation of continuous blocks of forestland, which can disrupt migration patterns for wildlife.

Hydro Siting

Not surprisingly, sites with hydro potential are along rivers with steep drops. LEAP modeling suggests that additional hydro capacity can be achieved by retrofitting existing dams.

The development of new hydroelectric projects is challenging. All new hydro projects that are grid-connected must seek permitting from the federal government, which is time consuming and expensive. Any development in our waterways requires a strict analysis of potential environmental impacts.

Hierarchy of Suitability

All of the lands within the Region have been analyzed on a rough scale using map data supplied by DPS to rank them in terms of areas of "raw potential": areas that are unsuitable because of high value resources; areas with constraints; areas with no known or possible constraints (prime area); "preferred" areas. The maps were made by first identifying areas that have raw potential for certain types of power production based upon certain qualities of the landscape. For example, only certain ridgelines are believed to have enough wind resource to justify building a wind turbine. As mentioned earlier, only lands with good exposure and gentle slopes make sense for solar development. (It should be noted that the maps do not take into account whether lands are clear or forested.) Preferred locations come in two forms: state preferred areas that are defined as such in 30 VSA § 8005a (Act 174) and specified locations identified by the town.

Raw Generation Potential Locations

This type of area is shown on the solar and wind maps and includes solar generation potential based on solar radiation, slope, and direction, as well as wind generation potential based on topography. Solar potential does not distinguish between open or forested areas.

Unsuitable (Prohibited Locations)

The Regional Plan identifies some areas as poor locations for most forms of development due to their natural or scenic value or to protect our citizens from potential natural disasters. These areas have already been removed from consideration and are not shown in the constraint or prime areas on the maps. The policies displayed in this section state the unsuitable areas in the Region.

Constraints

There are many areas that have the potential for renewable energy generation but include known or possible constraints that may make these

locations less desirable. These areas are neither preferred nor unsuitable. Development in these areas will require more detailed mapping at the site level as well as an evaluation of the impacts on the particular resources present. State supplied map data used in this Plan has "known" constraint areas removed and therefore these do not show on the maps. From a policy level this Plan makes no distinction between "known" or "possible" and simply combines both as constraints. Areas with constraints include:

- Historic districts, landmarks, sites, and structures listed, or eligible for listing, on state or national historic registers
- State or federally designated scenic byways, and municipally designated scenic roads and viewsheds
- Special flood hazard areas identified by National Flood Insurance Program maps (except as required for hydro facilities)
- Public and private drinking water supplies, including mapped source protection areas
- Primary agricultural soils mapped by the U.S. Natural Resources Conservation Service
- Agricultural Soils (VT Agriculturally Important Soil Units)
- Protected Lands (Updated 07/26/2016 – State Fee Lands and Private Conservation Lands)
- Deer Wintering Areas (as identified by ANR)
- Act 250 Agricultural Soil Mitigation areas (as Identified by ANR)
- ANR's Vermont Conservation Design Highest Priority Forest Block Datasets
- Priority Forest Blocks – Connectivity, Interior and Physical Land Division (as identified by ANR)
- Hydric Soils (as identified by ANR)
- River Corridor Areas as identified by the Vermont Department of Environmental Conservation
- Class 2 Wetlands as indicated on Vermont State Wetlands Inventory maps or identified through site analysis
- Vernal pools (as identified by ANR or through site analysis)
- State-significant Natural Communities and habitats of rare, threatened, and endangered species

Prime Areas

Recognizing that there may be areas that are also well-suited to the development of renewable energy generation, the following criteria should be applied to proposals that are not in constraint areas. These areas are shown on the maps under prime. If a proposed development is not on the list above, but meets all of the criteria below, it shall be considered a prime area for the purposes of this Plan. Such an area:

- Must not be identified as an Unsuitable Area
- Must not be identified as a Constraint Area
- Must be located in an area that has reliable and safe access to the grid (as determined by the local power provider)

Preferred Areas

While the development of any type of renewable energy generation facility is subject to review on a site by site basis, some areas are better suited than others. Act 174 specifically identifies state preferred areas. These areas are typically small and are not shown on the energy siting potential maps. They are:

- A parking lot canopy over a paved parking lot, provided that the location remains in use as a parking lot and is not located in an area identified as unsuitable by this Plan or the Municipal Plan of the municipality in which the development is proposed.
- A new or existing structure that is not located in an area identified as unsuitable by this Plan or the Municipal Plan of the municipality in which the development is proposed.
- Land certified by the Secretary of Natural Resources to be a brownfield site as defined under 10 VSA § 6642, provided that the location is not in an area identified as unsuitable by this Plan or the Municipal Plan of the municipality in which the development is proposed.
- A sanitary landfill as defined in 10 VSA § 6602, provided that the Secretary of Natural Resources certifies that the land constitutes such a landfill and is suitable for the development of the plant.
- The disturbed portion of a gravel pit, quarry, or similar site for the extraction of a mineral resource, provided that all activities pertaining to site reclamation required by applicable law or permit condition are satisfied prior to the installation of the plant.
- A specific location designated in a duly adopted municipal plan under 24 VSA chapter 117 for the siting of a renewable energy plant or specific type or size of renewable energy plant, provided that the plant meets any siting criteria recommended in the plan for the location, provided that it is not located in an area identified as unsuitable by this Plan.
- A site listed on the National Priorities List (NPL) that has received confirmation from the U.S. Environmental Protection Agency or the Vermont Agency of Natural Resources (ANR), and is not located in an area identified as unsuitable by this Plan or the Municipal Plan of the municipality in which the development is proposed.
- A new hydroelectric generation facility at a dam in existence as of January 1, 2016, or a hydroelectric generation facility that was in existence but not in service for a period of at least 10 years prior to January 1, 2016, and that will be redeveloped for electric generation, if the facility has received approval or a grant of exemption from the U.S. Federal Energy Regulatory Commission.
- A tract previously developed for a use other than siting a plant on which a structure or impervious surface was lawfully in existence and use prior to July 1 of the year preceding the CPG application.

The maps included as part of this guide were

Concept Design of Parking Lot Solar Canopy | *Source: SunCommon*

developed at the regional scale. As such, they do not include preferred locations. Communities should use their local knowledge to identify additional preferred areas. They can include preferred locations as legislated in Act 174.

Other considerations when identifying preferred areas within communities include existing infrastructure. For example, an area with immediate access to three-phase power or an upland area with existing road access may be more desirable than an area without.

Goal, Policies, and Recommendations: **Utility-Scale Renewable Energy Siting**

Goal

1. Carefully sited renewable energy facilities are built in the Region to meet generation goals.

Policies

1. TRORC supports the continued development and siting of renewable energy generation that counts toward the goals of the CEP.
2. Ground mounted solar arrays above 15kW in capacity should not be constructed in Regional Growth Areas if a reasonable alternate location is available, in order to preserve these areas for compact development. Solar arrays on structures in these areas are encouraged.
3. The following locations shall be considered regionally unsuitable for renewable energy generation facilities: floodways shown on FEMA Flood Insurance Rate Maps (except as required for hydro facilities), Class 1 Wetlands as indicated on Vermont State Wetlands Inventory maps or identified through site analysis, Wilderness Areas, including National Wilderness Areas, any unsuitable areas as identified in a duly adopted municipal plan that has received a determination of energy compliance from the Department of Public Service or TRORC.

Recommendations

1. TRORC will encourage communities and residents to identify areas with the potential for renewable energy generation.
2. TRORC should provide support for grid improvements that will allow improved renewable energy generation facility coverage in our Region by actively participating in the Act 250 and Section 248 review process.

I. Conclusion

Vermont has established ambitious but needed energy goals that will require all of us to reduce energy use and to transition to using renewable energy for our thermal, transportation, and electricity needs. This will result in a safer, cleaner, and more healthy world for us and our children. This chapter should be used to guide TRORC in its development of work plans, to focus attention on key issues and opportunities, and to provide a framework to evaluate energy conservation and development projects in the Region. TRORC will fully integrate energy planning into the technical assistance it provides its member towns and continue to coordinate with the Vermont Energy Investment Corporation, the Energy Action Network, the Department of Public Service, and other state agencies and departments to update and improve energy planning as necessary. Improvements in the development and maintenance of accurate estimates of energy demand, fuel use, and renewable electricity generation will be needed to track progress toward goals and to help adjust local, regional, and statewide strategies and actions. TRORC will also remain engaged in statewide energy planning to ensure that future plan updates and information provided to municipalities remain current and consistent with state policies.

A core message of the Energy chapter is that the quality of life and economic future of the Region is dependent on the efficient use of energy and access to a sufficient and sustainable amount of renewable energy. Planning for land use, transportation, community and economic development, and agriculture and food systems are inter-related must consider energy efficiency and the prudent development of renewable energy generation. The TRORC Energy chapter provides a basis for this comprehensive energy planning.

VERMONT ENERGY FACTS

- **More than one-third of VT schoolchildren attend facilities heated by wood, and almost one in six homes in VT heat with wood.**
- **VT produces 40% of the electricity it consumes and depends on power from Canada and neighboring states to meet customer demand.**
- **VT's electricity generation comes almost entirely from renewable resources, and more than half of it is hydroelectric power.**
- **In the years 2011 through 2017, 74.2 megawatts of utility-scale solar photovoltaic capacity and 89 megawatts of small-scale PV capacity were installed in VT.**
- **In 2015, VT enacted the nation's first integrated renewable energy standard (RES), which requires 75 percent of retail electricity sales to come from renewable sources by 2032.**

JULY 19, 2018, U.S. EIA

Solar panels | *Source: Unknown*

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Stockbridge | ©John Knox

ECONOMIC DEVELOPMENT

12

Huntington House Inn, Rochester | © *John Knox*

A. State of the Economy in the TRO Region

The TRO Region is largely rural and sparsely populated, as is typical of most of Vermont. Its landscape and scenery provide numerous recreational and professional opportunities, and the Region's economy is a reflection of historical patterns of development and recent economic trends, both local and statewide. Regional occupations are diversified, capturing the professional, technical, service, manufacturing, and agricultural sectors. With this variety, the Region's economy is not dominated by a single business type. The Region's diverse business mix currently affords a reasonably good match between jobs and population.

Job growth in the Upper Valley Region has been modest, and unemployment in the Region has been relatively low. While low unemployment rates have their positive attributes, there are negative ones as well. Low unemployment can be regarded as a barrier for businesses looking to expand or relocate to the Region because there may be concern that not enough skilled and available workers exist in the area.

Portions of the regional economy face favorable work conditions and offer attractive opportunities, while in others, low wage rates and weak income growth exists. This appears to push people into lower-level employment or into the job market when they may not otherwise choose it. Wage rates have been growing but still lag slightly behind the State as a whole. The economic challenge for the Region is to increase new and better wage jobs. It is in the Region's long-term economic interest to foster a business climate that will encourage the growth of businesses that are appropriately scaled to communities and provide high-paying, high satisfaction jobs.

The Region's land reflects many changes. The number of farms has increased marginally; however, the amount of farmland and the number of people employed in agriculture, silviculture,

Randolph | *© First Light Studios*

and other natural resource-dependent occupations has declined in recent generations. Today's land uses show more of a trend toward subdivision of agricultural and forest land, resulting in single or multiple home development geared toward middle- and upper-income buyers.

How Towns View Themselves Economically

The towns in the TRO Region have developed in different ways economically. Their Town Plans reflect towns' similarities, differences, and interdependence. Some towns regard themselves as economic centers, while others celebrate their remoteness.

Several towns such as Barnard, Bridgewater, Granville, and Tunbridge have a low level of larger commercial development. There are many more small commercial operations in these towns in the form of home-based businesses that are generally recognized in municipal plans. These towns' municipal plans state that they would like to see increased commercial activity so long as it does not adversely affect their rural character, natural resources, or local services. But for the most part, they do not propose specific policies that would help guide growth or protect special attributes. Town Plans that take a targeted approach to providing identified locations for traffic-generating businesses give potential business owners direction as to where they might fit within a community.

Some towns have remained rural because they are remote. These are the towns that are most distant from existing centers of development. It is possible that outward growth pressures from economic centers could reach more remote areas in the future, but it is unlikely to be substantial in any way without increased access to technology. In the meantime, home-based and small-scale businesses that process local products in towns that have access to transportation and/or high-speed Internet will be most likely to succeed in smaller towns.

Woodstock and Bradford define themselves as economic hubs and are seeking suitable locations for growth by encouraging diversification. Others such as Randolph and Hartford want to accommodate growth and increase their roles as regional employment, shopping, and service centers through improving infrastructure and services.

A number of towns are "bedroom communities" (such as Sharon, Royalton, Pomfret, Strafford, and Bethel) that provide housing opportunities for regional growth centers' workforces, such as the greater Hartford area and the Lebanon/Hanover area in New Hampshire. The general proximity to major highways I-89 and I-91 make them prime locations for workforce housing for employees of businesses in areas that have higher concentrations of available jobs.

Existing Economic Conditions: The 2011 Comprehensive Economic Development Strategy and East Central Vermont Economic Development District Designation

Our Comprehensive Economic Development Strategy (CEDS) is an economic roadmap plan designed to diversify and strengthen regional economies by helping to guide growth throughout the 40-town East Central Vermont Economic Development District that covers towns in both the TRO Region and the Southern Windsor County Regional Planning Commission Region. A CEDS is required by the U.S. Department of Commerce's Economic Development Administration (EDA) for districts to be eligible for planning and construction funds. TRORC has used this funding to help support work around the creative economy as well as health and wellness planning throughout the TRO Region. The dynamic process of developing a CEDS is heavily dependent on the coordinated efforts of regional planning and economic development organizations, town governments, interest groups, and private industries that are concerned about the economic development of a Region. In 2009, the ECV CEDS Steering Committee applied to the EDA for a designation as an economic development district (EDD), which was officially granted in December 2013. TRORC and the EDD partners updated the CEDS in 2011 and again in 2016. The current CEDS will need to be updated again in 2021.

The 2016 CEDS contains an increased focus on resilience to both economic shocks as well as climate related disasters. In addition, the CEDS also contains workforce development strategies through education, housing infrastructure, and quality of life improvements.

B. Regional Challenges and Opportunity Areas for Economic Development

- Telecommunications
  - The TRO Region still lacks and needs access to fast, affordable, and efficient Internet, data, and cellular technologies to promote business growth and attract prospective employees. According to a Vermont Public Service Department January 2018 report,[1] nearly 9,000 buildings in Orange and Windsor Counties are underserved even for basic Internet speeds.
- Housing
  - Providing ample workforce housing, in both rental and home buyer markets, is key to meeting the needs of the TRO Region's workers.
- Sewer and water supply
  - While some areas in the Region have ample infrastructural capacity to handle any anticipated growth, only 9 of the Region's 30 towns currently have both municipal water and sewer services for residents. Expansion and updates to existing services and the creation of such systems in other village and town centers will aid in economic growth and in attracting new businesses.
- Retention and expansion of existing businesses
  - Numerous employers have closed their businesses in the Region, particularly in the wake of the 2008 recession and Tropical Storm Irene. Increased efficiency, knowledge about the market, financing opportunities, and better business and entrepreneurial practices will improve business vitality.
- Workforce development
  - Local businesses often report that they struggle to find applicants for their jobs, which may be due to lack of nearby housing opportunities and services and the low

wages that they are able to offer, as well as a lack of qualified workers.

- Identification of needed businesses
  - It is unclear in many instances what market gaps there are for new businesses. These need to be identified to boost local economies.
- Existing buildings and brownfields
  - A better understanding of sites that may be suitable for reuse or redevelopment as new business headquarters or for the expansion of existing businesses is needed in core town and village locations. Utilizing appropriate grant funding such as EPA brownfields funding toward the revitalization process can help communities and business owners defray costs. A thorough inventory of vacant lots and underutilized parcels and reclamation of old properties where possible are both needed to promote infill development in downtowns.
- Plans and permitting
  - Lack of clarity or ambiguity in municipal plans makes it difficult for town officials, residents, and developers alike to properly discern which locations are most desirable for new business growth as well as what type of growth is preferred. Further, inconsistencies between some municipal plans and their corresponding implementation bylaws also confuse those making investment decisions.
- Transit and transportation
  - There is a distinct lack of public transit between many of the Region's towns and the regional growth centers, which makes commuting difficult. High transportation costs (i.e., owning and maintaining a vehicle and paying for gasoline) are prohibitive for many and may compound poverty.
- Tourism
  - The tourism industry needs to continue efforts that promote attraction diversification, showcasing the myriad spring and summer recreational, scenic, and artistic tourist opportunities that our Region has to offer in addition to the more ubiquitous autumn "leaf peeping" and winter sport seasons that many tourists commonly associate with Vermont.
- Creative Economy
  - The full scope of the creative economy is defined as the sum of these two measures: (1) people employed in creative industries and (2) those employed in creative occupations that are not in creative industries. The creative industries as identified in the Region's creative economy report were broken into seven segments: visual arts and crafts, media and digital arts, design and fashion, performance arts, literary arts, museums and cultural heritage, and artisanal foods. Employment in the creative industries is about 8.9 percent of the Region's total employment. Employment in the Region's creative industries grew 10.2 percent from 2010 to 2015, versus 8.2 percent for the U.S. and 7.6 percent for Vermont as a whole. The Vermont Arts Council has set up the Vermont Creative Network, which has divided the State into six different regional zones. The Cornerstone Creative Community of Vermont (3CVT) is the regional network that serves Orange and Windsor Counties.
- Value-added agriculture and forest products
  - While opportunities exist in the Region for food production, raw wood products, lumber, and craft furniture production, these businesses could experience a renaissance, particularly with the aid of enhanced coordination amongst business owners. Gaps in the market should be targeted more effectively to drive growth in areas that are underserved. Refer to the Working Landscape chapter for more detail.

- Local Economy
  - The TRO Region has strong social capital that is supported through its many development organizations such as chambers of commerce, Green Mountain Economic Development Corporation, and local nonprofits such as BALE (Building a Local Economy). BALE is a community resource center for local economy initiatives in the White River Valley. Through their programming, BALE focuses on advancing cooperative models, strong local food systems, localized energy initiatives, and creating local investment and exchange models to increase regional resilience over time.

C. Workforce Composition

A workforce is defined as all adults aged sixteen years and over who are currently employed, are actively pursuing employment, are not held in an institution (for incarceration, mental health, or other health-related reasons), or are not enlisted in military service. The workforce does not typically include those who are full-time students unless they happen to work while in school. It also does not necessarily take into account those who may consider themselves outside of the labor force after losing a job or being unemployed for a prolonged period. Additionally, people who work on a cash-in-hand basis, such as many child-care workers, are not included.

Size of the Workforce

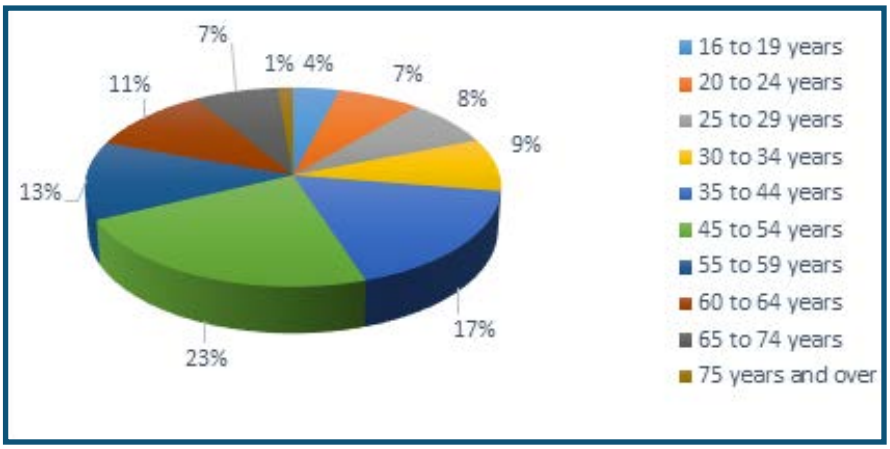
According to the Vermont Department of Labor, the Region's workforce increased at an approximate rate of 0.9 percent between 1990 and 2000. This growth rate is close to that seen at the state level over the same period (0.8%). Unlike the State, however, the TRO Region averaged 1.0 percent growth in workforce numbers between 2000 and 2010, even with the impacts of a severe economic downturn, while the entire State of Vermont only managed 0.7 percent growth over the same period. In real terms, this amounts to 2,520 workers added to the state workforce per year during the 2000s. During this time, 380 workers entered the TRO Region, which constitutes 15 percent of all added workers in Vermont.

According to data for the two decades from 1990 to 2010, over half of the individual towns in the Region experienced less pronounced workforce growth than the Region as a whole. The spread of towns impacted by these lower growth numbers runs the gamut of towns with access to major highways (I-89 and I-91), towns that are not in close proximity to such roadways, and towns that have municipal infrastructure such as sewer or water and access to broadband Internet.

Age of the Workforce

The TRO Region saw significant shifts in certain workforce age groups between 2010 and 2012, according to census and American Community Survey (ACS) figures. The Orange and Windsor County area saw a decline of about 1,700 people in the workforce between 2010 and 2016. Unfortunately for the Region, the age group between 16 and 44 lost almost 2,000 people with a gain of 300 people in the 44+ age group. A steadily aging workforce is already upon the State, as the Baby Boomer generation enters

Figure 12-1: Orange and Windsor County Workforce Participation



Source: 2011-2016 American Community Survey 5-Year Estimates

retirement. Having a young workforce capable of replacing the established workforce will ensure economic vitality for the Region in the long term.

At present, the majority of workers in the Region are in the 45 to 54 year age bracket. More than half of the current workforce is age 45 or older. Trends suggest that a substantial share of these people will no longer be in the workforce in the 2020s. How the Region will fill vacant positions while simultaneously driving additional job growth is a concern, since the Region currently lacks thousands of younger replacement workers.

Educational Attainment and Workforce Training

A well-educated workforce bodes well for having a skilled workforce capable of attracting higher-paying, specialized jobs to our 30 towns. As of 2013, the majority of residents over the age of 18 had completed, were pursuing, or had pursued higher education qualifications beyond a high school diploma (nearly 61 percent). Of those 25 and over, 44.5 percent have completed an associate's, bachelor's, graduate, or other professional degree. This is an increase of 7 percent in the twelve years between 2000 and 2013 alone. The State, in contrast, has a slightly higher percentage of individuals who have earned these qualifications but has witnessed a decline in higher education attainment in recent years. The Region's level of educational attainment is much higher than the rest of the country. Only 33.6 percent of the nation's populace have attained these qualification levels.

As previously mentioned, many industries, most notably the manufacturing sector, routinely struggle to find qualified workers. This problem is multifaceted in that it reflects a small qualified workforce, an inability to retain and train from within local communities to fill positions, and the struggle employers face to recruit from outside the Region. According to findings presented in the 2014 Upper Valley Workforce Needs Assessment, developed by the Green Mountain Economic Development Corporation (GMEDC), three key industry areas that require skilled workers are the health care and social assistance sector; manufacturing; and professional, scientific, and technical services industries. An assessment of these three sectors revealed a need for employees in the following fields: computer systems analysts, health educators, licensed vocational and practical nurses, pharmacists, physicians, industrial production managers, mechanical engineers, and more generally,

A Snapshot of Workforce Development Opportunities in the TRO Region

- GW Plastics launched its School of Tech in January 2015 in conjunction with the Randolph Union High School. It will provide high school students with a comprehensive, hands-on course to help equip the next generation of workers with the skills needed to pursue a career in manufacturing.
- Vermont Technical College, in collaboration with GMEDC, offers a four-year Advanced Manufacturing Apprenticeship program. This program helps local manufacturers meet growing workforce needs.
- The Vermont Academy of Science and Technology (VAST), taught at VTC, provides local high school students with a chance to partake in an alternative senior year, where students can complete their senior year of high school while earning credits toward their first year of college.
- The Vermont Strong school program, created by the State Legislature in 2014, will allow students in qualifying engineering and IT degree programs to receive loan forgiveness for their final year of degree studies.

Source: Green Mountain Economic Development Corporation, 2015

individuals with a background in science, technology, engineering, and mathematics (STEM subjects).[2] There are many workforce development and training programs throughout the State that are run through the Agency of Commerce and Community Development (ACCD), Department of Labor (DOL), and Agency of Human Services through the statewide community action agencies. ACCD provides programs such as Vermont Talent Pipeline Management for employers in health care, construction, and manufacturing to analyze the supply and demand of their desired employees. The Department of Labor has programs that are geared toward the individual job seeker to assist them through process. More information on these and many other programs provided by state and local partners can be found at the following links:

- https://accd.vermont.gov/economic-development/programs
- http://labor.vermont.gov/workforce-development/
- http://humanservices.vermont.gov/community-partners/cp-community-action

Knowing that there is a pronounced need for employees in particular industry sectors satisfies only one piece of the employment puzzle. While the needs have been identified, there still remains an issue of filling vacancies with qualified individuals, both from within and outside of the existing workforce pool. Finding employees from within the Region may prove difficult if recruits lack the professional experience or education necessary to fulfill job duties. Resources such as the Pathways to Promising Careers help individuals identify high-paying, high-growth jobs throughout the State that match their academic experience.[3] With respect to recruitment from outside the Region, though, there are a number of factors contributing to difficulties in finding nonlocal recruits for work, including the cold climate; lack of metropolitan opportunities; difficulty in finding spousal employment; lower pay and higher housing costs (relative to more urban areas); and overall lack of ethnic diversity.[4]

Retaining the Region's existing workforce pool is of the utmost importance, particularly for our younger residents fresh out of high school or college. Further findings from the Upper Valley Workforce Needs Assessment point to the desire to strike out on one's own and explore as being inducement enough to experience life outside of Vermont, even if only temporarily. However, one of the primary reasons for leaving the TRO Region is the allure of better job prospects, often near more metropolitan areas. Many may also feel they generally lack the requisite skills for the work that is believed to exist within the Region. To counter that pull, many businesses have begun to invest more time in on-the-job training to equip less-qualified but local recruits with the hands-on and management skills that are needed within their companies. For most employers, any hire is a risk until new employees have been vetted for an initial period to test professional strengths and weaknesses. Growing a seasoned workforce through on-the-job training aids this process, and some employers have created apprenticeship opportunities as a means of filling regional workforce gaps.

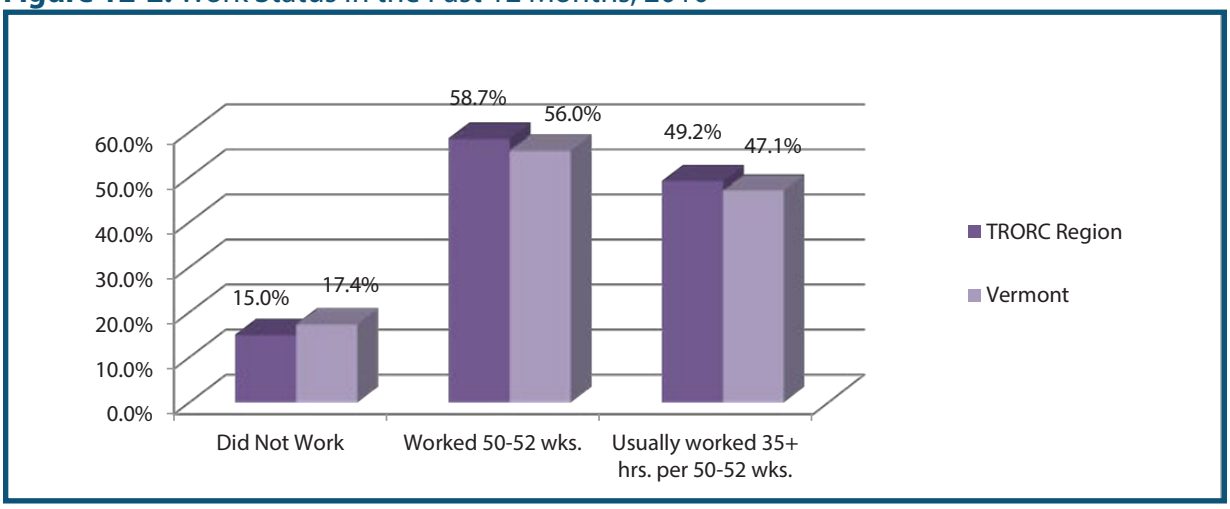
Another way to bolster educational opportunities for the Region's burgeoning and existing workforces is to promote the creation of continuing adult education opportunities throughout the Region. The workforce needs experience with learning day-to-day job skills but also with more general business and personnel management skills. Training in these areas can be in the form of practical on-site job training opportunities or courses and accreditation programs outside of the workplace that supplement existing job skills.

D. Employment Sector Characteristics

Employment Rates

According to U.S. Census Bureau data from 2010, of the population aged 16 to 64, 58.7 percent worked a total of 50 to 52 weeks out of the year,

Figure 12-2: Work Status in the Past 12 Months, 2010



Source: U.S. Census Bureau, 2010 American Community Survey

while 15 percent were not participants in the workforce. Of those who were in this workforce age demographic, 49.2 percent worked an amount equal to or in excess of 35 hours per week. Compared with state figures, towns in our Region cumulatively have more workers that are regularly working full time than Vermont does as a whole. Additionally, TRO Region towns have a lower percentage of individuals aged 16 to 64 who are inactive in the workforce.

Unemployment is defined to include individuals 16 years or older who are available and eligible to work and have been job seeking in the four weeks preceding a survey by the Department of Labor. While a number of towns in the Region have seen increased levels of unemployment, most towns saw positive growth in workforce numbers over the past two decades, with Rochester being an exception (partly attributable to population declines and employment losses).

Income Levels

Per capita income increased for Orange and Windsor Counties in 2016, the most recent year for which data is available. Windsor County has a higher per capita income than the state average and is the third highest out of the 14 counties in Vermont. While income increased in Orange County at a rate higher than the state or national average as well, it is still one of the lowest in Vermont, ranking tenth. As incomes are increasing in the TRO Region, the number of households on state public assistance programs is continuing to decrease.

Table 12-1: Per Capita Income

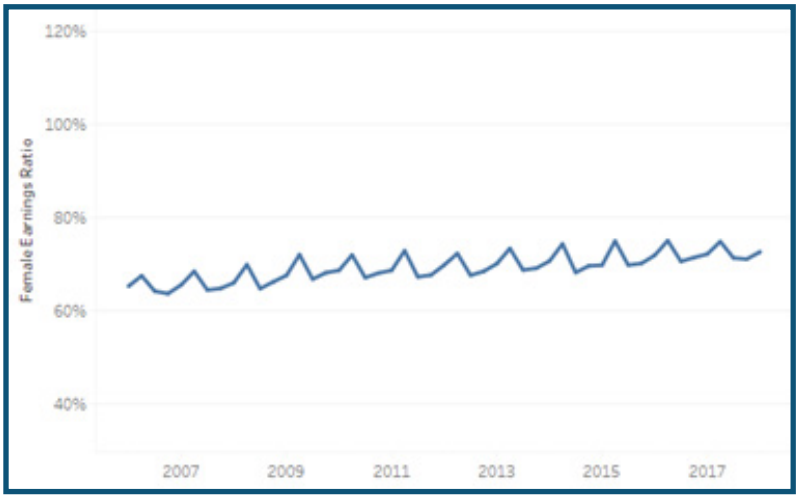
Indicator	2016	Change from 2015	Change from 2010
U.S.	$49,246	1.6%	22.2%
Vermont	$49,984	2.2%	22.1%
Orange County	$43,531	2.0%	18.5%
Windsor County	$53,186	2.1%	20.9%

Source: Vermont Department of Labor

In January 2018, 4,998 households, representing just above 14 percent of those in Orange and Windsor Counties, were enrolled in Vermont's cash assistance programs, which assist those below recognized income levels. The communities with the highest percentage of households that receive benefits are Bradford and Corinth. Each of those towns has more than 19 percent of their households involved in public assistance programs.

An overview of the U.S. gender wage gap demonstrates a substantially decreased but

Figure 12-3: Vermont Female-to-Male Earnings Ratio



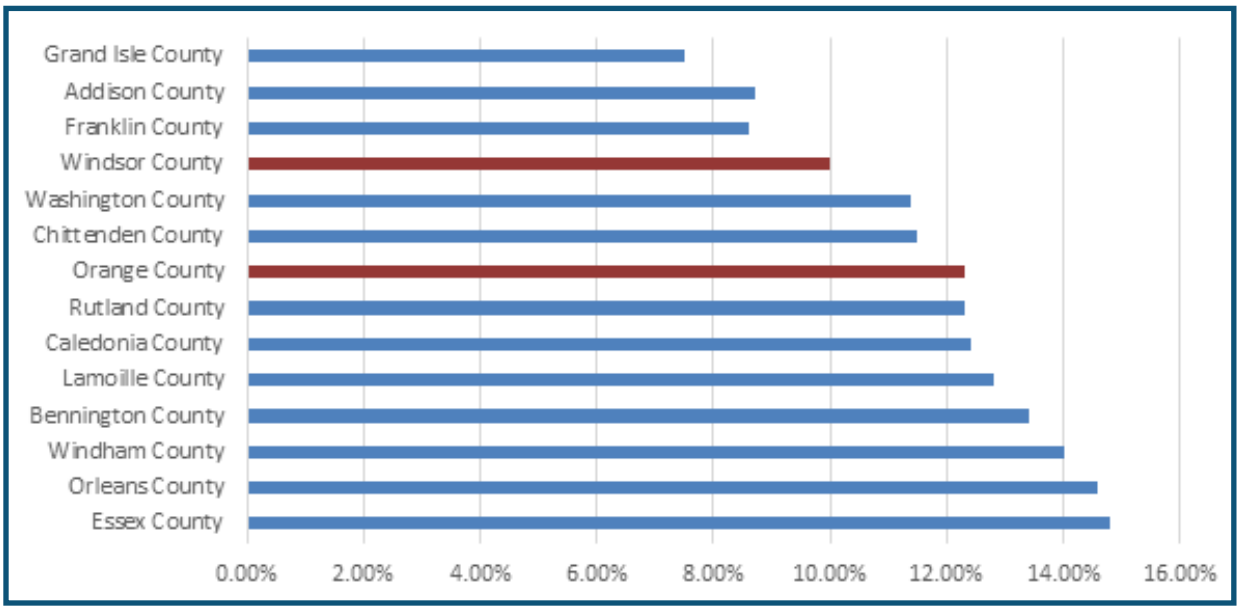
Source: Vermont Department of Labor, "Earnings and Jobs by Gender"

persistent wage gap between women and men. The erosion of the gap is considerable, yet progress has been nonlinear. Advancements in education, workforce participation, and higher-paying occupations, in conjunction with an increasing wage rate among women, have significantly narrowed the gap since the 1970s. Despite these gains, the rate at which the gender wage gap has declined has stalled. Since the early 2000s, the female-to-male earnings ratio has fluctuated between 79 percent and 83 percent.[5] In Vermont, the earnings ratio between 2007 and 2017 has risen from the mid-60s to low and mid-70s. Employers addressing the gender wage gap will help lower the number of women who are experiencing poverty or economic insecurity as well as raise the fixed incomes of elderly people when they reach retirement.

Poverty

According to 2016 American Community Survey (ACS) data, Vermont has a poverty rate that stands at 11.6 percent. At a local or regional level, it is very difficult to meaningfully determine poverty levels. That said, basing poverty on federal data does not always accurately represent the entire picture of poverty in the Region. The federal poverty line is calculated off of the price of food and does not take into account the proportion of family income spent on housing and transportation, which is particularly high in the TRO Region. Further, it fails to consider certain forms of income such as capital gains or income earned outside of the standard employment sector (i.e., earnings made "under the table").

Figure 12-4: Poverty Rates by County, 2016



Source: 2011-2016 American Community Survey 5-Year Estimates

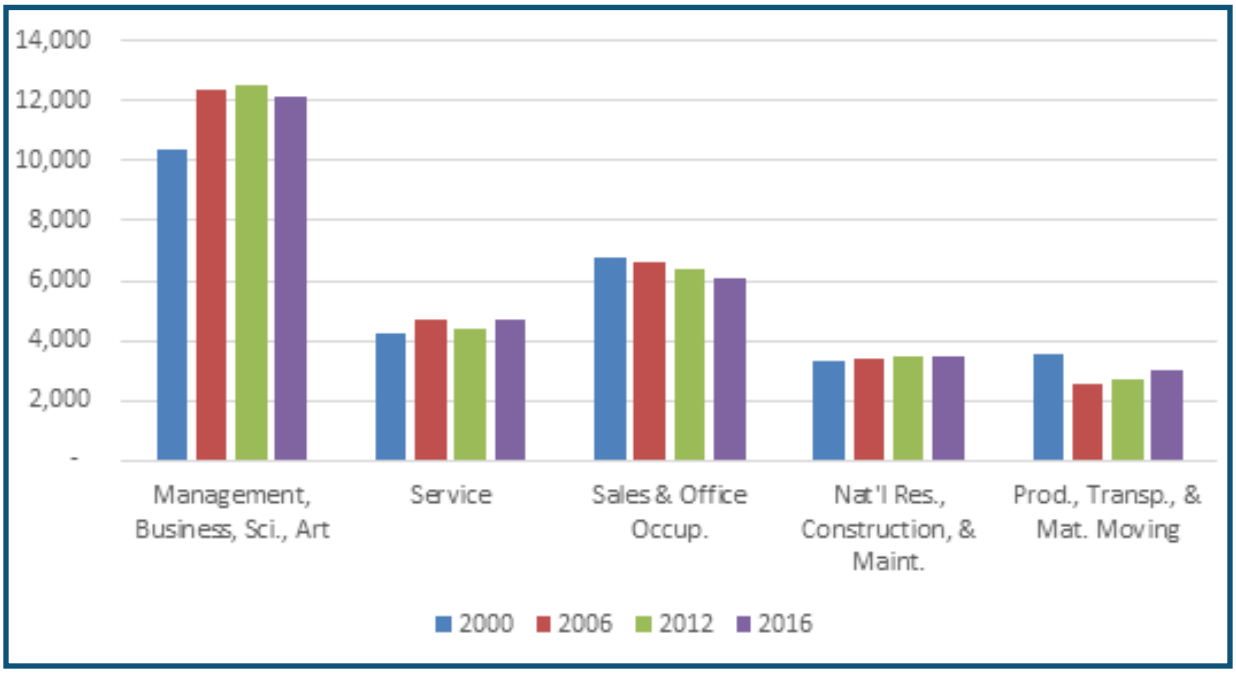
Compared with other counties in the State, the TRO Region is not beset by the highest rates of poverty when considering all age groups (see Figure 12-4). However, that statement is not meant to minimize the level of poverty in our Region, particularly in Orange County, where poverty rates in 2016 stood at 12.3 percent. Additional anecdotal evidence from the Upper Valley Haven, the Region's only homeless shelter, speaks to an increase in the depth of poverty in the Region. The homeless shelter's services have come under increasing demand in recent years, especially from families. This is directly related to the interaction between the Region's increasing housing costs and its stagnant wages, as described by the Vermont Housing Finance Agency in their *Housing and Wages Report*.[6] Without reversing these trends, the Region will continue to see rising numbers of both individuals and families slipping into poverty or increased numbers of residents emmigrating to more affordable areas.

Employment by Occupation and Industrial Sector

Occupational opportunities have changed significantly in recent decades, and common occupations now include a range of administrative, management, and sales opportunities. The 1980s were a period of decline for manufacturing jobs throughout the Region and were simultaneously a time of growth in the areas of construction, financial services, real estate brokerage, and retail trade.

While the Region has historically been known to host largely agrarian jobs or timber and resource extraction work, that trend shifted dramatically over the past century. As can be seen in Figure 12-5, nearly 41.3 percent of the Region's jobs fall within the managerial, business, science, or art occupational sector, whereas jobs in the natural resources, construction, and maintenance occupational sector now account for only 11.7 percent of all jobs in the Region. The managerial, business, science, or art occupation sectors grew by 17 percent between 2000 and 2016, while all other sectors have witnessed significantly lower growth or outright declines. Indeed,

Figure 12-5: Employment Numbers across Occupational Sectors, 2000-2016



Sources: Selected Econ. Char., 2000 Census; Selected Econ. Data, 2006-2010, 2008-2012 & 2011-2016 American Community Survey

production, transportation, and materials moving occupational sector jobs declined by 16 percent between 2000 and 2016.

The educational and health services industry sector continues to have a major impact on the growth of the Region's jobs. This is largely attributable to the existence of major regional medical service centers (notably Dartmouth-Hitchcock and Gifford Medical Center) and academic institutions (all of the municipal and private schools, as well as higher education institutions like Dartmouth College, Vermont Law School, and Vermont Technical College).

Agriculture and Silviculture

Only 3.5 percent of all the Region's 29,394 jobs in 2012 were in the agricultural, forestry, fishing, or hunting industries. The State, in contrast, has only 2.7 percent of jobs in those industries. From 2000 to 2012, though, there was a 1.7 percent increase in agricultural, forestry, fishing, and hunting jobs within the Region. There are a range of farms in the TRO Region, some strictly agricultural, some raising livestock, and others that are dairy farms, all of which dot the primarily rural landscape of our 30 towns.

The 2012 Census of Agriculture produced by the USDA reported that Orange and Windsor Counties have seen an increase in the number of farms since 2007. Orange County has seen a robust increase of 9.5 percent in the number of farms since 2007, whereas Windsor County has seen much more modest growth, at a rate of 0.13 percent. There is an even greater disparity in the revenue seen in either county, as can be seen in Table 12-2, with Orange County farms earning over double the average earnings of farms in Windsor County.

Dairy remains a multimillion-dollar industry in both Orange and Windsor Counties, accounting for 62.8 percent of farm revenue for Orange County and 40.6 percent for Windsor County. Additionally, the USDA captured how much revenue was derived from organic commodities for 2012, with 13.6 percent of Orange County's revenue and 6.5 percent of Windsor's. The majority of farms in both counties (90.7% in Orange County and 79.8% in Windsor County) earned an amount in excess of $50,000 in 2012.

There were 1,589 documented farm workers in 2012, with 791 in Orange County and a further 798 in Windsor County. The majority of farms operated with only one or two workers in each county (62.0% in Orange County and 49.1% in Windsor County). The median farm size for both counties combined is 75 acres, and only 27.5 percent of the farmland in both counties was used for food crop growing. A further 20.3 percent of farmland in both counties is used for growing forage crops for livestock.

With respect to the silviculture industry and value-added wood products, there are many major regional employers that rely on forestland products, such as Copeland Furniture in Bradford and the Pompanoosuc Mills Corporation in Thetford, each with a workforce varying between 100 and 249 people. Numerous smaller operations exist too, such as local sawmills and lumberyards, maple sugaring businesses, Christmas tree farms, and furniture producers. As noted in the TRORC Regional Forest Stewardship Report from 2012 (see Appendix I), there are a number of other smaller forest-related businesses in our Region:

- Britton Lumber (Fairlee)
- Shackleton Thomas (Bridgewater)
- Lumberjack Lumber (White River Junction)
- Redstart Forestry (Corinth)
- Baker Lumber Co. (White River Junction)
- David Hurwitz Originals (Randolph)
- GMC Hardwoods, Inc. (Norwich)

Tourism

No exact numbers exist to show how many people in the Region work specifically in jobs catering to tourist needs; however, if we combine the number of individuals working in entertainment, the arts, recreation, and food services with those working in the retail trade, roughly 21 percent of the

Table 12-2: 2012 Agriculture Data		
Market Value of Agricultural Products Sold (Incl. Direct Sales)		
	Orange Co.	Windsor Co.
Farms, 2012	748	768
Farms, 2007	683	767
Total sales ($1k), 2012	$ 53,540	$ 22,416
Total sales ($1k), 2007	$ 43,292	$ 24,978
Average per farm, dollars, 2012	$ 71,578	$ 29,187
Average per farm, dollars, 2007	$ 63,385	$ 32,566
Percent farms with sales over $50k, 2012	90.7%	79.8%
Farms growing crops (incl. nursery and greenhouse crops), 2012	476	472
Farms growing crops (incl. nursery and greenhouse crops), 2007	394	435
Livestock, poultry, and their products	422	379
** Milk from cows, farms, 2012	101	43
** Revenue from dairy farms, 2012 ($1k)	$ 33,647	$ 9,095
Value of products sold directly to individuals for human consumption, 2012 ($1k)	$ 2,109	$ 2,556
Value of products sold directly to individuals for human consumption, 2007 ($1k)	$ 1,580	$ 1,948
County Summary Highlights, 2012		
Land in farms, acres	105,234	101,362
Average size of farm, acres	141	132
Median size of farm, acres	76	74
Total crop land, farms	511	465
Total crop land, acres	33,207	23,585
Percentage of farm acres for crop land	31.6%	23.3%
Forage – land used for all hay and all haylage, grass silage, and greenchop, farms	345	325
Forage – land used for all hay and all haylage, grass silage, and greenchop, acres	24,157	17,797
Percentage of farm acres for forage	23.0%	17.6%
Hired Farm Labor – Workers and Payroll, 2012		
Number of hired farm workers	791	798
Total payroll ($1k)	$ 6,785	$ 6,683
Farms with 1 worker	65	62
Farms with 2 workers	72	52
Percentage of farms with only 1 or 2 workers	62.0%	49.1%
Organic Agriculture, 2012		
USDA National Organic Program certified organic production, farms	52	20
USDA National Organic Program organic production exempt from certification, farms	7	13
Value of sales of certified or exempt organically grown commodities ($1k)	$ 7,255	$ 1,458

Source: USDA Census of Agriculture, 2012

Region's workforce may directly (or tangentially) have a part in the Region's tourism industry. As such, the tourism industry still remains a key component to the Region's financial success. There is not simply one tourist attraction that is the anchor for the entire Region; rather, there are a multitude of year-round opportunities that visitors flock to the Region to explore and partake in.

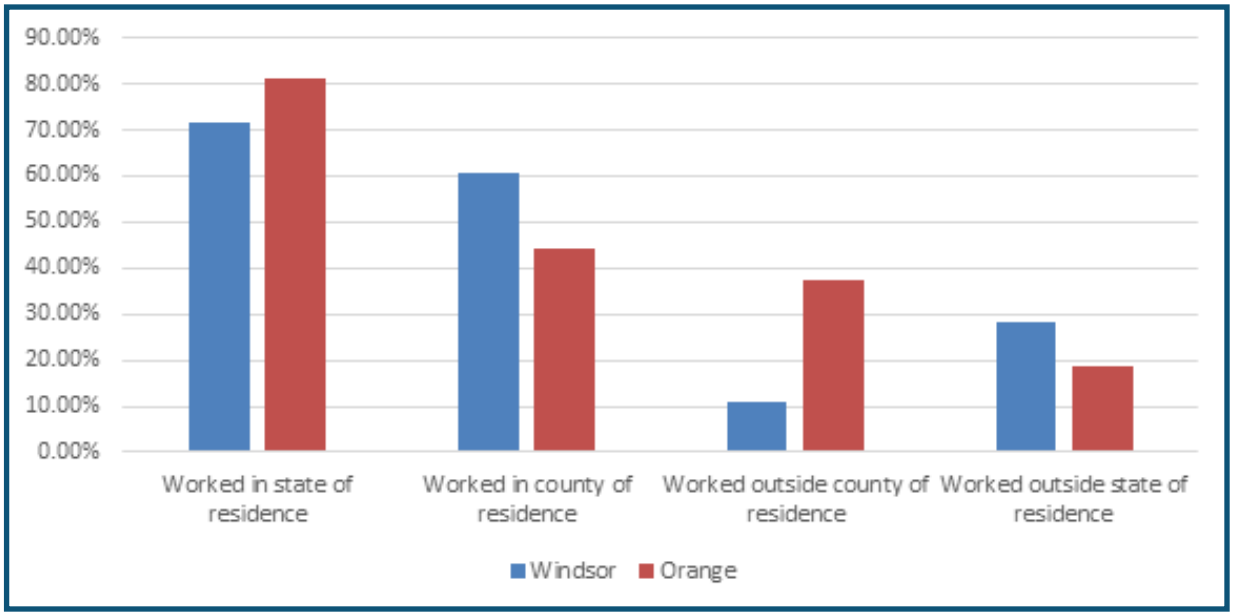
Whether it is a cavalcade of leaf peepers descending upon our Region in autumn; skiers, snowboarders, and snowshoers traversing the landscape in the winter; or fishermen, hikers, and cyclists in the spring and summer months, the TRO Region has a wide range of recreational opportunities for tourists of all stripes throughout the year. Additionally, the cultural and artistic heritage of the Region cannot be overlooked. The breadth and depth of the history in the Region and the skilled craftsmanship displayed by so many makes the Region a draw for tourists seeking quality fine art, sculpture, pottery, and countless forms of value-added products. The extensive opportunities to sample locally produced food stuffs, including a wide range of artisanal cheeses and beer, is part of a larger niche market that draws on the local craft food and drink movement that has become a cornerstone of the Vermont brand.

A key area of concern with the tourism sector is the need to ensure that all areas within the Region are capable of diversifying their economies to attract visitors on a season-to-season basis instead of attracting a niche tourist base at only certain times of the year. Further, ensuring that the tourism industry is equipped to face future impacts from climate change head-on is critical to ensuring business continuity and financial and economic resiliency. This is of particular importance with respect to the winter sport industry, as it is most vulnerable to increasing temperatures and reduced snowpack levels.

Employment Centers and Commuting

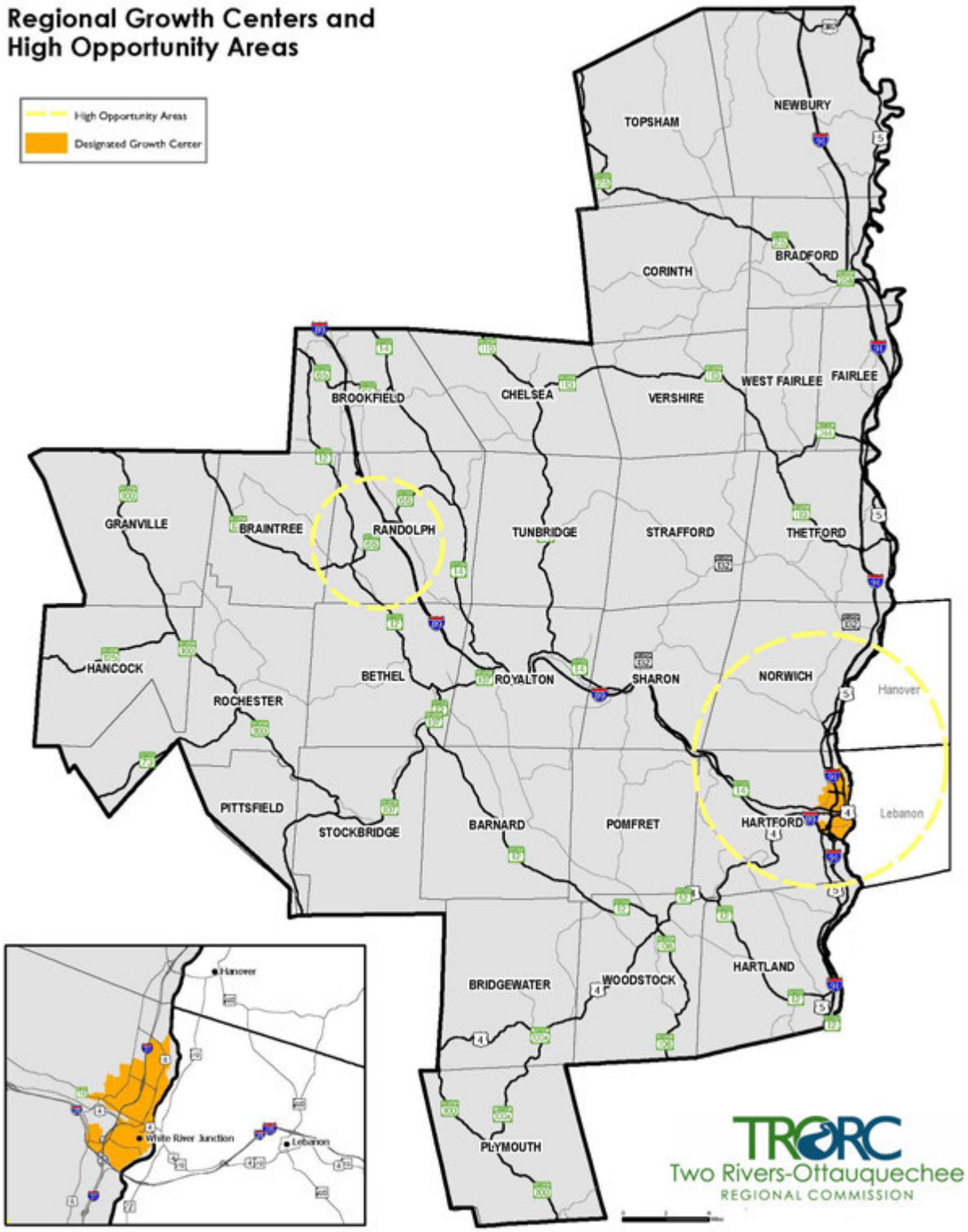
The TRO Region has two major high-opportunity areas that are designated as having the strongest job markets, infrastructure, services, and educational institutions. These areas cross state lines and are key drivers for economic development and growth for the overall Region. The two major areas within and around our Region are the Randolph area and the area encompassing the towns of Hartford and Norwich

Figure 12-6: Place of Work



Source: Commuting, 2011-2016 American Community Survey

Figure 12-7: State Designated Growth Centers and High Opportunity Areas

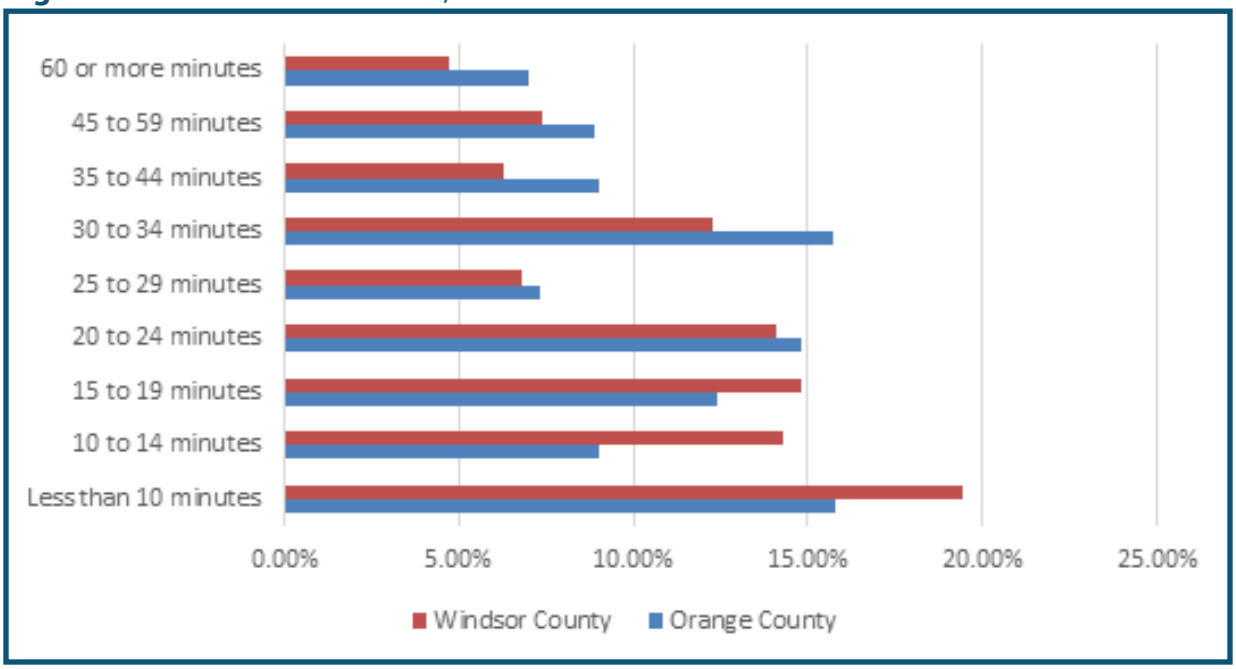


within the TRO Region and the towns of Lebanon and Hanover across the Connecticut River in New Hampshire (see Figure 12-7). As a consequence of the latter grouping of towns in particular, our regional economy is intricately interwoven in the fabric of the greater Upper Valley Region. Indeed, the Region is part of the Lebanon-Claremont (NH) Micropolitan Statistical Area, per the U.S. Census, denoting the cross-border relationship between TRORC's 30 towns and those in the adjacent towns of neighboring New Hampshire.

Many residents in the Region routinely travel outside of their town limits for recreational, shopping, and work opportunities, particularly to the high-opportunity areas that provide a wider array of goods, services, and employers than do many of the small towns and villages in the Region. The high-opportunity areas are where job markets, infrastructure, schools, and services are the most extensive and strongest. Indeed, with respect to jobs, 28.3 percent of workers in Orange County and 10.8 percent of workers in Windsor County are employed outside of their respective county of residence. Due to the nature of the Region being part of the two-state Upper Valley region, 19 percent of Windsor County workers and 28 percent of Orange County workers are employed outside of Vermont. These rates far exceed those seen at the statewide level, largely due to the ease of access to these outside work markets.

Most towns in the Region are within close distance of major interstate highways that make access to high-opportunity areas much easier, allowing many to live farther afield from work. This has augmented the trend of extending growth and development away from historical settlement areas throughout the Region, placing added strain on the provision of municipal services and the ability of smaller town and village center businesses to remain viable in some instances. This trend also increases commuting times for many of the Region's workers, even with improved accessibility to major roadways. The average amount of time workers in the Region travel to their jobs is between 22 and 26 minutes, which is roughly equivalent to a 15- to 20-mile commute in most areas (see Figure 12-8). This constant travel creates additional strain on built infrastructure (roadways and bridges), adds to traffic congestion in some areas, and increases pollution of the air, soil, and waterways.

Figure 12-8: Travel Time to Work, 2016



Source: Commuting, 2011-2016 American Community Survey

Major Regional Employers

The TRO Region is home to a number of important business sectors and major employers. As has been noted, two of the largest employment sectors in the Region are education and health care. A review of employers that have more than 100 staff members supports this, with academic institutions like Vermont Law School and Vermont Technical College and medical centers like Gifford Medical Center and the VA Medical Center being amongst the largest employers. The hospitals in fact are the largest regional employers, according to Vermont Department of Labor data (see Table 12-3). The list of regional employers employing over 100 individuals also serves to demonstrate that recreation and tourism are key contributors to the regional economy, with Lake Morey Resort, the Woodstock Inn and Resort, and the Quechee Club all being large employers. All told, the educational, medical, and tourism employers in our Region are clear anchor institutions within our local economies with respect to job creation and the trickle-down economic boost they provide to other area businesses as well as municipal and social capital support. For a list of regional employers, go to https://www.thinkvermont.com/regional-employers/.

E. The Future of Economic Development

A Vision for the Future

Vermont is often touted as being a great place to both live and work. The TRO Region is certainly no exception to this, and as such is well poised to attract newcomers to the Region who seek fulfilling, rich professional and personal lives.

TRORC recognizes that the Region has a number of unique characteristics that provide the opportunity for a high quality of life. Like other parts of Vermont, it is blessed with a display of mountains, lakes, open fields, and villages. It has a small number of people in rural settings, a clean environment, and access to a variety of natural resource–based activities. The Region's residents have ready access to the natural environment, yet they also have good access to culture, technology, transportation, and other characteristics typically associated with urban life. Many residents fortunate enough to take advantage of this quality of life are committed to extending the same opportunities to others seeking to live in the Region.

While many have often held to the assumption that enticing new large employers is the preferred means of improving the Region's growth prospects, such an approach does not focus on the best source of jobs: small business growth from existing employers. Enticing large new employers also usually involves public subsidies and creates vulnerability in the event of future closure. Instead, it is preferred that the Region focuses on development based on our local assets and emphasizes the need to help existing small businesses, including cottage industries, grow and flourish. We can also grow local entrepreneurs and attract workers who can telecommute remotely for employers outside of the Region. Given the current shortage of housing, training employees from amongst our current workforce may be easier than attracting outside employees in some cases; however, we also need a concerted effort to attract new working-age adults to augment our aging population.

As noted within the "Major Regional Employers" section of this chapter, higher education and health institutions comprise two of the most significant sectors of our regional economy. Instability of any of these institutions, be it Vermont Technical College, Vermont Law School, Gifford Medical Center, or Dartmouth-Hitchcock Medical Center, would trickle down to communities throughout our Region, prompting job loss and adverse financial impacts to the towns and businesses that depend on their continued existence. It is imperative that we as a Region support and retain these and similar anchor institutions for the sake of our continued economic vitality. Efforts should be

made to engage and assist these institutions with community dialogue and business continuity planning.

The Vermont Department of Labor produces projections on occupations that are anticipated to see job growth across the State. Their findings in 2014 are shown in Table 12-3, listing the employment areas projected to grow the most in Vermont by 2024, many in highly skilled job sectors.

It is worth noting that of the skilled job sectors set to see the most growth, many are not high-wage jobs. This fact should not be surprising, as most jobs in the economy are not high-wage jobs. Personal care aides and home health aides will be critical to our aging population but may require supplementary income to affordably live in the Region. Further, it is evident that these are the professions that, compared to others in the table, require less in the way of educational qualifications.

While focusing on securing jobs in growing

Table 12-3: Occupations with the Highest Anticipated Growth

Occupation Name	Jop Openings Base Year: 2014	Job Openings Projection Year: 2024	Annual Growth Rate	Median Wage, 2016 (hourly except as noted)	Typical Education Needed for Entry
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	54	76	3.5%	$21.26	High school diploma or equivalent
Food Batchmakers	217	290	2.9%	$16.66	High school diploma or equivalent
Taxi Drivers and Chauffeurs	290	374	2.6%	$10.86	No formal educational credential
Farmworkers and Laborers, Crop, Nursery, and Greenhouse	304	385	2.4%	$14.11	No formal educational credential
Physical Therapist Assistants	89	112	2.3%	$26.69	Associate's degree
Software Developers, Applications	156	192	2.1%	$29.66	Bachelor's degree
Home Health Aides	203	249	2.1%	$13.46	No formal educational credential
Software Developers, Systems Software	123	150	2.0%	n/a	Bachelor's degree
Market Research Analysts and Marketing Specialists	436	527	1.9%	$23.72	Bachelor's degree
Clinical, Counseling, and School Psychologists	398	481	1.9%	$27.05	Doctoral or professional degree

Source: Vermont Department of Labor: 2014–2024 Projection, Southern Balance of the State—does not include all occupations for lack of data or for confidentiality reasons.

employment sectors is important to both retaining residents and to attracting people, we need to ensure that the array of services and housing are securely in place to support our current and anticipated residents. For example, the child care industry contributes to the regional economy as a business and employer in its own right and as a service industry that provides crucial support to employers and employees. Ample supply of child care services and facilities allows parents in the regional economy to work, and their importance to the local economy cannot be overstated if we wish to see an influx of workers to the Region. Further, providing increased housing opportunities is critical, especially near job centers.

A more robust transit system will enable people to access both work and services at much less expense, and increased high-speed Internet and cell phone service will increase the area's viability for prospective residents to the Region. Multimodal and public transit opportunities influence settlement patterns of younger generations as attitudes toward vehicle ownership shift away from car-reliant lifestyle choices that have dominated our culture since the twentieth century. This shift has occurred for a host of reasons, ranging from financial considerations to environmental ethical stances. Recent studies on the transportation needs and desires of younger generations of Vermonters, including current undergraduate students and young professionals, show that Vermont would be a more attractive place to settle for young adults if there were safe alternative transportation options available, be they well-lit walking and bike paths or more bus and rail services to population and work centers.[7] Additionally, we cannot expect to draw large numbers of younger people if we do not have adequate cellular service. Regional infrastructural improvements will ultimately lead to lower costs of living, increased community vitality, and a wider array of professional opportunities for residents.

Goals, Policies, and Recommendations: **Economic Development**

Goals

1. Economic development, community development, and land use policies and plans are aligned to improve the Region's unique quality of life.
2. Essential elements for attracting new, younger residents are in place, including housing that is affordable, ubiquitous telecommunications, transit, and a mix of desirable employment, recreation, and cultural opportunities.

Policies

1. Public and private infrastructure shall be planned and funded to support and sustain a viable economy and environment while enhancing quality of life goals and shall not detract from existing core areas most appropriate for economic development.
2. Regional development activities should support the diversity of the Region's economic base by encouraging entrepreneurship, supporting the expansion of local businesses, and attracting new businesses that are consistent with the Regional Plan. The establishment of diversified attractions that expand tourism and recreation opportunities while respecting the Vermont brand is encouraged.
3. New workforce housing development is supported in villages and downtowns.
4. High-speed Internet, with fiber-based systems, is supported throughout the Region.
5. Cellular phone networks are supported in all areas of the TRO Region.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Economic Development**

Policies (continued)

6. Transit systems should connect all village and town centers and serve major employment centers and businesses.
7. Child care facilities in our communities or in employment centers are supported by this Plan.
8. Economic development strategies between TRORC, ECVEDD, and other regional economic development consortiums should align to support a more diverse and resilient regional economy.

Recommendations

1. TRORC will provide grant management, Act 250 support, and local regulatory reform assistance to further the development of job growth and workforce housing in areas close to employment and service opportunities.
2. TRORC will participate in discussions to improve the regulatory system at the state level and improve permitting coordination between local and state levels of government.
3. TRORC will assist towns with village and downtown designation in order to provide incentives in these areas.
4. TRORC will work in concert with towns and development organizations to provide technical support (such as support with permitting, funding, or brownfield assistance) to businesses wishing to stay in or relocate to core areas.
5. TRORC will work with Vermont state agencies, regional and local development groups, trade associations, Chambers of Commerce, planning commissions, and other groups to integrate land use planning with economic planning and development programs based on our Region's assets.
6. TRORC will review and recommend revisions to zoning bylaws and other land use guidelines to ensure they actively support vitality in town centers, including infill, adaptive reuse of structures, increased height limits, and density bonuses.
7. TRORC will offer assistance to towns in asset management, capital budgeting, and shared services/purchasing in order to lower costs and stabilize taxes.
8. TRORC will assist towns to apply for and manage grants and loans for infrastructure repairs and/or upgrades that bolster the livability of core areas.
9. Public agencies, schools, and private businesses must expand workforce training and education that aligns with the strategic needs of our Region's current and future employers and expand linkages that allow the Region's youth to learn about local career opportunities and gain exposure to the workplace.
10. TRORC and child care providers must work with member towns to address identified needs for child care facilities or services, including identifying publicly owned buildings throughout the Region suitable to serve as child care facilities.
11. The State should map existing cellular and broadband services in the Region, identify gaps, and work with cellular companies to provide coverage in those gap areas, ensuring that all areas have good service that supports both current and future businesses and residents.
12. State, regional, and local economic development agencies should develop stronger financing/funding mechanisms for business expansion and entrepreneurship.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Economic Development**

Recommendations (continued)

13. The Small Business Development Center, Chambers of Commerce, and development corporations should develop a coordinated network of resources for businesses—including business coaching, financing, permitting assistance, and peer-to-peer networking—to equip current and would-be business owners with the skills needed to brand, promote, and effectively operate businesses.
14. TRORC will work with towns and development organizations in the Region to identify and inventory vacant and underutilized sites and buildings most suitable for near-term commercial and residential development in existing downtowns and villages where water, sewer, power, Internet, and roadways have capacity.
15. TRORC will support efforts to recognize businesses for excellence in creating better downtowns and villages.
16. TRORC should support and assist efforts that focus on how best to utilize our rivers as economic drivers while improving water quality and protecting the rivers' natural beauty, native animal and plant species, health, and unique character.
17. TRORC should work with local producers, development corporations, educational programs, the Vermont Agency of Agriculture and other organizations to identify and create needed processing, storage, and distribution capacity for locally made food and forestry products.
18. TRORC should work with land trusts and local conservation commissions to inventory farm and forest lands to understand where parcels are available that could provide opportunities for new farm and forest businesses and to assist towns in crafting regulations to reduce fragmentation and leave land available for farming, forestry, and other land-based businesses.
19. TRORC will work with the Vermont Arts Council to support regional and statewide creative zones.

Economic Development Endnotes

1. "Broadband Availability," Vermont Department of Public Service, https://publicservice.vermont.gov/content/broadband-availability.
2. "Upper Valley Workforce Needs Assessment," Green Mountain Economic Development Corporation, March 2014, http://www.gmedc.com/gm/wp-content/uploads/2014/03/Upper-Valley-Workforce-Needs-Assessment-Presentation-2014.pdf.
3. "Pathways to Promising Careers," The J. Warren and Lois McClure Foundation, 2018, https://www.vermontcf.org/McClureFoundation/Initiatives/PathwaystoPromisingCareers.aspx.
4. "Upper Valley Workforce Needs Assessment," Green Mountain Economic Development Corporation, March 2014, http://www.gmedc.com/gm/wp-content/uploads/2014/03/Upper-Valley-Workforce-Needs-Assessment-Presentation-2014.pdf..
5. "Getting Millennials from A to B," Vermont Transportation Board, 2014, http://legislature.vermont.gov/assets/Legislative-Reports/2014-Annual-Report.pdf.
6. "Between a Rock and a Hard Place: Housing and Wages in Vermont," Vermont Housing Finance Agency, 2011, https://www.vhfa.org/documents/housing-wages-2011.pdf.
7. "Getting Millennials from A to B," Vermont Transportation Board, 2014, http://legislature.vermont.gov/assets/Legislative-Reports/2014-Annual-Report.pdf.

Tracey Hall, Norwich | © John Knox

RELATIONSHIP OF TRORC REGIONAL PLAN TO NEIGHBORING PLANS

13

Quechee Balloon Festival | © *Jericho Hills Photography*

A. Relationship to Plans of Adjoining Vermont Commissions

Five Vermont regional planning commissions, and one New Hampshire regional planning commission, border the TRO Region.

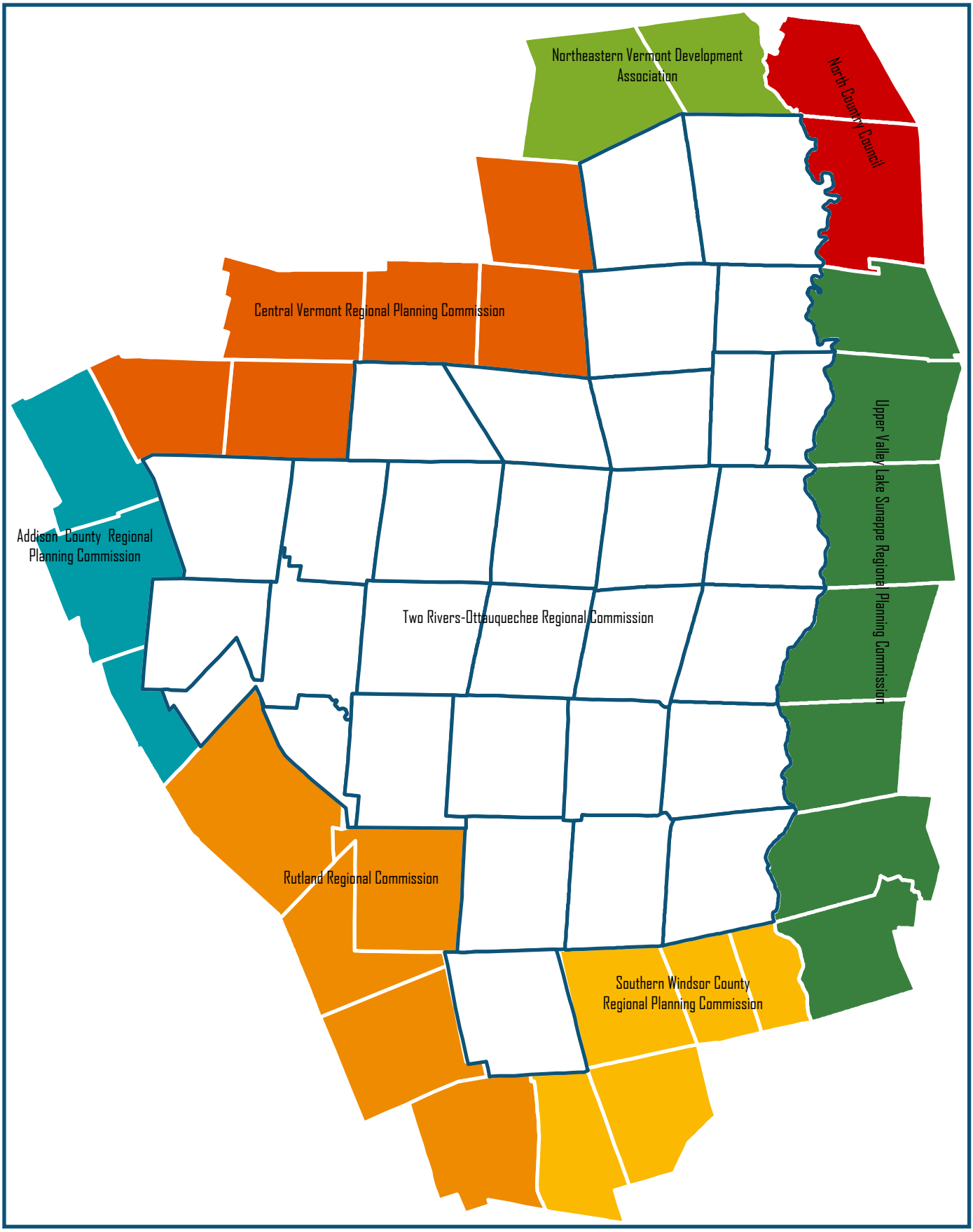
All six of these have a current regional plan in effect. Below are the dates of their adoption:

- Southern Windsor County Regional Planning Commission (SWCRPC): Plan adopted November 18, 2014
- Rutland Regional Planning Commission (RRPC): Plan adopted June 16, 2015
- Addison County Regional Planning Commission (ACRPC): Plan adopted March 9, 2016
- Northeastern Vermont Development Association, Inc. (NVDA): Plan adopted August 27, 2015
- Central Vermont Regional Planning Commission (CVRPC): Plan adopted July 12, 2016
- Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC): Plan adopted June 17, 2015

TRORC consults and coordinates with neighboring regional planning commissions during their planning processes. Our largest and most interconnected neighboring region is that of the UVLS Region, and to further coordinate, our executive directors are currently representatives on each other's board of directors.

For an issue to rise to the level where we feel that there needs to be coordination, a neighboring region's plan must affect us or we must affect our neighbors in a meaningful way. This could be a small matter that is literally on the border of two regions, such as exit 17 on I-91, or a larger matter that has effects for some distance, such as employment at centers like Dartmouth-Hitchcock Medical Center.

Figure 13-1: Surrounding Regional Planning Commissions



Land Use

All adjoining regional planning commissions identify regional areas that are intended to support high densities of development. Some nearby regional areas, such as Windsor, Rutland, Middlebury, St. Johnsbury, and Lebanon and Hanover in New Hampshire could have an effect on the TRO Region if they were to expand, but there are no land use conflicts noted between what adjacent regional planning commissions and ours see as desired future regional patterns of development.

Most municipalities that border our Region are quite rural, with the exception of UVLS Region towns Lebanon and Hanover, which are considered economic hubs for our Region where residents do most of their shopping. Hartford, and to some extent Norwich, tie in relatively seamlessly with their adjacent New Hampshire towns. Windsor, Vermont, adjacent to Hartland, is largely rural, but it does have some commercial development in its downtown. However, the future land use map for the SWC Region matches that of the TRO Region in that the bordering area is designated to remain primarily rural outside the town centers of Windsor and Hartland, keeping this stretch of U.S. 5 free from sprawl.

Watersheds

The TRO Region shares several watersheds with neighboring regional planning commissions. The TRO Region receives the Connecticut River and Wells River watersheds from the NVDA Region. The Connecticut goes through a series of three dams known as Fifteen Mile Falls, just above our Region, and is managed for both hydropower production and flood control. The water quality of the river is quite good, as it drains a largely rural and forested area. The TRO Region then shares the Connecticut with the UVLS Region and the SWC Region as it flows south. Several smaller rivers from New Hampshire and Vermont empty into the Connecticut River along our border. The Wilder Dam between Hartford, Vermont, and Lebanon, New Hampshire, impounds almost all of the upstream reach of the Connecticut in our Region. As the Wilder Dam is in both states, both regional planning commissions are involved in its relicensing. The Connecticut River Joint Commission (on which TRORC and UVLSRPC sit) is also involved in the relicensing and serves as a bi-state body to coordinate issues around the Connecticut River.

Downstream of us, the river flows into the SWC Region and the rest of the watershed, all the way to Long Island Sound. Nitrogen is a pollutant issue in the Sound, and it is therefore a matter of concern even in our Region.

With the exception of some small upland areas in the outermost reaches of the watershed, most of the TRO Region forms the entire watershed for the White River. This major river empties into the Connecticut River in the aptly named White River Junction village in Hartford. The flooding that occurred as a result of Tropical Storm Irene serves as an example of the White River impacting downstream communities. Though the White River is usually much smaller in size, during this flooding event it was flowing at an estimated 90,000 cubic feet per second (cfs), almost three times the flow of the Connecticut, at the two rivers' confluence. Not only did the fury of the White River render a highway bridge and a rail bridge in Hartford unusable, it also transported significant amounts of silt, pollutants, and debris, which ultimately entered the Connecticut River and impacted towns downstream. Similarly, though the TRO Region is the host to just a small portion of the headwaters of the Black River, which runs through SWC Region, major erosion in Plymouth from Irene caused siltation to affect downstream waters in Ludlow.

The lower portion of the TRO Region is in the Ottauquechee River watershed, with headwaters beginning in Killington, part of RRPC's region. The Ottauquechee is an

important part of the Quechee area of Hartford, providing a scenic center to Quechee Village as well as the significant attraction of Quechee Gorge. Flooding during Irene heavily damaged the covered bridge in Quechee. Just below the Gorge, the Ottauquechee is held behind the North Hartland dam run by the U.S. Army Corps of Engineers. This dam is operated for flood control, protecting communities along the Connecticut River as the Ottauquechee flows south.

Water quality and quantity are issues that tie the regions together. All agree that improving water quality is a priority. Adjacent Regional Plans are also very cognizant of flooding as an important issue. No conflicts are noted when it comes to watershed and water quality planning.

Economic Development

The TRO Region is tied to the state, national, and international economies of course, but of more direct concern are the local employment links with other nearby regions. Many of our residents commute to municipalities outside of our Region for work, shopping, and other needs. While some people commute into the TRO Region, most of our economic ties are outward. On our western edge, Rutland and Middlebury are economic centers, while to our north, the Barre/Montpelier area draws commuters. However, the biggest connection is with Hanover and Lebanon, New Hampshire, to the east. These two towns are considered the economic hub of the bi-state Upper Valley region (consisting of TRORC, SWCRPC, and UVLSRPC), providing most of the shopping and employment. TRORC and SWCRPC are part of a 40-town organization called the East Central Vermont Economic Development District (ECVEDD). This organization is a federally designated area whose mission is to "provide access to resources, facilitate partnerships, and support economic decision making" and "provide resources and facilitation as regions make decisions that will affect entrepreneurs, businesses, and communities." None of the current economic development plans for adjacent areas are viewed as detrimental to the TRO Region.

Transportation

There are several major highway transportation routes that pass through the TRO Region, including Interstates 91 and 89, Vermont Route 100, and U.S. Routes 302, 4, and 5. Highways function much like pipelines, in that any problems at a particular spot can affect the entire system. Therefore, planning around construction projects or larger developments that would have an effect on traffic are by their nature matters of concern across regional boundaries.

One Main Tap & Grill, Randolph | © *First Light Studios*

The I-89 and I-91 corridors are considered major thoroughfares for people traveling to Canada, New Hampshire, Vermont, and Massachusetts. U.S. 5 is the main non-interstate road on the Vermont side of the Connecticut River, and U.S. 4 and 302 remain main east-west corridors, with U.S. 4 being a primary artery for traffic coming from New York State. VT Route 100 is a major connector for AC Region, SWC Region, and RR Region residents to the Green Mountains in the westernmost part of our Region.

None of the neighboring regional planning commissions has plans that would adversely impact the function of these roads. It should be noted that bridges across the Connecticut River are built by NHDOT, as the Vermont border is generally the western shore of the river. Both state transportation agencies cooperate when planning construction on these bridges.

The TRO Region is also home to a freight rail line that parallels U.S. 5 and a rail line that has both freight and Amtrak service that cuts diagonally across the Region. Both of these are important to the Region and are also supported by other regions and the state level.

There are no airports of significance in the TRO Region, but Lebanon, New Hampshire, does have a small regional airport, and both TRORC and UVLSRPC recognize the importance of this airport.

Transit services exist in the Region that cross into neighboring areas, with a commuter bus line that goes north to Montpelier and routes on the VT/NH border that cross over and provide good options in the Hanover/Lebanon/Hartford area. All neighboring regional planning commissions highly support maintaining and increasing transit options.

Housing

Much of the TRO Region serves as a bedroom community for larger towns, especially the economic centers just to our east.

Currently, TRORC, SWCRPC, and UVLSRPC are jointly working on developing a region-wide housing needs analysis to identify areas that need more housing to serve the Upper Valley. All of the regional planning commissions in the area support increased housing that is affordable for both residents that are currently paying too much and new families that we are trying to attract to the region, as well as needed additions to the housing stock that are handicapped accessible or senior friendly to deal with the demographics of a rapidly aging population.

B. Municipal Plans within the TRO Region

There are 30 member municipalities that comprise the TRO Region. All municipalities have duly appointed planning commissions charged with the responsibility of planning for the future growth and development of their respective communities. As is the case in many areas of Vermont, the extent or nature of these local planning programs is varied. Several communities have had planning programs in existence since the late 1960s. As a result, these programs are relatively advanced. Other towns, particularly those removed from development pressure, are somewhat inactive and may have allowed their plans to expire. Implementation programs, including zoning bylaws, subdivision regulations, or capital budgets and programs exist for approximately two-thirds of the municipalities comprising the Region. TRORC provides technical assistance in the preparation of most of the Town Plans as well as subsequent bylaws. TRORC also provides regular training and assistance to towns on preparing plans and administering bylaws. Experience has indicated that these services are valuable resources to local planning efforts.

Towns are not required to but may request regional approval of their locally adopted

plans. In conducting a formal review of these municipal plans, TRORC determines if these plans are:

1. Consistent with the goals in 24 VSA §4302;
2. Compatible with the Regional Plan;
3. Compatible with approved plans of other municipalities in the Region; and
4. Contain the elements of a plan outlined in 24 VSA §4382.

Twice in an eight-year period, regional planning commissions are also required to meet with communities to discuss their municipal planning process and report on how effectively the municipality's planning process is meeting state planning goals. Municipalities in our Region have already used the results of these consultations to improve their municipal plans and better comply with state planning goals.

Since both Town and Regional Plans have basically the same required elements, they naturally look somewhat like each other. The regional plan must, and Town Plans may (unless seeking regional approval, as most do), also be consistent with the same set of state planning goals, furthering the similarities between the two. To the extent feasible, this Plan has been developed to reflect the general planning goals and policies expressed in plans of our member municipalities while ensuring consistency with state planning law. During the preparation of this Plan, Commissioners and staff attempted to maintain a close and coordinated working relationship with local public officials and the general public on matters relating to the purpose and application of this Plan, understanding that Town Plans often have more detailed maps and policies than the Region does.

Goals and Recommendations: **Relationship of TRO Regional Plan to Neighboring Plans**

Goals

1. Plans for the TRO Region and neighboring regions are mutually compatible.
2. Municipal Plans are comptaible with the Regional Plan.

Recommendations

1. TRORC will continue to actively coordinate with neighboring commissions and other organizations to achieve planning goals.
2. TRORC will work with other regional planning commissions to influence state and national policies that support our communities.
3. TRORC will actively participate in the permitting and planning of development, infrastructure, or services outside the Region that can impact the Region.
4. TRORC will work with member towns when updating their Town Plans in order to consider being compatible with plans of neighboring towns.

PLAN IMPLEMENTATION 14

Leavitt's Barn, Hartford | © Jericho Hills Photography

A. Determination of Substantial Regional Impact

State statute requires that TRORC define in this Plan what kinds of development would constitute "substantial regional impact," as this then is a threshold for review under Act 250 and precedence of this Regional Plan as the primary planning document to consider, since such developments by their nature are regional in scope. Larger developments that meet this definition, although perhaps only involving lands in one town, are likely to affect the character of growth and development or impact infrastructure in adjacent towns. The "substantial regional impact" threshold does not mean that a project is not desirable; it simply acknowledges that a proposed development may have an effect that will be felt in a wider area.

For example, an industrial park or commercial complex located in one town will result in increased employment opportunities for the area, thus stimulating the demand for housing in neighboring towns. A resort complex that draws tourists from outside of the Region may impact the capacity of existing highways beyond the border of the town where the resort is located. The type, location, scale, and timing of the development are factors that determine the relative impact of growth in an area. Furthermore, the relative capacity of an area to reasonably accommodate new development and the relationship of that development to existing and proposed development plans and policies for an area are determinates of substantial regional impact. Projects of such magnitude may be very beneficial, and this process is simply meant to ensure that they are thoughtfully reviewed with the impacts to the wider Region fully considered.

The eight specific criteria that qualify a development as resulting in substantial regional impact are outlined below:

1. A development that modifies existing regional settlement patterns by:
    a. shifting activity away from an

existing "Regional Growth Area" (as defined in the Land Use chapter of this Plan) to a major new area of regional growth; or

b. locating in an area that does not presently contain development of similar type or scale; or

c. resulting in activities currently served or planned for by development elsewhere in the Region.

2. A development that significantly affects existing capacity of regional public facilities by:

a. contributing to a reduction in the peak hour level of service (LOS) from D to E or from E to F; or

b. contributing five percent or more traffic volume to the peak hour LOS D on a regionally significant local or state highway in or immediately adjacent to Regional Growth Areas or LOS C on regionally significant local or state highways in rural areas; or

c. contributing five percent or more to the annual volume or tonnage of solid waste for disposal at a regional disposal facility; or

d. necessitating substantive capital improvements, such as widening or signalization of regionally significant (Class II) local or state highways; or

e. demanding five percent or more electrical energy during peak hours from facilities serving the immediate area; or

f. necessitating substantive capital improvements such as extension, upgrading, or englargement of regional electrical transmission lines; or

g. utilizing five percent or more unallocated student reserve capacity for any given year from any regional school facility serving the project.

3. A development that may place substantial demands on the Region's economy, or on a major sector of the economy by:

a. increasing the cost or availability of affordable housing in municipalities immediately adjacent to the project site; or

b. increasing the cost or availability of energy for users in the Region immediately adjacent to the project site; or

c. having an impact on the tax rates of major employment centers or growth centers in the Region; or

d. generating new employment equal to or greater than 1% of the Region's existing employment level; or

e. drawing employees from towns outside the town in which the development is proposed.

4. A development that endangers the perpetuation or appreciation of regionally significant natural or cultural features, including but not limited to necessary wildlife habitats, fragile areas, public water supply watersheds, aquifer protection areas, historic and scenic resources, and national landmarks.

5. A development that impairs the continued function of significant regional facilities, including but not limited to Interstate highway systems, waterways, educational institutions, hospitals, recreational facilities, bridges, dams, airports, and trails.

6. A development exceeding the following thresholds:
    a. residential construction where the total proposed housing units exceeds five percent of the total housing count of the host town; or
    b. commercial or industrial construction involving a proposed project, whether phased or not, of 20,000 square feet or more of gross floor area; or
    c. construction of large regional public, private, or nonprofit facilities or utilities within one mile of a municipal boundary.
7. A development that by reason of size, type, timing, or location affects the existing or potential capacity to provide essential or required public services by one or more municipalities adjacent to the municipality where the proposed development is located due to direct and indirect impacts.
8. A development or series of developments located within a limited geographic area; under the control of a single applicant; and developed and planned incrementally over a relatively short period of time, the impacts of which may result in environmental, economic, or social conditions substantially different than any one of these criteria alone.
9. A new or expanded generating or transmission facility, electrical or other, located within one or more municipalities or requiring Public Service Board approval under 30 VSA § 248.

B. Cumulative Development Impacts – Findings

The cumulative impacts of growth from development within a geographic area can result in overall conditions that are more detrimental than the sum of their incremental parts. That is, they have a synergistic effect, rather than an additive effect. Large individual developments have more easily understood impacts that can be mitigated than smaller widespread projects with cumulative impacts. Such cumulative effects are difficult to evaluate when development plans are presented incrementally.

Large individual developments have more easily understood impacts that can be mitigated than smaller widespread projects with cumulative impacts.

For example, a large-scale 200-lot residential subdivision may be presented for review in ten 20-lot increments. The entire subdivision may have a significant impact on ground water supplies in the area. However, as presented, each piece of the total has no identifiable impact. Regardless, as the development segments are completed over time, it becomes increasingly difficult to remedy the problems identified.

Large-scale development that occurs in increments may result in an inability of a municipality or region to adequately provide facilities or services when they are needed. Take the example of a major recreational facility (i.e., ski area) announcing plans for expansion. The project is reviewed and granted permits. Over the next several years, related satellite developments, including vacation homes and commercial establishments, are built. Eventually, the municipality or region finds that its roads and schools or other infrastructure services are strained. Traffic congestion occurs on local or state highways, necessitating substantial capital improvements to relieve the problem. Because of an inability or failure to anticipate the relationships of one project to another as each part of the plan was presented, the burden for the costs to upgrade these facilities or services becomes heavy.

In sum, development that proceeds incrementally has a high potential for ultimately failing to meet the goals of this Plan, the Vermont Municipal Planning and Development Act (24 VSA Chapter 117), and Act 250 (10 VSA Chapter 151).

C. Implementation of Cumulative Development Impact Assessment

TRORC has found that cumulative development can produce environmental, social, and economic impacts that are contrary to purposes of sound and coordinated comprehensive planning and the goals of this Plan. Furthermore, review of developments on an incremental basis may present applicants with problems such as uncertainty about assessments on later stages of related projects or the imposition of conditions to correct situations only partially caused by the actions of a particular applicant.

TRORC firmly supports and recognizes use of cumulative development assessment techniques or processes for the following purposes:

1. to enable orderly growth within the context of the total development in an area;
2. to enable development contributing to an adverse or unreasonable condition to be assessed in accordance with its respective contribution to the problem; and
3. to remove uncertainty in the outcome of the planning and review process for both the applicant and the affected parties.

To utilize the beneficial effect of cumulative development impact assessment as provided for in the Act 250 review process, TRORC supports the following approaches to the extent authorized by administrative or statutory law:

1. Master Plans and Umbrella Permits— a permit procedure requiring receipt of an application for a complex or extended project in its entirety to enable comprehensive review of its overall impacts. This permit procedure would allow the district commission or environmental court to grant limited authority to the applicant to undertake certain phases of the project in the context of the overall project (Land Use Panel Rule 21); and
2. Uniform Conditions on Permits — a process where a district environmental commission establishes special review procedures and conditions for any and all projects proposed within a limited geographic area to enable monitoring of permit conditions where more than one developer is involved. Such a procedure provides for more equitable development of solutions to problems (i.e., apportionment of costs of infrastructure improvements by applying them to more than one developer).

D. Implementation Mechanisms

Adoption of this Plan will be most valuable if accompanied by a program of implementation. This section provides guidelines from which both public and private action can be taken to implement the goals and policies of the Plan. Implementation of the Plan consists of the following mechanisms:

1. regional planning;
2. municipal planning;
3. state agency plans and capital programs;
4. coordination with regional entities;
5. state and national legislative policy processes; and
6. public participation and coordination.

Regional Planning

There are many issues that pass beyond the borders of an individual community and that require a broader level of consideration. Recognizing this, state statute enables regional planning as a way to acknowledge the need for planning and implementation beyond the municipal level. The Regional Plan is, by law, required to uphold Vermont's state planning goals (VSA Title 24, Chapter 117, §4302). Through this Plan, those goals are implemented on a regional level.

While the Regional Plan does not have the same regulatory effect as municipal land use regulations, the policies and recommendations

within this Plan do guide decision making at the state, regional, and local level. Under Act 250, the Regional Plan has a regulatory effect.

Municipal Planning

The Planning and Development Act enables towns to establish planning programs to meet local needs (24 VSA Chapter 117). If a municipality chooses to conduct a planning program, it must follow the statutory requirements in the Act. Section 4302 of the Act sets forth an intent to establish a planning process that will further specific goals. All thirty member towns in the Region have planning programs and planning commissions appointed by the selectboard. Most towns have plans in existence that address most or all of the goals in the Act. Although the planning goals set forth in the Act may not be relevant locally, TRORC believes that all towns should carefully evaluate each of the goals in the Act prior to determining whether or not the goal is appropriate.

Regulatory and non-regulatory implementation tools can be used by municipalities to achieve planning goals. Regulatory approaches include such actions as adopting zoning bylaws, subdivision regulations, impact fees, curb cut permits, health ordinances, noise ordinances, and junkyard ordinances. Non-regulatory approaches can include public facility projects, purchase of development rights to conserve land, or adopting a capital budget to direct local funding and plan ahead for public improvements. Some of these tools are described below.

- ***Bylaws:*** Implementation of the goals expressed as part of the municipal plan can be accomplished through a variety of ways, including bylaws adopted by the towns. Vermont law enables several kinds of bylaws, including bylaws for zoning, site plans, subdivision regulations, unified development, official maps, impact fees, phasing, transfer of development rights, and special or freestanding bylaws (24 VSA Subchapter 7). However, prior to having any land use bylaw, the municipality must have a municipal plan. Also, any bylaw in effect must have the purpose of implementing the Plan and must be in accord with the policies of the Plan (24 VSA Chapter 117 §4401). Since municipal plans are updated every five years, municipalities are required to update their bylaws in a timely manner to reflect those changes.
- ***Capital Budgeting and Programming***: Capital budgeting and programming is also a means of directing local public investments over a five year period to implement community needs as expressed in the Plan. The capital budget and program establishes an order of priority for major capital expenditures and sets forth a means of financing the investments. By having a capital budget and program, municipalities can:
    a. encourage growth and development at a pace that is consistent with its ability to provide services; and
    b. direct change or improvements to public infrastructure and utilities in accordance with the goals and policies set forth in the municipal plan.
- ***Impact Fees:*** Vermont enacted impact fee legislation to enable towns to require the beneficiaries of new development to pay their proportionate share of the costs for capital projects incidental to the impact of the development (24 VSA Chapter 131). The impact fee would require payment by the developer to the town to cover the costs of the capital project attributable to the expenses.

While a few towns in Vermont have established impact fees, no community in the Region has advanced its local planning and has the development activity to enable it to clearly establish the cost of facilities and the relative impact development has on public services. Nevertheless, TRORC believes that the larger towns in the Region will soon begin to evaluate their options for impact fees, particularly when the rate of development in these towns begins

to exceed average levels. While optional, the existence of local planning bylaws enables municipalities to regulate land use within their borders.

Private Sector Conservation and Development

The land developer or conservationist is an important player in the implementation of the Plan. Non-regulatory implementation tools for land conservation include purchase of development rights and coordinated purchase of properties to preserve land that has a clear value to the community. The Vermont Housing and Conservation Board maintains funding for farmland preservation, historic property projects, and land conservation efforts.

State Agency Plans and Capital Programs

State agency planning processes and capital expenditure programs provide an excellent opportunity for the Region's member governments to exercise more control over their future and to improve coordination between various state agencies and local government. As the quality of planning continues to increase at all levels, the ability to promote consistency and coordination will increase concurrently.

If a municipality chooses to conduct a planning program, it must follow statutory requirements.

~24 VSA Chapter 17

Coordination with Regional Entities

TRORC recognizes the function and purpose of regional entities existing in the Region. Vermont law enables the creation of inter-municipal cooperative agreements, compacts, districts, and contracts by municipalities (24 VSA Chapter 121). Under the provision of this law, towns may cooperatively organize to undertake a particular kind of project or service with other towns of similar needs. Given the complexity and economic costs associated with the provision of a required public service by municipalities, such as solid waste disposal or public education, the creation of special purpose units of government within the Region is likely to continue.

TRORC recognizes these regional entities and seeks to work cooperatively with such organizations to ensure that the goals and policies of the Plan are fairly addressed and applied in the long-range planning operations of these entities. Regional entities currently formed in the Region include union school districts, fire and water districts, solid waste districts, and natural resources conservation districts.

Several state and regional nonprofit corporations or organizations exist or operate to provide services or programs within the Region. Activities of these public service organizations are generally complementary and supportive of the general work of this Commission and specific Plan policies. TRORC intends to coordinate with these corporations, to the extent practical, to promote the implementation of this Plan.

State Legislative Policy Processes

In order to improve coordination and management of future growth and development in the Region, planning and decision-making processes between local and state jurisdictions need to be enhanced. TRORC is available and will, to the extent practical, provide the expertise necessary to inform policy makers of possible deficiencies or inadequacies in existing state laws on programs affecting land use and development in this Region.

Public Participation and Coordination

In order to implement the Plan through any or all of the above mechanisms, local officials, agency administrators, policy makers, other governmental organizations, and the private sector must understand the purpose and effect of this Plan on growth and development in the Region. Education of not only those entities

that coordinate daily with TRORC but also the general public as to the Plan's policies and its implementation is essential. Plan implementation without public input is destined to fail. A deliberate effort to involve the public in all aspects of the Plan implementation process is essential.

Education of the public on the overall values of multiple town planning for an area will continue to be an ongoing function of TRORC as it seeks to implement this Plan with others. Specific means of assessing public input will include:

1. newsletters and press releases;
2. TRORC website;
3. social media;
4. public forums;
5. opinion surveys and questionnaires;
6. media announcements and coordination; and
7. education.

Investment in efforts to improve the planning process by involving the public as an integral part of it will build greater consensus for the policies of this Plan and thus improve its implementation.

Bridgewater Better Back Roads Discussion | *Source: TRORC Staff*

Flume Model Demonstration | *Source: TRORC Staff*

E. Implementation of the Plan

This Regional Plan contains extensive goals, policies, and recommendations for action. While the goals and policies frame a state that the Plan seeks to achieve and specify how to reach that state, the recommendations for action are intended to actually implement the policies to reach the goals for the Region. To ensure that the Plan is implemented, an implementation matrix has been developed.

Appendix M: Implementation Matrix, collects a majority of the recommendations for action in this Plan and assigns a party (or parties) responsible for implementation. In addition, a rough timeframe for implementation is established, which is broken out into five groups:

- ASAP — The recommendation for action should be implemented as soon as feasibly possible by the responsible party. These recommendations usually reflect an urgent need.
- Short-term – The responsible party should implement the recommendation for action within 1-3 years of the adoption of this Plan.
- Mid-term – Mid-term recommendations for action should be implemented within 4-8 years of the adoption of this Plan. Recommendations of this nature often require specific funding that will need to be acquired before implementation, have multiple steps that must be taken to reach implementation, or require substantial public

process.

- Long-Term – Recommendations for action that are important to this Plan but may take extensive effort and substantial shifts in policy at multiple levels of government are viewed as long term. Implementation of these action items may take longer than the eight-year life of this Plan.
- Ongoing – A substantial amount of the recommendations for actions contained in this Plan represent the day-to-day work of TRORC and our municipalities. By designating these action items as ongoing, the Regional Plan is acknowledging that these items are always being acted upon to further the goals of the Plan and the State of Vermont.

Estimated costs are broken into three groups:

- Low — less than $10,000
- Moderate — $10,000 to $100,000
- High — more than $100,000

Tracking Progress

An implementation plan is of no use if no action is taken to move forward. Because this is the Two Rivers-Ottauquechee Regional Plan, it falls to TRORC to monitor progress throughout the Plan's eight-year life.

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DEFINITIONS

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Accepted Management Practices (AMP).—Methods of activity generally approved by regulatory authorities and practitioners as acceptable and common to that type of operation. AMPs may not be the best methods, but are acceptable. Agriculture has AMPs typically documented in agency regulations. Other industries may also have AMPs, documented in regulation or not. Professional associations often list AMPs or similarly named methods of conduct for their members.

Active Living.—Active living is a way of life that integrates physical activity in daily routines.

Active Transportation.—Active transportation refers to any form of human-powered transportation: walking, cycling, using a wheelchair, in-line skating, or skateboarding. There are many ways to engage in active transportation, whether it is walking to the bus stop or cycling to school/work.

Adaptive Reuse.—The development of a new use for an older building or for a building originally designed for a special or specific purpose.

Affordable Housing.—According to 24 VSA §4303, affordable housing means either of the following, based on tenure:

a. Housing that is owned by its inhabitants whose gross annual household income does not exceed eighty percent of the county median income, or eighty percent of the standard metropolitan statistical area income if the municipality is located in such an area, as defined by the United States Department of Housing and Urban Development, and the total annual cost of the housing, including principal, interest, taxes, insurance, and condominium association fees, is not more than thirty percent of the household's gross annual income.
b. Housing that is rented by its inhabitants whose gross annual household income does not exceed eighty percent of the county median income, or eighty percent of the standard metropolitan statistical area income if the municipality is located in such an area, as defined by the United States Department of Housing and Urban Development, and the total annual cost of the housing, including rent, utilities, and condominium association fees, is not more than thirty percent of the household's gross annual income.

Aging in Place.—Allows individuals to remain at home or within a supportive living community as they age, without requiring the need to move as their needs increase over time.

Agriculture.—The production, keeping, or maintenance, for sale, lease, or personal use, of plants and animals useful to man, including but not limited to: forages and sod crops; grains and seed crops; dairy animals and dairy products, poultry, and poultry products; livestock, including beef cattle, sheep, swine, horses, ponies, mules, or goats, or any mutations or hybrids thereof, including the breeding and grazing of any or all of such animals; bees and apiary products; fur animals; trees and forest products; fruits of all kinds, including grapes, nuts, and berries; vegetables; nursery, floral, ornamental, and greenhouse products; or lands devoted to a soil conservation or forestry management program.

Archeological Site.—Land or water areas which show evidence or artifacts of human, plant, or animal activity, usually dating from periods of which only vestiges remain.

Aquifer Protection Area (APA).—The surface and subsurface area contributing significantly to the surface and/or subsurface recharge and maintenance of an aquifer. APAs can often include upland watersheds of surface waters contributing significantly to the maintenance and operation of aquifers below the surface or downstream.

Assimilative Capacity Study.—Scientifically valid research documenting the physical, cultural, economic, ecological, or other characteristics of an area or site and that area's or site's ability to host different changes to its characteristics before significant alterations in its function or character are created.

Base Flood Elevation (BFE).—The water surface elevation resulting from a flood that has a 1 percent chance of equaling or exceeding that level in any given year. On the Flood Insurance Rate Map the elevation is usually in feet, in relation to the National Geodetic Vertical Datum of 1929, the North American Vertical Datum of 1988, or other datum referenced in the Flood Insurance Study report, or the average depth of the base flood, usually in feet, above the ground surface.

Best Available Technology (BAT).—Methods and products for design, operation, maintenance, retrofit, and function of activities which will result in the best reduction of undesired byproducts or effects currently achievable. BAT achievability is based upon the owner/operator's ability to implement the methods or products within their economic means. This type of technology is usually considered to be the "state-of-the-art" and achieves the best performance available.

> EXAMPLES: Woodstoves achieving best EPA particulate standard performance, highest efficiency factory stack scrubbers, water treatment systems producing water of same or higher quality as the receiving water body.

Best Management Practices (BMP).—Methods of activity generally established by regulatory authorities and practitioners as the best manner of operation. BMPs are generally more stringent than AMPs. BMPs may not be established for all industries or in agency regulations, but are often listed by professional associations and regulatory agencies as the best manner of operation for a particular industry practice.

Best Practical Technology (BPT).—Methods and products for design, operation, maintenance, retrofit, and function of activities which will result in the best reduction of undesired byproducts or effects within the practical means of the owners/operators while providing a practical cost/benefit ratio. For example, removing ninety-eight percent of a pollutant from a waste stream may be practical, but removing the last two percent may be impractical for the cost required and the relatively insignificant gain in cleanliness.

> EXAMPLES: Woodstove operation schedule rotations, catalytic converter retrofits for woodstoves versus mandatory stove upgrades, artificial wetland pretreatment of agricultural runoff versus onsite treatment plant investment or storage/hauling.

Built Environment.—The built environment includes all of the physical parts of where we live and work (e.g., homes, buildings, streets, open spaces, and infrastructure).

Build-out.—An estimate of the projected population, employment, traffic, utilities, and types/sizes of land uses in a project area or other designated area in accordance with the current zoning and other applicable regulations.

Capital Improvements Program (CIP).—A proposed timetable or schedule of all future capital improvements to be carried out during a specific period and listed in order of priority, together with cost estimates and the anticipated means of financing each project.

Class A and B Waters.—Class A waters are managed for enjoyment of water in its natural condition, as public drinking water supplies (with disinfection and filtration) or as high quality waters which have significant ecological values. Class B waters are managed for aesthetic values, recreation on and in the water, public water supply with disinfection and filtration, high quality habitat for aquatic biota, fish, and wildlife, irrigation and other agricultural uses. The Secretary of the Agency of Natural Resources may designate by permit portions of Class B waters as "Mixing Zones," or "Waste Management Zones," for any waste that has been properly treated to comply with federal and state effluent requirements.

Cluster.—A development design technique that concentrates building in specific areas on the site to allow the remaining land to be used for recreation, common open space, and preservation of environmentally sensitive features.

Cultural Facilities.—Establishments such as museums, art galleries, and botanical and zoological gardens of a historic, educational, or cultural interest which are not operated commercially.

Designated Growth Centers.—A state designation as defined by 24 VSA 76A § 2793c.

Dwelling, Commercial.—A commercial residential building, including but not limited to a nursing home, group home, residential care facility, or dormitory, which traditionally has common space and staff on site and in which rooms may not have all of the components of a dwelling unit and are not meant for transient occupation. An apartment building is a multi-family dwelling.

Dwelling, Single Family.—A detached building used as a single dwelling unit.

Dwelling, Two-Family.—A building containing two dwelling units. "Duplex" is synonymous with this definition.

Dwelling, Multi-Family.—A building containing three or more dwelling units that is not a commercial dwelling.

Dwelling Unit.—One or more rooms, connected together, constituting a separate independent housekeeping establishment that is physically separate from other dwelling units that may be in the same structure, and containing facilities for its own independent living, including a toilet, lavatory, food preparation/kitchen facilities, and one or more bedrooms. The term shall not include rooms with such provisions intended for transient occupation in boarding houses, dormitories, hotels, or other similar buildings.

Dwelling Unit, Accessory (ADU).—Efficiency or one-bedroom apartments that are clearly subordinate to a single-family dwelling, with facilities and provisions for independent living (e.g., sleeping, food preparation, and sanitation). These units must comply with the following:

a. Have sufficient wastewater capacity.
b. Do not exceed 30 percent of the total habitable floor area of the single-family dwelling they are subordinate to.

Environmentally Significant Wetland.—Those wetlands designated by the Vermont Water Resources Panel as "Significant Wetlands," and those other wetlands designated as "significant" according to the wetlands designation rules are included in this category. As of February 23, 1990, the Water Resources Panel classified wetlands into three (3) groups. Classes 1 and 2 are "Significant Wetlands." Most of those wetlands designated on the National Wetlands Inventory (NWI) Maps are identified as Class 2 wetlands. Those wetlands contiguous to the mapped NWI wetlands are also included as Class 2 wetlands. Any wetland meeting the minimum criteria for significance established by the Water Resources Panel or a town may be included in this category.

Establishment.—A commercial business that operates within a building or structure. A single building or structure can contain more than one distinct establishment.

Expansion Areas.—Land that extends the cohesive core of Regional Growth Areas or Designated Downtowns, Villages, or Growth Centers, with or without the presence of municipal sewer or water service. The land should be adjacent, as defined in 24 VSA §2791, to the cohesive core.

Fixed Route Service.—A transportation service that travels along a predetermined route, with known stops, according to an established time schedule.

Flood Insurance Rate Map (FIRM).—Official map of a community, on which the Federal Insurance Administrator has delineated both the Special Flood Hazard Areas and the risk premium zones applicable to the community. In some communities the hazard boundaries are available in paper, pdf, or Geographic Information System formats as a Digital Flood Insurance Rate Map (DFIRM).

Floodplain.—Areas where excessive water flows over river banks and beyond shorelines, temporarily dispersing water, sediment, and energy.

Floodway.—A portion of the Special Flood Hazard Area, as mapped for the National Flood Insurance Program, that has protections for the movement of flood waters. Floodway means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot at any point.

Fluvial Erosion.—Erosion caused by streams and rivers. Fluvial erosion can be catastrophic when a flood event causes a rapid adjustment of the stream channel size and/or location.

Forest-Based Resource Area.—As used in this Plan, "Forest-Based Resource Area" means the future land use area identified as such in the Regional Future Land Use Area Map, and is a regional land use designation.

Forest Block.—A contiguous area of forest in any stage of succession and not currently developed for non-forest use. A forest block may include recreational trails, wetlands, or other natural features that do not themselves possess tree cover, and uses exempt from regulation under subsection 4413(d) of Title 24.

Forest Fragmentation.—The division or conversion of a forest block by land development other than by a recreational trail or use exempt from regulation under subsection 4413(d) of Title 24.

Formula Retail. – A type of retail store that is part of a chain of stores (more than 2) where the establishment maintains two or more of the following features: a standardized array of merchandise, a standardized facade, a standardized decor and color scheme, a uniform apparel, standardized signage, or a trademark or a servicemark.

Habitat Connector.– Land or water, or both, that links patches of wildlife habitat within a landscape, allowing the movement, migration, and dispersal of animals and plants and the functioning of ecological processes. A habitat connector may include recreational trails and uses exempt from regulation under subsection 4413(d) of Title 24 VSA. Synonymous with wildlife corridor.

Hamlet.– As used in this Plan, "Hamlet" or "Hamlet Area" means the general future land use area identified as such in the Regional Future Land Use Area Map and as specified in more detail in Town Plans, and is a regional land use designation for locally important groupings of buildings that are generally residential in nature, with a few stores and businesses supported primarily by local residents. Hamlets are not regional markets or trade centers, but minor community facilities and services sometimes are located in these areas.

Heavy Industrial.– As used in this Plan, "heavy industrial" means the processing or assembly of natural or man-made materials or products where such activity generally results in off-site impacts, such as noise, and where such activity and storage of materials or products are typically not fully enclosed inside a building or screened from the abutting properties. Examples: rail and truck terminals; concrete, asphalt, or brick plants; bulk fuel storage and distribution facilities; solid waste facilities; foundry, etc.

Impervious Surface.–Any hard-surfaced, man-made area that does not readily absorb or retain water, including but not limited to building roofs, roadways, parking and driveway areas, graveled areas, sidewalks, and paved recreation areas.

Inclusionary Zoning.–Inclusionary zoning bylaws require a specified percentage of housing units in new planned unit development or subdivision to meet certain affordability standards, and comply with the following:

a. Conform with municipal plan housing policies.
b. Be determined based on municipal affordable housing needs, both rental and for sale.
c. Include development incentives that contribute toward the economic feasibility of providing affordable housing units (ex: density bonuses and waivers).
d. Require that, once built, affordable housing availability will be maintained through income qualification for residents, the promotion of affirmative marketing, and rent and resale pricing that remains affordable for a specified period of time on designated affordable units, as written in municipal bylaws.

Industrial Area.– As used in this Plan, "Industrial Area" means the future land use area identified as such in the Regional Future Land Use Area Map, and is a regional land use area designation of land that is appropriate due to local plans, designs, and zoning as a location for one or more industrial buildings or uses, that may include adequate access roads, utilities, water, sewer, and other services necessary for the uses of the industrial buildings, and includes no principal retail use except that which is incidental to an industrial use. Industrial uses in this area may include both light industrial and heavy industrial uses.

Industrial. – As used in this Plan, "industrial" includes light industrial and heavy industrial.

Interchange.–A grade separated system of access to and from major highways.

Intermodal.–Transportation by more than one means of conveyance: as by foot, bike, car, truck, rail, air, etc.

Land-Intensive Commercial Uses.–As used in this Plan, "land-intensive commercial uses" are commercial operations that rely on large amounts of indoor or outdoor storage as the dominant use of space, and include, but are not limited to, sales lots and warehouses, but do not include retail stores.

Level of Service (LOS).–Level of service is a qualitative measure defined as the ability of a maximum number of vehicles to pass over a given section of roadway or through an intersection during a specified time period, while maintaining a given operating condition.

1. **LOS A.**–Highest LOS, which describes primarily free-flow traffic operations at average travel speeds. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delay at intersections is minimal.
2. **LOS B.**–Represents reasonably unimpeded traffic flow operations at average travel speeds. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tensions.
3. **LOS C.**–Represents stable traffic flow operations. However, ability to maneuver and change lanes may be more restricted than in LOS B, and longer queues and/or adverse signal coordination may contribute to lower average travel speeds. Motorists will experience an appreciable tension while driving.
4. **LOS D.**–Borders on a range in which small increases in traffic flow may cause substantial increases in approach delay and, hence, decreases in speed. This may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combinations of these.
5. **LOS E.**–This represents traffic flow characterized by significant delays and lower operating speeds. Such operations are caused by some combination of adverse progression, high signal density, extensive queuing at critical intersections, and inappropriate signal timing.
6. **LOS F.**–This represents traffic flow characterized by extremely low speeds. Intersection congestion is likely at critical signalized locations, with high approach delays resulting. Adverse signal progression is frequently a contributor to this condition.

Light Industrial.–As used in this Plan, "light industrial" means a use involving research and development, assembly, processing, manufacturing, packaging of products, or storage and warehousing of materials or goods, conducted primarily within a building with few off-site impacts other than trucking.

> EXAMPLES: cabinetry or woodworking shop, food processing, electronics high-tech manufacturing or assembly, machine shop, sewing, printing, research and testing laboratory, warehousing, and similar uses.

Major Development.–Development that meets any one of the eight specific criteria that qualify a development as resulting in substantial regional impact (see Chapter 14, section A) according to this Plan.

Maximum Peak Hour Service Volume.–The maximum number of vehicles which have a reasonable expectation of passing over a given roadway section or through a given intersection under prevailing road and traffic conditions during a specified hour of time.

Mixed-Use Area. – As used in this Plan, "Mixed-Use Area" means the future land use area identified as such in the Regional Future Land Use Area Map, and is a regional land use area designation of land with a mixture of existing uses that is served by state highways, is generally multi-story, includes residential uses and deep lots, and is within walking distance of Regional Growth Areas. This Area is appropriate for recreational facilities, higher density residential, light industrial/manufacturing, land-consumptive commercial uses, service businesses, secondary retail, and uses not appropriate for the core of downtowns and villages, such as lumberyards, nurseries, warehouses, and kennels. Principal retail establishments are not allowed in this area.

NFIP.–National Flood Insurance Program.

No Adverse Impact.—No Adverse Impact floodplain management is where the action of one property owner does not adversely impact the rights of other property owners, as measured by increased flood peaks, flood stage, flood velocity, and erosion and sedimentation.

Open Space.—Any parcel or area of land or water essentially unimproved and set aside, dedicated, designated, or reserved for public or private use or enjoyment, or for the use and enjoyment of owners and occupants of land adjoining or neighboring such open space.

Peak Hour.—As it is used in describing traffic volumes, it represents the hour of a twenty-four hour period in which the highest traffic volumes occur on a segment of roadway or at an intersection.

Passive Outdoor Recreation.—Leisure time activities which use an outdoor public or private space that are not dependent upon structural facilities such as swimming pools, ball courts, etc.

Planned Unit Development (PUD).—Planned unit development is a design approach that balances intensive settlement with open land. Also known as "clustered housing," developments can be designed to conserve energy; depending on the nature of construction, savings can be accrued on construction costs. PUDs facilitate efficient provision of municipal services such as fire protection, school transportation, and road construction or maintenance. The undeveloped open space reserved in PUDs is an asset for the landowners and municipalities. PUD design strategies should be employed in planning for development or subdivision of rural land in the Region.

Principal.—Means foremost or chief.

Principal (Primary) Retail.—As used in this Plan, "principal (primary) retail" means a use whose primary use is the supply of merchandise or wares to the end consumer for use off site. Examples include (but are not limited to) supermarkets, hardware stores (without lumberyards), dry-goods stores, pharmacies, big box stores, etc. Principal retail does not include online sales with no product on site, land-consumptive intensive and resource-based commercial uses, service businesses, restaurants, retail as a home occupation, or secondary retail.

Pristine Waters.—Those waters having Class A status and those waters predominantly in their natural state relatively unaffected by human activity physically or aesthetically. Undeveloped lakes and ponds may be included in this category, as would streams and rivers unaffected by human activity. Pristine waters are generally accepted to be the finest unspoiled natural water bodies or other waters with Class A qualities.

Recreational Trail.—A corridor that is not paved and that is used for hiking, walking, bicycling, cross-country skiing, snowmobiling, all-terrain vehicle riding, horseback riding, and other similar recreational activity.

Regional Center.— As used in this Plan, "Regional Center" means the future land use area identified as such in the Regional Future Land Use Area Map, and is a regional land use designation of an urban area where development is highly concentrated with a diverse mix of uses, where public sewer and water utilities exist, transportation infrastructure is capable of handling significant volumes of commuting and commercial traffic, sidewalks and transit are present, and buildings are often multi-story, particularly in the core of the area. Uses in the area include offices, principal retail, light industrial, residential, governmental and judicial functions, hospitals, schools, and cultural facilities. This area is identical to the State Designated Growth Center for Hartford.

Regional Growth Area.—As used in this Plan, "Regional Growth Area" means any regional center, town settlement, village, or hamlet future land use areas.

Regionally Significant Transportation Facilities.—Any facility primarily designed to rapidly and efficiently transport goods and passengers between towns and/or regions.

Resilience.—The ability of a system, community, region, or society exposed to hazards to resist, absorb, accommodate to, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Resource-Based Commercial Uses.— As used in this Plan, "resource-based commercial uses" means certain uses and any associated structures such as sawmills, quarries, and sandpits, outdoor recreation, nurseries, and agricultural product processing that are dependent on resources at the site or coming from Rural Areas or Forest-Based Resource Areas and may include retail of products produced on site.

Riparian Buffer.—A vegetated area (a "buffer strip") near a stream, usually forested, which helps shade and partially protect a stream from the impact of adjacent land uses. It plays a key role in increasing water quality in associated streams, rivers, and lakes, thus providing environmental benefits. With the decline of many aquatic ecosystems due to agricultural production, riparian buffers have become a very common conservation practice aimed at increasing water quality and reducing pollution.

River Corridor.—The land area adjacent to a river that is required to accommodate the dimensions, slope, platform, and buffer of the naturally stable channel, and necessary to maintain or restore fluvial equilibrium conditions and minimize fluvial erosion hazards, as delineated by the Agency of Natural Resources in accordance with river corridor protection procedure.

Rural Area.—As used in this Plan, "Rural Area" means the future land use area identified as such in the Regional Future Land Use Area Map, and is a regional land use designation.

Secondary or Ancillary Retail.—A business whose primary use is not retail sales but contains a retail component that is clearly secondary to the primary use. Examples include (but are not limited to) eye doctor's offices, veterinarian's offices, small engine repair shops, manufacturers with a small showroom, etc. The term also includes retail within a multi-story, mixed-use building in a Mixed-Use Area where any total retail floor space is less than the total residential floor space, and any individual retail use does not exceed 4,000 square feet.

Service Business.—Any establishment whose primary activity is the provision of services and retail associated with that service assistance, as opposed to the sole provision of products to individuals, businesses, industry, government, or other enterprises. Such businesses include fuel distributors, auto body shops, storage units, vehicle and tire sales with repair, heavy equipment and small engine sales with repair, landscaping contractors with a yard that has trees and mulch available, etc.

Smart Growth Principles.—Growth that:

a. Maintains the historic development pattern of compact village and urban centers separated by rural countryside;
b. Develops compact mixed-use centers at a scale appropriate for the community and the region;
c. Enables choice in modes of transportation;
d. Protects the state's important environmental, natural, and historic features, including natural areas, water quality, scenic resources, and historic sites and districts;
e. Serves to strengthen agricultural and forest industries and minimizes conflicts of development with these industries;
f. Balances growth with the availability of economic and efficient public utilities and services;
g. Supports a diversity of viable businesses in downtowns and villages;
h. Provides for housing that meets the needs of a diversity of social and income groups in each community;
i. Reflects a settlement pattern that, at full build-out, is not characterized by:
    - Scattered development located outside of compact urban and village centers that is excessively land consumptive;
    - Development that limits transportation options, especially for pedestrians;
    - The fragmentation of farm and forest land;
    - Development that is not serviced by municipal infrastructure or that requires the extension of municipal infrastructure across undeveloped lands in a manner that would extend service to lands located outside compact village and urban centers;
    - Linear development along well-traveled roads and highways that lacks depth, as measured from the highway.

Soils, Primary Agricultural.—A farmland soils map unit that the Natural Resources Conservation Service of the U.S. Department of Agriculture (NRCS) has identified and determined to have a rating of prime or statewide significance. For the purposes of this Plan, Prime Agricultural Land is synonymous with this definition.

Soils, Productive Forest.—Those soils which are not primary agricultural soils but which have a reasonable potential for commercial forestry and which have not been developed. In order to qualify as productive forest soils, the land containing such soils shall be of a size and location, relative to adjoining land uses, natural condition, and ownership patterns, so that those soils will be capable of supporting or contributing to a commercial forestry operation. Land use on those soils may include commercial timber harvesting and specialized forest uses such as maple sugar or Christmas tree production.

Source Protection Area (SPA).—The surface and subsurface area surrounding a public water source system, through which contaminants are likely to move toward and reach the water well or well-field during normal pumping activity. Synonymous with "Wellhead Protection Area" (WHPA). Most often delineated by the Vermont Department of Health.

Special Flood Hazard Area.—Synonymous with "area of special flood hazard." The floodplain within a community subject to a 1 percent or greater chance of flooding in any given year. This area is usually labeled Zone A, AO, AH, AE, or A1-30 in the most current flood insurance studies and on the maps published by the Federal Emergency Management Agency. Please note, where floodways have been determined, they may be shown on separate map panels from the Flood Insurance Rate Maps.

Sprawl.—Dispersed auto-dependent development occurring outside of compact urban and village centers, along highways, and in rural countryside. Sprawl is typically characterized by:

a. Excessive land consumption;
b. Low densities in comparison with older centers;
c. Lack of choice in ways to travel;
d. Fragmented open space, wide gaps between development, and a scattered appearance;
e. Lack of choice in housing types and prices;
f. Separation of uses into distinct areas;
g. Repetitive one-story development;
h. Commercial buildings surrounded by acres of parking;
i. Lack of public spaces and community centers.

Strip Development.—Linear commercial development along an arterial highway leading from an urban or village center or connecting two centers. Strip development has many characteristics, not all of which need to occur for strip development to be present. The characteristics of strip development include, but are not limited to, the following:

a. Use of individual curb cuts for each project along the highway;
b. Lack of connections between the projects, except for the highway connection;
c. One-story buildings containing a single type of use;
d. Little to no pedestrian circulation between projects on the strip;
e. Accessibility of individual projects primarily to automobiles;
f. Separation of projects by parking lots;
g. Individual project design, signage, lighting, parking, and landscaping; lack of coordination between projects concerning these items, causing cluttered appearance;
h. Narrow depth and broad street frontage of project parcels to take advantage of exposure on the arterial highway.

Substantial Regional Impact.—A threshold for review under Act 250 and precedence of this Regional Plan as defined in Section XIV(A) of this Plan under the authority of VSA Title 24, Chapter 117 §4345a(17).

Structure.—An assembly of materials for occupancy or use.

Tax Increment Financing (TIF).—Provides authority for municipalities to bond for indebtedness due to infrastructure improvements within a TIF District.

Town Center.— As used in this Plan, "Town Center" means the future land use area identified as such in the Regional Future Land Use Area Map, and is a regional land use designation that contains a concentrated mix of uses at a high level of density. They are areas where central public utilities for water and/or sewer are available and where there exists a central location for commercial activities, schools, and cultural and civic activities for the town and the surrounding communities. Uses in the area include offices, principal retail, light industrial, residential, governmental, clinics, schools, and cultural facilities.

Transit Development Plan (TDP).—A regionally developed transit plan approved by the Agency of Transportation which outlines passenger transportation needs and quality of service in the region. The TDP's goals are to be incorporated into the transportation elements of Regional Plans prepared by regional planning commissions.

Transportation Improvement Program (TIP).—A staged, multi-year, intermodal program of transportation projects, funded by the Federal Highway Administration or Federal Transit Administration, which are consistent with the Statewide Long Range Transportation Plan and its planning processes.

Traveler Services.—Establishments whose primary purpose is to assist road travelers. These establishments would provide easy access to fuel, prepared food, restroom facilities, commuter parking, lodging, or travel information. Establishments that fall under this definition do not include primary or principal retail establishments such as supermarkets, hardware stores, dry-goods stores, pharmacies, or big box stores.

Universal Design.—Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

Unnatural Conversion.—Man-made successional changes in physical or biologic communities such as logging, development, mining, reduction of habitat continuity or composition, or other actions altering the natural process of ecological change normally occurring in an area.

Use.— As used in this Plan, "use" is a commercial, public, nonprofit, or private entity, and any associated structures, operating on lands and/or in a building or part thereof. Synonymous with "establishment."

Village Settlement.— As used in this Plan, "Village Settlement" or "Village Settlement Area" means the future land use area identified as such in the Regional Future Land Use Area Map, and is a regional land use designation for a compact settlement that normally consists of a mix of uses, including principal retail, at medium to high densities based on the availability of municipal water and/or sewer. Unlike Regional Centers and Town Centers, Village Settlements are not regional markets or trade centers and typically serve a local clientele and visitors.

Wetland.—Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Workforce Housing.—Affordable housing that is in close proximity to employment centers and is typically associated with members of the community who are gainfully employed in roles that may require advanced certification or degrees, including police officers, nurses and other medical staff, and school teachers.

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APPENDICES

Note: *Appendices A through L can be found at www.trorc.org. (Direct links are included here.)*

Appendix A: Transit-Dependent Demographic Groups by Town

https://www.trorc.org/wp-content/uploads/2019/05/Appendix-A-Transit-Dependent-Demographic-Groups-by-Town.pdf

Appendix B: Regional Special Road Designations

https://www.trorc.org/wp-content/uploads/2019/05/Appendix-B-trorc_specialroads.pdf

Appendix C: Hartford U.S. 4 Corridor Management Plan and U.S. 4 West Corridor Management Plan

https://www.trorc.org/wp-content/uploads/2019/05/Appendix-C-US4HartfordCorridorMgmt.pdf

https://www.trorc.org/wp-content/uploads/2019/05/Appendix-Ca-CorridorUS4West.pdf

Appendix D: Transportation Corridors Overview

https://www.trorc.org/wp-content/uploads/2019/05/Appendix-D-Transportation-Corridors-Appendix-for-Public-Hearing.pdf

Appendix E: Project Prioritization

https://www.trorc.org/programs/transportation/project-prioritization/

Appendix F: Homes in the Region Chapter Tables

https://www.trorc.org/wp-content/uploads/2020/08/Appendix-F-Homes-in-the-Region-Chapter-Tables.pdf

Appendix G: Housing Needs in East Central Vermont

https://www.trorc.org/wp-content/uploads/2019/05/Appendix-G-HousingNeedsinEastCentralVermont2013_3-21-14.pdf

Appendix H: Vermont Affordable Housing Programs

https://www.trorc.org/wp-content/uploads/2019/05/Appendix_H_Vermont-Affordable-Housing-Programs.pdf

Appendix I: Regional Forest Stewardship Report 2012

https://www.trorc.org/wp-content/uploads/2019/05/Appendix-I-TRORC-Regional-Forest-Stewardship-Report-2012-reduced.pdf

Appendix J: LEAP Outputs and Methodology

https://www.trorc.org/wp-content/uploads/2019/05/Appendix-J-TRRPC-LEAP-Outputs-and-Methodology_withcover2019.pdf

Appendix K: TRORC Energy Targets

https://www.trorc.org/wp-content/uploads/2020/08/Appendix-K_Energy_Targets_.pdf

Appendix L: Guide to Farming-Friendly Solar

https://www.trorc.org/wp-content/uploads/2020/08/Appendix_L_Guide-to-Farming-Friendly-Solar_07_26_17.pdf

Coolidge Homestead, Plymouth | ©J ohn Knox

Appendix M: Implementation Matrix

HEALTHY COMMUNITIES: CHAPTER 2					
Action	**Lead/ Partner**	**Estimated Cost**	**Timeline**	**Priority**	**Potential Financing**
Community Design, the Built Environment, and Land Use					
TRORC should work with Vermont legislators to create a public health element in 24 VSA § 4382.	TRORC/VDH	Low	Ongoing	Medium	Various
TRORC should organize and host a regional public health summit.	TRORC/VDH	Low	Ongoing	Medium	Various
Healthy Food Access					
Municipalities should connect with the Vermont Farm to Plate and Farm to School networks to see how they can best promote the consumption of locally grown foods to their residents.	Municipalities	Low	Ongoing	Medium	Various
TRORC and/or the State should create mapping resources, showing: A) Locality of grocers, convenience stores (if healthy food options are offered), farmers markets, farms, agricultural institutions, community gardens, food banks, and food pantries. B) Transportation routes and types to food retail and food shelves. C) Location of low-income census tracts.	TRORC/State	High	Long-term	Medium	Various
Municipalities should develop incentives such as local tax breaks for small or convenience store owners to stock healthy and local options.	Municipalities	Low	Long-term	Low	Municipal
Municipalities should promote and expand farmers markets and community gardens by identifying ideal locations for such activities and letting potential organizers know of these locations.	Municipalities	Low	Ongoing	Low	Various
TRORC and municipalities should educate state and local policymakers on connections between food access and nutrition.	TRORC/ Municipalities	Low	Ongoing	Medium	Various
Municipalities should support the preservation of large, contiguous blocks of productive agricultural land.	Municipalities	N/A	Ongoing	Medium	N/A
Municipalities should work jointly with other jurisdictions to preserve agricultural land.	Municipalities	N/A	Ongoing	Medium	N/A
TRORC should conduct a food system analysis for the Region.	TRORC/NGOs	Moderate	Long-term	Low	Various
Healthy Homes					
The Vermont Department of Health should provide community assessment, testing sites, and remediation programs for housing-related illnesses (high blood lead levels, respiratory conditions, and skin disease).	State	High	Long-term	High	Various

HEALTHY COMMUNITIES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
The Vermont State Housing Authority and other housing entities should educate policymakers on the relationship of poor housing conditions to health outcomes.	State/Other	Low	Ongoing	Medium	ACCD/ Municpal Dues
TRORC will advocate for project approval processes that reflect the Housing Resources chapter's housing-needs allocation for all income levels.	TRORC	Low	Ongoing	Medium	Various
TRORC and municipalities should participate in health impact assessments of proposed housing developments.	TRORC/ Municipalities	Low	Ongoing	Low	Various
Municipalities should support efforts to structure community design, housing, and health care to meet the needs of seniors and those with disabilities.	Municipalities	Moderate	Mid-term	Medium	Grants
Municipalities should work with local housing authorities to create a variety of housing types and maintenance options.	Municipalities	Low	Ongoing	High	Various
The State and housing organizations should promote healthy home renovation and construction.	State/Other	High	Ongoing	High	State/ Private
Environmental Health and Justice					
TRORC will advocate for implementation of the State's greenhouse gas reduction plans.	TRORC	Low	Ongoing	Medium	Various
TRORC and municipalities should participate in the review of environmental impact reports.	TRORC	Low	Ongoing	Medium	Various
TRORC and municipalities should advocate for and participate in health impact assessments.	TRORC	Low	Ongoing	Medium	Various
Municipalities should prioritize the reuse and remediation of brownfields.	Municipalities	N/A	Ongoing	High	N/A
Municipalities should require new development and significant additions to existing development to provide adequate tree canopy to improve or maintain environmental health.	Municipalities	N/A	Ongoing	Low	N/A
TRORC and municipalities will continue to advocate for plentiful, high-quality drinking water.	TRORC/ Municipalities	N/A	Ongoing	Medium	N/A
The State and municipalities must protect water quality of rivers, streams, lakes, and wetlands.	TRORC/State	Moderate	Ongoing	High	State
Healthy Natural Environment					
TRORC should work with municipalities to distribute information on Lyme disease and prevention.	TRORC	Low	Ongoing	Low	N/A

HEALTHY COMMUNITIES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC should work with municipalities on climate change mitigation strategies.	TRORC	Moderate	Mid-term	Medium	Various
Active Living and Transportation					
The State and/or TRORC should map neighborhoods and advocate for connectivity to essential services, walkable routes, recreational opportunities, and transportation options.	TRORC/State	Moderate	Long-term	Low	VTrans
TRORC and municipalities should plan for bike-friendly state highways to connect village centers.	TRORC/VTrans/ Municipalities	High	Ongoing	Low	VTrans
Municipalities should conduct walkability and bikability assessments.	TRORC	Low	Ongoing	Low	VTrans
TRORC should work with local jurisdictions to adopt bike and pedestrian master plans.	TRORC/ Municipalities	Moderate	Ongoing	Low	Various
The State and TRORC will educate decision makers on links between safe streets and health.	TRORC/State	N/A	Ongoing	Medium	N/A
TRORC will collaborate with local agencies and communities to implement Safe Routes to Schools programs and Vermont's Complete Streets program.	TRORC/State/ Municipalities	Moderate	Ongoing	High	VTrans
Municipalities should promote joint use of park and recreation facilities between communities.	Municipalities	N/A	Ongoing	Low	N/A
Municipalities should promote existing trails.	Municipalities	N/A	Ongoing	Medium	N/A
Social Inclusion					
Municipalities should map public gathering spaces and indicate their levels of accessibility.	Municipalities	N/A	Ongoing	Low	N/A
Public health professionals should educate decision makers on the link between social support and health.	Other	N/A	Ongoing	Medium	N/A
Municipalities should consider accessibility when developing public spaces or recreational opportunities.	Municipalities	High	Ongoing	High	Various
The State and TRORC will provide training for neighborhood residents to participate in boards and commissions.	TRORC/State	Low	Short-term	High	Various
Substance Misuse Prevention					
With the help of public health professionals, municipalities should assess the types of problem within their community.	TRORC/ Municipalities/ VDH	High	Ongoing	Low	VTrans
Municipalities should raise awareness of the nature and seriousness of health issues.	Municipalities	Low	Ongoing	Medium	N/A
Municipalities should assess the community's readiness for prevention.	VDH	Low	Ongoing	Medium	N/A

HEALTHY COMMUNITIES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Municipalities should review current programs already in place.	Municipalities / VDH	Low	Ongoing	Medium	N/A
Municipalities should convene community organizations who serve youth and local leaders to capture ideas and resources to help implement and sustain research-based programs.	Municipalities	N/A	Short-term	Low	N/A
Municipalities should provide plenty of healthy recreational opportunities for youth and overall community participation.	Municipalities	N/A	Short-term	High	N/A
Health-Care Facilities					
TRORC should identify areas of the Region where medical or elderly care facilities would be beneficial.	TRORC	Low-Moderate	Short-term	High	Various
TRORC should review local zoning and subdivision regulations to ensure that they do not have the effect of prohibiting health-care or elderly or other vulnerable populations care facilities from appropriate areas and should assist with revisions as needed.	TRORC	Low	Ongoing	High	Various

LAND USE: CHAPTER 3

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Rural Areas					
TRORC will work with towns and developers to site housing in Rural Areas to meet housing needs. (See also the Homes in the Region chapter.)	TRORC/ Municipalities	Moderate	Ongoing	High	Various
TRORC will work to ensure that agriculture in these areas remains an important part our economy. (See also the Working Landscape chapter.)	TRORC/Dept of Ag	N/A	Ongoing	Medium	Various
TRORC will work with towns, state and federal agencies, and conservation organizations to conserve important forest and agricultural lands.	TRORC/Dept of Ag	N/A	Ongoing	Medium	Various
TRORC will work with member towns on Town Plans and bylaws to address development in the Rural Areas so that it meets state planning goals and the desires of towns.	TRORC/ Municipalities	Low	Ongoing	Medium	State
Forest-Based Resource Areas					
As habitat data is updated, TRORC will re-evaluate this land use area to ensure that its purposes are being met.	TRORC	Low	Mid-term	Low	N/A
TRORC will work to ensure that the functions of these areas are economically valued so that both the towns containing them and their owners have incentives to leave them in a largely undeveloped state.	TRORC	Low	Ongoing	Medium	N/A
TRORC will work with state and federal agencies and conservation organizations to conserve these lands in ways that also support the local economy and bring value to landowners.	TRORC/ANR/NGOs	Moderate	Ongoing	Medium	Federal/ State
TRORC will work with member towns on Town Plans and bylaws that will address smaller development not subject to Act 250 so that it is done in ways that preserve the functions of these areas while allowing compatible development.	TRORC/ Municipalities	Low	Ongoing	Medium	State
Flood Resilience					
TRORC will work with towns to strengthen their Flood Hazard Bylaws in order to mitigate risks to public safety, critical infrastructure, historic structures, and municipal investments from inundation and erosion.	TRORC/ANR	Low	ASAP	High	ANR/ DEHMS

LAND USE: CHAPTER 3

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will work with VTrans on advocating for and improving the flood capabilities of state- or town-owned transportation infrastructure.	TRORC/VTrans	N/A	ASAP	High	DEMHS
TRORC should continue working with the emergency coordinators and selectboards from each town to develop mitigation plans and emergency preparedness and recovery procedures from flooding.	TRORC/ Municipalities	Low	Ongoing	High	DEMHS
Existing homes and businesses at serious risk of flood damage should be identified and prioritized by towns in concert with the VT ANR River Management Section and TRORC for mitigation actions such as elevation/relocation or purchase and demolition.	TRORC/ Municipalities/ ANR	High	ASAP	Medium	HMGP
To fully address flood risks, towns should add areas not designated in either FEMA's maps or in VT ANR's maps but that are flooded during a weather event to local flood regulations.	Municipalities/ ANR	Low	Ongoing	Medium	N/A
Watershed-level planning should be done by towns with assistance from TRORC to evaluate natural and constructed flood storage options upstream of existing areas of concentrated development that are at risk of flooding.	TRORC/ Municipalities	Moderate	Mid-term	Medium	ANR
TRORC will work with VT ANR, towns, and landowners to lessen flood risk by restoring natural channel functions through berm or dam removal or intentional lowering of streambanks.	TRORC/ANR/ Municipalities	High	Ongoing	Medium	Various
TRORC will work with towns to understand the impact stormwater runoff has on the Region and on specific towns, and then work to address impacts from impervious surfaces through increased retention and infiltration.	TRORC/ANR	Moderate	Ongoing	High	Various
The State should institute a permanent buyout program to continue to lessen flood risk.	State	High	Ongoing	High	Various
TRORC will work with VT ANR to adjust the boundaries of river corridors in developed areas per the Vermont Flood Hazard Area and River Corridor Protection Procedure.	TRORC/ANR	Moderate	Ongoing	Medium	Various

TRANSPORTATION: CHAPTER 4

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Overall Transportation					
TRORC will assist towns to develop capital improvement plans that address paved and gravel road maintenance costs.	TRORC	Low	Ongoing	High	VTrans
Towns and the State should maintain roads and bridges in good condition and must design new transportation facilities to be flood resilient.	Municipalities/ State	Moderate-High	Ongoing	High	Local/ State
Towns should consider options to reduce winter maintenance costs, including, but not limited to, downgrading winter road maintenance policies, combined with a public information campaign to alter traveler expectations of snow removal.	Municipalities	N/A	Ongoing	Low	N/A
Towns should identify dead-end Class 3 town roads that serve few structures and consider reclassification to Class 4 to reduce town expenses.	Municipalities/ TRORC	Low	Ongoing	Low	N/A
Towns should identify any local bridges that are redundant and can be abandoned or removed, or need not to be rebuilt if destroyed.	Municipalities	N/A	Short-term	High	N/A
TRORC will work with others to better estimate the full cost of the transportation system.	TRORC	N/A	Ongoing	Medium	N/A
TRORC will support regional coordination efforts by transit providers to achieve cost efficiencies, provided that services are not negatively affected.	TRORC/VTrans	Low	Ongoing	Low	State
Land Use and Transportation					
TRORC will continue to review and participate in Act 250 permit proceedings.	TRORC	Low	Ongoing	High	ACCD
TRORC will continue to work with towns to ensure Town Plans are consistent with the Regional Plan and state policy.	TRORC/ Municipalities	Low	Short-term	High	State
TRORC will work with towns and the Vermont Agency of Transportation to achieve context-sensitive solutions that enhance historic, scenic, and agricultural properties of roadways consistent with public safety through transparent public processes and project development.	TRORC/State/ Municipalities	Low	Ongoing	Medium	VTrans

TRANSPORTATION *(continued)*					
Action	**Lead/ Partner**	**Estimated Cost**	**Timeline**	**Priority**	**Potential Financing**
The Natural Resources Board must revise Act 250 rules regarding Master Plans to make Master Plans a mandatory requirement for large-scale, multi-phase developments that have the potential for substantial regional impacts.	State	N/A	ASAP	High	N/A
TRORC shall support efforts to develop context-sensitive municipal parking facilities in Regional and Town Centers.	TRORC	Moderate	Ongoing	Medium	State
TRORC will encourage communities to develop land use regulations that promote reduced density in rural areas.	TRORC	N/A	Ongoing	Medium	N/A
TRORC will seek out new ways its municipalities can approach issues of density in rural areas.	TRORC	N/A	Mid-term	High	N/A
TRORC will update this Transportation chapter to coincide with any future updates to the Land Use chapter.	TRORC	Low	Ongoing	High	VTrans
Housing and Transportation					
TRORC will work with housing providers and developers to ensure that new multi-family housing, assisted living facilities, and health and human service facilities be located in close proximity to services in village and urban centers or along public transportation fixed routes.	TRORC	Low	Ongoing	Medium	Various
TRORC will work with member towns during plan and bylaw revisions to further connect housing needs to transportation system efficiency, reducing the need to travel solely by car and increasing access to goods and services.	TRORC	Low	Ongoing	High	Various
Environmental Considerations					
Vermont Agency of Transportation and the Transportation Advisory Committee will work to reduce wildlife crossing collisions through improved signage and wildlife passage facilities.	TRORC/State	Moderate	Ongoing	Low	Various
TRORC will work with local highway departments as requested to assist with compliance with the Municipal Roads General Permit to minimize stormwater runoff, minimize road/river conflicts, and minimize roadway erosion.	TRORC/ Municipalities	High	Ongoing	High	State/ Federal

TRANSPORTATION *(continued)*					
Action	**Lead/ Partner**	**Estimated Cost**	**Timeline**	**Priority**	**Potential Financing**
Towns should consider minimizing the use of impervious surfaces for parking through shared parking, reduced parking requirements when supported by data, or phased parking development when demand arises.	Municipalities	N/A	Ongoing	Medium	N/A
The Vermont Agency of Transportation, FEMA, ANR, the Vermont Department of Public Safety, and others involved in flood recovery should address wildlife and aquatic passage needs in new construction and upgrades of bridges and culverts when feasible.	State/Federal	High	ASAP	Medium	VTrans/ ANR/FEMA
TRORC will pursue funding opportunities to advance the planning and construction of projects that preserve or enhance water quality.	TRORC/ANR	High	Ongoing	Medium	Various
TRORC shall encourage agricultural and silvicultural businesses to use best management practices that minimize damage to roadways, land, and waterways.	TRORC	N/A	Ongoing	Medium	N/A
With support from the State, TRORC will work with towns to implement the strategies and actions outlined in the *Regional Energy Implementation Plan*, thereby helping to shift the Region to more energy efficient and less polluting transportation systems.	TRORC/ Municipalities	Moderate	Ongoing	High	Various
Towns should track damages to highways during all hazard events.	Municipalities/ State	Low	Ongoing	High	Taxes
Economic Development and Transportation					
TRORC will continue to assist towns with their efforts to improve public access to outdoor recreational opportunities, while ensuring consistency with local and regional land use plans.	TRORC/ Municipalities	Low	Ongoing	High	Various
TRORC will continue to ensure that regional transportation planning activities are integrated with land use planning and economic development planning efforts.	TRORC	Low	Ongoing	Medium	N/A
Driving					
TRORC will offer support to towns in capital budgeting for transportation facilities and related equipment.	TRORC/ Municipalities	Low	Ongoing	Medium	State

TRANSPORTATION *(continued)*					
Action	**Lead/ Partner**	**Estimated Cost**	**Timeline**	**Priority**	**Potential Financing**
TRORC will continue to work with towns to identify and address road safety risks through the Vermont Agency of Transportation's Systemic Local Roads Safety Program. Focus on roads that have development proposals and/or are expected to support increased development. If the State declares a road or intersection a high accident location, then conduct a road safety audit and advocate for those improvements to be implemented.	TRORC/State	Low	Ongoing	Medium	VTrans
TRORC will continue conducting speed studies as requested by towns.	TRORC	Low	Ongoing	High	VTrans
TRORC will work with towns to promote traffic calming, including development of road standards that promote traffic calming in private development.	TRORC	Low	Ongoing	Medium	VTrans/ MPG
TRORC will work with towns and Vermont Agency of Transportation to identify poor pavement conditions for improvement. TRORC will continue collaborating with Vermont Agency of Transportation on paving projects and district leveling prioritization.	TRORC/VTrans	Low-Moderate	Ongoing	Medium	VTrans
TRORC will offer town support as needed as liaisons for Vermont Agency of Transportation projects.	TRORC	Low	Ongoing	High	VTrans
VTrans should take over Route 132 as a state highway.	VTrans	High	Ongoing	Medium	VTrans
Public Transportation					
TRORC will advocate for increased funding for more robust transit services that encourage increased ridership.	TRORC/Transit Providers	N/A	Ongoing	High	N/A
TRORC will support funding increases to meet demand in transportation services for the elderly and people with disabilities.	TRORC/Transit Providers	N/A	Ongoing	High	N/A
TRORC will advocate for increased capital investments for commuter and human service public transportation.	TRORC/Transit Providers	N/A	Ongoing	High	N/A
TRORC will continue coordination with agencies in providing transportation services for the elderly and people with disabilities.	TRORC/Transit Providers	N/A	Ongoing	High	VTrans
TRORC will support the development of the Upper Valley U.S. Route 4 commuter bus service.	TRORC	N/A	Ongoing	High	N/A

TRANSPORTATION *(continued)*					
Action	**Lead/ Partner**	**Estimated Cost**	**Timeline**	**Priority**	**Potential Financing**
TRORC shall assist interested communities with studies and planning designed to improve multi-modal networks in Regional and Town Centers.	TRORC	Low	Ongoing	Medium	Various
TRORC will assist transit providers in assessing unmet transit needs and developing strategies to meet those needs. Strategies could include, but are not limited to, improving coordination between providers to identify and address underutilized capacity of existing services.	TRORC/Transit Providers	Moderate	Ongoing	High	State
TRORC will advocate for and support providers in continuing to adopt technologies that help reduce costs, improve efficiency, and enhance service quality.	TRORC	Moderate	Ongoing	High	State
TRORC will support regional efforts to disseminate public information about available transit options.	TRORC	Moderate	Ongoing	High	State
Carpooling and Park and Rides					
The Transportation Advisory Committee (TAC) shall continue to identify park and rides in need of state investments and improvements, including the lot at the Hartford I-89/I-91 interchange (CMG PARK(12)SC).	TRORC	Moderate	Ongoing	High	State
Towns should apply to the Municipal Park and Ride Program and expand the regional park and ride network.	Municipalities	N/A	Ongoing	Medium	VTrans
TRORC and towns should continue to support public transportation and ride-share programs to reduce the Region's dependency on single-occupant vehicle trips.	TRORC/ Municipalities	N/A	Ongoing	High	N/A
Towns should consider shared parking lots with other properties that may become formal or informal park and ride lots.	Municipalities	N/A	Ongoing	Low	N/A
TRORC shall support efforts to develop and improve park and ride lots in village areas.	TRORC	N/A	Ongoing	Medium	N/A
TRORC will advocate for more state funding for park and ride lots.	TRORC	N/A	Ongoing	High	State
TRORC will support efforts to incorporate electric vehicle charging infrastructure into formal park and ride lots and other appropriate locations, as practicable.	TRORC	Moderate	Ongoing	High	State

TRANSPORTATION *(continued)*					
Action	**Lead/ Partner**	**Estimated Cost**	**Timeline**	**Priority**	**Potential Financing**
Walking and Biking					
TRORC will work with towns and the Vermont Agency of Transportation to institutionalize pedestrian and bicycle accommodations (including transit connectivity) in all of its planning, engineering, and construction related activities (i.e., implement "Complete Streets"), especially in regional, town, and village centers. In addition to the existing local land use regulations, this work will include development of free-standing Bicycle and Pedestrian Plans for interested towns.	TRORC/State	Low-Moderate	Ongoing	Medium	Various
TRORC will work with towns to support land use regulations that increase the density and mixed use development pattern that improves walking and bicycling conditions by shortening trips between where people live, work, and recreate.	TRORC/ Municipalities	N/A	Ongoing	High	N/A
TRORC will cooperate with private and public initiatives that seek to market walking and bicycling in towns and the Region and participate in state and local initiatives that promote bicycling and walking.	TRORC	N/A	Ongoing	Low	N/A
TRORC will use objective measures to gauge the potential for walking and bicycling to assess priorities for investments in these modes. These measures could include population density, employment density, and block sizes or intersection density.	TRORC	N/A	Ongoing	Low	N/A
TRORC will continue to support municipal planning for safe routes to school, especially within densely settled villages or town centers.	TRORC	N/A	Ongoing	High	N/A
TRORC will advocate that commercial and other development projects invest in transportation infrastructure and services to increase use of alternative modes such as bicycling, walking, or transit, or provide necessary rights-of-way to allow later investment in those facilities.	TRORC	N/A	Mid-term	Medium	N/A
TRORC will provide education and training to large employers as opportunities arise on the benefits of providing showers and bike lockers for employees that commute by biking.	TRORC	Low	Short-term	Low	Various

TRANSPORTATION *(continued)*					
Action	**Lead/ Partner**	**Estimated Cost**	**Timeline**	**Priority**	**Potential Financing**
Telecommuting					
Towns, the State, telecommunications providers, and TRORC should map existing cellular and broadband services in the region, identify gaps, and work to provide coverage in those gap areas.	TRORC/State/ Municipalities	Low-Moderate	Mid-term	Low	Various
Private businesses should support telecommuting and teleconferencing options where practical for employees.	Private Sector	N/A	Ongoing	Medium	N/A
As opportunities arise, TRORC will provide education to employers on the benefits of allowing some telecommuting for employees.	TRORC	N/A	Ongoing	Low	N/A
TRORC will support efforts to develop community-owned fiber optic Internet service.	TRORC/ Municipalities	Low	Ongoing	High	State
TRORC will support efforts to provide public access to teleconferencing equipment.	TRORC	Low	Ongoing	High	Various
Passenger and Rail Freight					
TRORC will support the implementation of the Northern New England Intercity Rail Initiative final recommendations for a Boston/New Haven to Montreal passenger rail service.	TRORC	High	Ongoing	Medium	Federal/ State
TRORC will support improved rail service along the I-91 corridor.	TRORC	High	Ongoing	Medium	Federal/ State
TRORC will work with towns to consider land use and transportation investment policies that make rail-based industries a viable commercial activity.	TRORC/ Municipalities/ VTrans	Low	Ongoing	Medium	Federal/ State

WORKING LANDSCAPES: CHAPTER 5

Action	Lead/Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC, as part of its ongoing Technical Assistance Program, will provide planning advice and support to town planning commissions, conservation commissions, nonprofit conservation organizations, and other groups interested in sustaining agriculture and forestry.	TRORC	Low	Ongoing	Medium	Various
The Natural Resource Conservation Service, Conservation Districts, University of Vermont Extension, and others should continue efforts to educate landowners as to the benefits of maintaining and improving streambank vegetation and shoreline buffer.	Nat. Res. Conserv. Service/ Conserv. Dist./ UVM	Low	Ongoing	Medium	Various
The State and others should strengthen programs that are designed to provide new farmers access to farms and farmland, as well as programs designed to assist retiring farmers with the transition to a new generation.	TRORC/State	Low	Ongoing	Medium	Various
Streambank stabilization erosion control projects to protect farmlands from erosion should use vegetation and other natural materials when practical to protect wildlife habitat and water quality as well.	TRORC	Low	Ongoing	Medium	Various
Invasive species that threaten forestry and agriculture should be closely monitored by state and federal governments, and education and prevention methods shared with landowners.	NGOs	Moderate	Ongoing	High	Various
In order to keep land in production, the State should work to ensure that there are price supports, better marketing, or other mechanisms so that producers of food and fiber are able to be assured they will at least get paid their production costs.	State/Federal	High	Ongoing	High	Various
Local land use planning should consider the following as ways to promote agriculture and forestry: Agricultural zoning, Cluster development, Impact fees, Overlay districts, Performance standards, Purchase of development rights, Transfer of development rights.	TRORC/ Municipalities	Low	Ongoing	Medium	State
To promote a better understanding of the farming and forestry practices, and natural resource management in general, the industry, conservation organizations, public schools, and the tourism and recreation industries should sponsor continuing educational opportunities to the public.	Other	N/A	Ongoing	Low	N/A
TRORC should organize a regional committee of stakeholders to focus on how TRORC can support the local agricultural and forest products industry.	TRORC	Low	Ongoing	Medium	Various

WORKING LANDSCAPES: CHAPTER 5

Action	Lead/Partner	Estimated Cost	Timeline	Priority	Potential Financing
Towns should set up a town fund for conservation purposes to purchase lands or easements outright that are important to the town, or to leverage other public funds or donations for conservation purposes.	Municipalities	Moderate	Ongoing	Low	Local funds

NATURAL RESOURCES: CHAPTER 6

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Groundwater					
TRORC will work with the Agency of Natural Resources and with towns to identify and map aquifers and aquifer protection areas.	TRORC/ANR	Medium	Mid-term	Medium	Various
Towns are encouraged to develop Source Protection Plans for public water supplies or aquifers that have been identified. Such programs may include limiting or prohibiting development and other land uses within wellhead or aquifer protection areas.	Municipalities	Low-to-Moderate	Mid-term	Low	State/ Municipal
The Legislature must keep the Petroleum Cleanup Fund at a level sufficient to meet all cleanup needs.	Legislature	High	Ongoing	High	Federal/ State
TRORC will work with the Agency of Natural Resources, town officials, and others on educational outreach about the proper use of floor drains and local spill response capacity.	TRORC/ANR	Low	Ongoing	Low	State/ Regional
TRORC will coordinate with the Agency of Natural Resources, other state agencies, and local officials in the assessment, cleanup, and redevelopment of contaminated (brownfield) sites.	TRORC/ANR	Low	Ongoing	Low	State/ Regional
TRORC will assist towns when requested to identify, monitor, and protect important local groundwater resources as part of their planning programs. Aquifers, public water supplies, and recharge areas should be mapped whenever possible in order to determine critical areas for protection of drinking water supplies.	TRORC/DEC	Moderate	Ongoing	Medium	State
Surface Water					
Municipalities need to review existing and proposed water quality classifications of surface waters within town boundaries, or within basins, to determine if classifications meet the uses and needs. Both TRORC and the Agency of Natural Resources are available to provide support.	Municipalities	N/A	Ongoing	Medium	N/A
Municipalities must play an active role in the basin planning process and prepare water resources elements in municipal plans that are in compliance with state and federal laws.	Municipalities	Low	Ongoing	Medium	MPG
The Vermont Department of Environmental Conservation's listing of threatened and impaired waters must be targeted for immediate attention.	ANR	N/A	ASAP	High	N/A
Towns in the Region are encouraged to cooperate on a watershed-wide basis when planning for surface water quality and use.	Municipalities	N/A	ASAP	High	N/A

NATURAL RESOURCES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC, in cooperation with the Vermont Watershed Management Division, the Agency of Natural Resources, Vermont Local Roads Program, and the Agency of Transportation, should advise town officials on cost-effective road erosion and sediment control.	TRORC/ANR	Low	Ongoing	Medium	VTrans/ANR
TRORC shall continue to participate in watershed and basin planning efforts.	TRORC	Low	Ongoing	High	ANR
Unless there are specific public benefits to lower classifications, the Agency of Natural Resources shall adopt the highest possible classification and uses for water bodies based on their actual conditions and uses or that which is reasonably attainable.	TRORC/ANR	N/A	Per Basin Plans	High	N/A
Public and private sectors should refrain from activities that spread invasive plants such as ill-timed roadside mowing, transporting invasive plants in ditch soil, and the cleaning of mowing and earthmoving equipment after working in an infested area. Road maintenance personnel should be trained to recognize the invasive plants on the Vermont Noxious Weed Quarantine List and Watchlist.	Towns/ VTrans	Low	ASAP	High	N/A
The Agency of Natural Resources and local watershed groups are encouraged to monitor water quality, and when monitoring indicates a water quality violation, to promptly locate and address the source of degradation when possible.	ANR/ Watershed Groups	N/A	Ongoing	Medium	N/A
In preparation for writing any basin plans, the Agency of Natural Resources must conduct a comprehensive assessment of water quality in such basins and identify the source(s) of any known water quality problems.	ANR	N/A	Ongoing	Medium	N/A
Proper erosion control procedures shall be applied in all construction activities, and all stormwater shall be treated through natural or mechanical systems to remove nutrients and sediments and to attenuate flood flows to natural levels before any stormwater reaches streams.	Various	Low	Ongoing	High	Various
To protect high-quality forested riparian (riverbank, streambank, or lakeshore) habitat, towns should prohibit development near these areas and regulate the disturbance of vegetation in riparian zones through general, conditional use, and/or site plan standards.	Municipalities	Low-to-moderate	ASAP	High	MPG
The Agency of Agriculture, Food, and Markets must revise the Required Agricultural Practices to manage animal uses in buffer areas.	Agency of Ag	Low	Ongoing	High	State

NATURAL RESOURCES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Wetlands					
The State of Vermont must more accurately identify and map significant wetland areas not currently classified as Class 1 or 2 wetlands and petition the Agency of Natural Resources to have such areas reclassified at a higher level.	State	Medium	Mid-term	Medium	State
TRORC should work with towns to establish a priority list of wetlands for protection and/or acquisition.	TRORC/Local Conservation Commissions	Low	Ongoing	Low	MPG
The State should provide property tax relief incentives for the protection of designated wetlands.	Municipalities	N/A	Ongoing	Low	N/A
To protect wetland functions, native biological diversity, and the loss of habitat, towns should adopt zoning and/or subdivision regulations that discourage development near wetlands and vernal pools that are not already protected under state or federal law. They should consider restricting development within 500 feet of all wetlands in conservation districts.	TRORC/ Municipalities	Low-to-Moderate	Mid-term	Medium	MPG
TRORC supports and encourages community efforts to identify and inventory wetlands, including vernal pools, and to adopt mechanisms for their increased protection, including formal petitions to be shown on the Vermont Wetlands Inventory Map. This information can increase the effectiveness of the state and federal regulatory process.	TRORC/ ANR/ Municipalities	Low-to-Moderate	Ongoing	Medium	State
Wildlife Resources					
With the help of specialists from the Department of Fish and Wildlife or the Vermont Institute of Natural Science, towns in the Region should work to inventory wildlife species; sensitive areas including wetlands, vernal pools, bogs, and fens; mature oak trees; and critical habitats for birds, deer, bear, bobcats, heron, and threatened or endangered plant species.	Municipalities	Moderate	Mid-term	Low	MPG/VTFW
Towns should establish Conservation Commissions that work alongside VTrans, Vermont Fish and Wildlife, and nonprofit conservation organizations to maintain wildlife corridors.	Municipalities	N/A	Ongoing	Medium	N/A
Towns are encouraged to use mechanisms such as cluster zoning, conservation districts, transferring or purchasing of development rights, or purchasing of land containing critical habitat areas in order to maintain the integrity of large forest blocks and preserve critical habitat and habitat connectors.	Municipalities	High	Ongoing	High	Private/ Federal

NATURAL RESOURCES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Towns should work cooperatively and seek assistance from land trusts to maintain large tracts of undeveloped habitat that cross political boundaries.	Municipalities/ State	N/A	Ongoing	Low	N/A
Town Plans and zoning regulations should protect significant natural features and sensitive habitat areas by using setbacks and buffers.	TRORC/ Municipalities	Low	Ongoing	High	State
Local officials are encouraged to work with staff from regional offices of the Vermont Department of Fish and Wildlife and wildlife biologists from VINS to assist in identifying and creating inventories of the critical habitat areas and significant natural communities in their municipalities.	Municipalities	Moderate	Ongoing	Medium	MPG/VTFW
Towns should attempt to identify critical bear habitat areas within the broader areas identified on Vermont bear habitat maps.	Municipalities	Moderate	Mid-term	Low	MPG/VTFW
VTrans and towns should always consider terrestrial and aquatic wildlife passage as part of a design when constructing bridges and culverts, especially in areas along known wildlife corridors.	VTrans/ Municipalities/ Fish & Wildlife	High	Ongoing	Medium	VTrans
Towns should time roadside mowing to limit spread of plants such as wild chervil and wild parsnip.	Municipalities	Low	Ongoing	High	Municipalities
When using heavy machinery near streams, machinery operators must clean them before and after use to avoid inadvertent spread of species such as Japanese knotweed.	Municipalities	Low	Ongoing	High	Municipalities
Air Quality					
Install and maintain a regional air quality monitoring network in cooperation with the Vermont Agency of Natural Resources so as to determine current and potential threats to air quality. Potential impact areas include village centers or other areas of traffic congestion and high elevations, where pollutants and acidic levels are potentially greater and more harmful to fragile vegetation.	ANR	Moderate	Mid-term	Low	State
Municipalities and state agencies should educate communities about the impacts of trash burning and develop more effective mechanisms to enforce laws prohibiting backyard burning of trash, including the adoption of civil ordinances.	ANR	Low	Ongoing	Low	State/ Municipal
Woody debris from site clearing or forestry operations should be left on site or chipped, instead of being burned, in order to reduce pollution and to enable this material to contribute to soil formation.	Various	Low	Ongoing	Low	Various
TRORC should be prepared to comment upon projects outside the Region that may potentially impact air quality within the Region.	TRORC	Low	Ongoing	Medium	State

NATURAL RESOURCES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Mineral Resources					
All sites must plan for their eventual rehabilitation so that slopes are stable and the surface is revegetated. To that end, topsoil shall not be removed from sites and excavations shall stop early enough so that stable slopes can be established on the property.	Contractors	Low	Ongoing	Medium	N/A
Mineral extraction and processing facilities must be planned and developed so they do not place an excessive or uneconomic burden on local and state highways and bridges.	Contractors	Low	Ongoing	Medium	N/A
All extraction sites must maintain at least a 50-foot buffer of undisturbed land by any wetland or surface water and sufficient additional land above the grade of adjacent streams to preclude a danger of avulsion of the stream into any working areas under flood conditions.	Contractors	Low	Ongoing	Medium	N/A

HISTORIC, CULTURAL, ARCHEOLOGICAL & SCENIC RESOURCES: CHAPTER 7

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Historic Resources					
TRORC should continue to support efforts to designate National Historic Register Districts and Sites. In so doing, TRORC should coordinate with the State and affected municipalities. In accordance with Section 106 of the National Historic Preservation Act, TRORC must review all federally funded projects in the Region that affect Register properties or places to ensure that such publicly assisted projects are planned with due consideration to the resource.	TRORC	Low	Ongoing	Medium	State
TRORC, as part of its Transportation Planning Program, should continue its work with the Agency of Transportation, town officials, its Transportation Advisory Committee, and other groups and organizations to ensure that design standards and plans for proposed transportation projects are reasonably compatible with historic resource needs and values. (See Transportation chapter.)	TRORC	Low	Ongoing	Medium	State/ VTrans
Towns are encouraged to clearly outline in their plans those resources deemed worthy of protection. Town officials can participate in the Act 250 process, thus influencing decisions affecting historic sites in their community.	Municipalities	Low	ASAP	High	MPG
Archeological Resources					
To increase public awareness of archeological resources, TRORC encourages archeologists, local and regional groups, towns, and landowners to organize educational programs focused on Vermont's ancient history. Such a program could be made a part of an overall cultural heritage program through public schools.	TRORC	N/A	Mid-term	Low	N/A
Local planning commissions, conservation commissions, historical societies, and other interest groups are encouraged to develop an archeological plan for their community as part of the overall master planning program. Such a plan could be an important step in planning for future development in identified areas or areas most likely to contain sites. Assistance and guidance are available from the state archeologist within the Division for Historic Preservation.	Municipalities	Low	Ongoing	Low	MPG

HISTORIC, CULTURAL, ARCHEOLOGICAL & SCENIC RESOURCES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Outdoor Lighting Design and Management					
TRORC should assist local and state policymakers in evaluating lighting options. TRORC will consider sponsorship of educational workshops for planning commissions, design professionals, and others to acquaint them with the principles of good lighting design.	TRORC	Low	Mid-term	Low	Various
Towns interested in planning for outdoor lighting in their communities should consider using their municipal plans to establish goals and objectives for lighting. Additionally, consideration should be given to incorporating a lighting section into a town's zoning ordinance to cover lighting installations in all or parts of the town.	TRORC/ Municipalities	Low	Ongoing	Low	MPG
TRORC staff should continue to work with Vermont's public utilities and design professionals to evaluate lighting technologies and efficiencies.	TRORC	N/A	Ongoing	Medium	N/A

HOMES IN THE REGION: CHAPTER 8

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will continue to assist nonprofit housing organizations in the development of affordable housing projects and programs when such efforts are consistent with the policies of the Regional Plan.	TRORC/ Nonprofits	Low	Ongoing	High	Various
TRORC will continue to provide professional assistance to member municipalities in the identification of housing needs and implementation of local housing assistance programs, including revising regulations to encourage more housing to meet town needs and minimize development costs while still protecting community values and to qualify for a Neighborhood Development Area designation.	TRORC/ Municipalities	Low	Ongoing	Medium	Various
Community leaders within the Region will work with state housing agencies, nonprofit organizations, and lending institutions to ensure the availability of loan or grant funds for Vermonters to purchase, acquire, or improve their primary homes.	Others	N/A	Short-term	Low	N/A
TRORC will continue to work with the State and towns on regulatory efforts to make quality construction happen.	TRORC/State/ Municipalities	Low	Short-term	High	State
Towns within the Region should actively cooperate with local and regional nonprofit housing trusts to develop and preserve new and existing housing, with mechanisms to assure the perpetual affordability of that housing.	Municipalities/ Others	N/A	Ongoing	High	N/A
Community leaders, housing advocates, and TRORC must work to retain Vermont's innovative publicly financed home mortgage lending and housing assistance programs.	VHCB/VHFA/ TRORC	Low	Ongoing	High	Various
TRORC will assist towns in writing strong housing components in Town Plans that are based on current data that address proven needs. TRORC will actively help identify land that is suitable for development so that towns may work with developers and existing property owners to promote mutually beneficial partnership opportunities.	TRORC/ Municipalities	Low	Short-term	High	Various
TRORC will educate communities on density allowances in towns, encourage communities to allow for ADU approval at the municipal staff level, and enhance local awareness of the need for workforce housing in the Region through community forums.	TRORC	Low	Short-term	Medium	Various

HOMES IN THE REGION *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC should offer assistance to towns to address aesthetic concerns about housing in ways that reduce permitting obstacles while resulting in quality projects.	TRORC/ Municipalities	Low	Short-term	Medium	State
TRORC will facilitate discussions with local land developers, bankers, and community leaders to better understand the structural and institutional impediments to providing new housing throughout the Region.	TRORC	N/A	Short-term	Medium	N/A
TRORC will work with housing providers and adjacent regional planning commissions to understand our neighbors' growth pressures and increase housing production that meets our joint needs.	TRORC/ Municipalities/ NGOs	Moderate	Short-term	High	Various
Towns and the State should provide incentives to property owners to rehabilitate existing vacant structures for housing in town, village, and hamlet centers that are compatible with existing neighborhoods. Towns should incentivize affordable housing through a variety of methods, including regulatory bonuses, easier permitting, and minimizing lot size, parking, and other requirements.	Municipalities/ State	High	Ongoing	High	Various
TRORC will represent the Regional Plan's housing policies to the Vermont State Legislature.	TRORC	N/A	Ongoing	High	N/A
TRORC will support the public awareness campaign of the Vermont Housing and Finance Agency and facilitate the education of our towns on the Federal Fair Housing Law.	TRORC	N/A	Ongoing	Low	N/A
TRORC should work with towns facing pressure for Short-term rentals so that they retain housing for residents while allowing such a business model to produce income for residents.	TRORC/ Municipalities	Low	Ongoing	Low	State

UTILITIES, FACILITIES, AND SERVICES: CHAPTER 9

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Overall Utilities, Facilities, and Services					
TRORC will foster partnerships between public investment planning and implementation activities and the private sector in a manner which advances the goals and policies set forth in this Plan.	TRORC	N/A	Ongoing	Medium	N/A
TRORC should look into developing a capital budget for the Region.	TRORC	Moderate	Long-term	Low	N/A
Water and Wastewater Systems					
Municipal plans, per Vermont statutes, shall identify and prioritize future capital improvements and major repairs and estimate costs and means of financing for maintenance and future capacity.	Municipalities	Low	ASAP	High	MPG
TRORC will assist communities with the identification and prioritization of future capital improvements and majorrepairs.	TRORC	Low	Ongoing	High	Various
TRORC will offer capital budgeting workshops throughout the Region.	TRORC	Low	Ongoing	High	ACCD
Water efficiency programs and codes should be adopted at the state or local level to reduce demand on municipal water systems.	State/ Municipalities	Low	ASAP	High	Various
TRORC shall seek grant opportunities to map water and wastewater systems throughout the Region.	TRORC	Low	Mid-term	Medium	Various
When funding is available, municipal plans should inventory water and wastewater systems to identify current and projected capacity gaps.	Municipalities	Low	Long-term	Medium	MPG
Municipalities should conduct periodic auditing of all water and wastewater distribution systems for calculation of infiltration and losses.	Municipalities	Low-Moderate	Ongoing	Medium	Various
Municipalities are encouraged to adopt regulations or amend current regulations that promote dense development in areas with public sewer and water.	Municipalities	Low	Ongoing	Medium	State
Solid Waste					
TRORC will continue to assist member towns, alliances, and the Greater Upper Valley Solid Waste Management District in the update and implementation of municipal and regional solid waste plans.	TRORC	Low	Ongoing	Medium	Various
TRORC will support and participate in any future discussions regarding the development of regional waste management services.	TRORC	N/A	Ongoing	Medium	N/A

UTILITIES, FACILITIES AND SERVICES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC should assist towns in meeting the Universal Recycling Law requirements through outreach and education, with assistance from the Agency of Natural Resources.	TRORC	Low	Short-term	Medium	Various
All towns or districts of this Region are encouraged to contact TRORC offices regarding their current planning activities and determine if their SWIP revisions meet the overall goals and policies of this Plan.	Municipalities/ Districts	Low	Ongoing	Medium	N/A
TRORC should study the affordability of solid waste services in the Region.	TRORC	Moderate	Mid-term	Low	State
Educational Facilities and Services					
Town and school authorities should create and maintain safe pedestrian access and transit opportunities to educational facilities, in line with Safe Routes to School efforts.	Municipalities/ TRORC	Low	Ongoing	Medium	VTrans
Towns must assess and incorporate the needs of disabled children and staff into educational facility and budgetary planning efforts to ensure the provision of free and appropriate education for all children.	TRORC/ Municipalities	N/A	Ongoing	High	N/A
Child Care Services					
TRORC should work with towns to address identified needs for child care facilities or services by identifying publicly owned buildings throughout the Region and evaluating and prioritizing their suitability to serve as child care facilities after considering Vermont regulations.	TRORC/ Municipalities, Businesses	Low-Moderate	Short-term	Low	Various
Towns should review their zoning regulations (if adopted) to determine the ability of the regulations to allow child care providers to be located in the town.	Municipalities	Low	Ongoing	High	State
Develop business "how-to" guides for providers to navigate local permitting.	State	Low	Short-term	Medium	State
Conduct a child care needs assessment in the Region.	TRORC	Low-to-Moderate	Mid-term	Medium	State
Telecommunications					
TRORC should continue to participate actively in the Section 248a permitting process.	TRORC	Low	Ongoing	High	ACCD
Communities should seek out funding to implement new or sustain existing Wi-Fi zones in villages and downtowns.	Municipalities	Low	Short-term	Medium	Various
The State should continue to support programs that achieve universal broadband and cellular communication access.	State	High	Ongoing	High	State

UTILITIES, FACILITIES AND SERVICES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Municipal Buildings and Properties					
Towns should assess expected maintenance and upgrades for town buildings and create reserve funds to cover these so that these buildings remain in good condition.	Municipalities	Moderate	Ongoing	High	Various
TRORC should assist towns with planning, public dialogue, and grant writing, if requested, when considering constructing new buildings so that they meet community needs and are located wisely.	TRORC/ Municipalities	Low-to-Moderate	Ongoing	Medium	State
The State must consider effects on the Region and our towns if they are considering siting new buildings so they fit well with the Region's needs.	State	N/A	Ongoing	Medium	N/A
Recreational Opportunities					
TRORC will assist communities with the establishment of Conservation Commissions and will support existing Conservation Commissions when possible.	TRORC	Low	Ongoing	Medium	Various
TRORC should help towns develop highway policies that address recreation needs and should encourage the adoption of walkable communities programs within the Region.	TRORC/ Municipalities/ VTrans	Low	Ongoing	High	State/ Federal
TRORC should assist towns with establishing and managing town forests.	TRORC/ Municipalities	Low	Ongoing	Medium	State
TRORC should work with the State, White River Partnership, and the Vermont River Conservancy on increased river access.	TRORC/NGOs/ State	Moderate	Ongoing	Medium	Various
Shared Services/Infrastructure					
TRORC will assist communities with the development of inter-local agreements, union municipal districts, and other cooperative agreements whenever possible.	TRORC/ Municipalities	Low-to-Moderate	Ongoing	High	State

EMERGENCY MANAGEMENT: CHAPTER 10

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
State and federal governments must continue funding and operation of warning systems, including the National Weather Service's Emergency Alert System, NOAA weather radio and USGS river and precipitation gauges.	State/Federal	Moderate	Ongoing	High	State/Federal
Towns should pursue the use of capital programs and reserve accounts to properly budget for emergency vehicles and other large capital costs, as well as coordinate and share services to achieve overall efficiencies.	Municipalities/ TRORC	Low	Ongoing	High	Municipalities
Towns should encourage sprinkler systems in residential structures to reduce loss from fire.	Municipalities	High	Ongoing	Medium	Various
TRORC will continue to work with all communities to annually update Local Emergency Operations Plans, ensuring that these plans take into account the variedneeds of people with disabilities, pets, and those without access to transportation.	TRORC/ Municipalities	Moderate	Ongoing	High	DHS/VT DEMAS
TRORC will continue to work with all communities on hazard mitigation efforts, including updating mitigation plans, enhancing road and bridge standards for resiliency, and addressing flood resilience in Town Plans.	TRORC/ Municipalities	Low	Ongoing	High	FEMA
TRORC will continue to work cooperatively with local emergency response organizations, VEM, LEPC #12, social service agencies, long-term recovery organizations, community resilience organizations, and others to help improve emergency planning response and recovery.	TRORC/DEHMS/ Municipalities	Low	Ongoing	High	DEHMS
The federal and state governments should increase funding for preparedness and mitigation planning and actions at the local level in order to reduce escalating response and recovery costs.	VEM/ Federal	Moderate	ASAP	High	Federal
FEMA should modernize flood maps, especially in Orange County and in unnumbered A zones, and incorporate newer flood frequency predictions into maps.	FEMA	High	ASAP	High	FEMA
TRORC should assist towns and VT ANR in refining river corridor maps.	TRORC/ANR	Low	Mid-term	High	Various

EMERGENCY MANAGEMENT *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC should work to ensure that new hazard assessment data from the state and federal levels is disseminated to the public and local officials so that capacity is risk based.	TRORC	Low	Ongoing	High	Various
Communities should work to ensure that important local facilities that provide emergency services, water, food, and gas or that act as emergency shelters are able to function during power outages.	Municipalities	Moderate	Ongoing	Medium	Various
TRORC should work with towns and other organizations to coordinate land use, transportation, and energy policies and actions to result in more resilient communities.	TRORC	Low	Ongoing	High	Various
TRORC should assist towns in response and recovery stages through damage documentation assistance and navigating federal and state grants.	Municipalities	High	Ongoing	High	FEMA
TRORC will continue to do outreach on preparedness by individuals and continuity planning for businesses so they are better prepared for expected incidents.	TRORC/VEM	Low	Ongoing	High	FEMA
Vermont should look into statewide building codes for residential wood heating systems.	State	Low	Mid-term	Low	State

ENERGY: CHAPTER 11

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Electricity Conservation and Renewable Generation					
TRORC will provide education and outreach to municipalities on energy generation.	TRORC	Low	Ongoing	High	DPS
TRORC will advocate for continued incentives that lead to the retirement of Renewable Energy Credits instate.	TRORC	Low	Long-term	High	DPS
TRORC will help interested towns meet the standards set forth in Act 174 for Enhanced Energy Planning so that local preferences receive "substantial deference" in the Public Utility Commission's Section 248 proceedings. "Substantial deference" is a term used in statute but has not been further defined in proceedings or litigation.	TRORC	Moderate	Ongoing	High	DPS
TRORC should promote the use of programs such as eHome and Zero Energy Now! in conjunction with Green Mountain Power and the Building Performance Professionals Association of Vermont (BPPA-VT) through outreach and education.	TRORC	Low	Ongoing	Medium	DPS
The Department of Public Service (DPS) should work with BPPA-VT to encourage HVAC and weatherization providers to join the organization to provide holistic energy advice to the Region.	DPS	Low	Long-term	Medium	DPS
DPS and TRORC should support and provide outreach for Energy Action Network's Community Energy Dashboard and Efficiency Vermont's customer engagement web portal and home energy reports.	DPS/TRORC	Moderate	Ongoing	Medium	DPS
TRORC and DPS should support efforts to develop programs that encourage energy conservation through behavioral change by advocating for a roll-out of smart rates in the Region.	TRORC/DPS	Low	Long-term	Medium	DPS
TRORC should fully integrate energy planning into the technical assistance it provides its member towns.	TRORC	N/A	Ongoing	Medium	State
TRORC will work with partners to promote a wide variety of renewable energy generation types, including adding photovoltaic solar installations and wind turbines, optimizing existing hydroelectric dams, promoting sustainable use of biomass and bio-digesters, and encouraging passive solar building designs.	TRORC/Efficiency VT	Low	Ongoing	High	DPS

ENERGY *(continued)*					
Action	**Lead/ Partner**	**Estimated Cost**	**Timeline**	**Priority**	**Potential Financing**
TRORC will develop easy to understand materials about the State's energy goals and how they interact with local and regional planning.	TRORC	Low	Long-term	High	DPS
TRORC will maintain an enhanced energy compliant Regional Plan in order to play a stronger regional role in the Public Utilities Commission (PUC) permitting process.	TRORC	Low	Short-term	High	State
TRORC will work with member towns on exploring possible shared energy program services aimed at improving efficiency and adoption of electrification and conservation measures, including hiring a multi-town energy coordinator.	TRORC	Moderate	Ongoing	Medium	DPS
Transportation and Land Use					
TRORC will encourage compact development, particularly housing, within town villages and downtowns and encourage a reduction of planned density in more rural areas.	TRORC	Low	Ongoing	High	State
TRORC will encourage communities to develop bylaws that allow for the development of co-working spaces as a way to reduce VMT.	TRORC	Low	Ongoing	Medium	ACCD
Employers should invest in workplace incentives for carpooling, cycling, public transportation use, and telecommuting.	Businesses	Moderate	Ongoing	High	VTrans
TRORC will work with groups such as the Vermont Bicycle and Pedestrian Coalition (VBPC), Local Motion, Green Mountain Bicycle Club, and towns to encourage safe bicycling as a transportation alternative in the Region.	TRORC	Low	Ongoing	Medium	VTrans
TRORC will provide technical assistance to communities interested in implementing Complete Streets to increase density and mixed uses in compact settlements and to foster transit-oriented development along major roads in rural areas.	TRORC	Moderate	Ongoing	High	VTrans
TRORC will continue to identify locations for additional park and rides (state and municipal) and work to expand existing park and ride infrastructure.	TRORC	Low	Ongoing	High	VTrans
TRORC will push for increased capacity and continue to support local transit providers through technical assistance.	TRORC	High	Ongoing	High	VTrans
TRORC will work with VTrans and local transit providers to ensure a seamless regional transit system and to explore possibilities for additional buses or routes.	TRORC	Low	Ongoing	High	VTrans

ENERGY *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will work with VTrans to investigate the feasibility of commuter rail along the I-91 corridor.	TRORC and VTrans	High	Long-term	Low	VTrans
TRORC will work with communities to incorporate the principles of smart growth into their municipal plans and bylaws and to support creative economic development concepts that allow residents to live and work in their communities.	TRORC and Municipalities	Low	Ongoing	High	VTrans
TRORC will promote and share information provided by Drive Electric Vermont, including their video highlighting the costs and benefits of EVs.	TRORC	Low	Ongoing	Medium	DPS
TRORC should identify locations for alternative fuel stations (electric, biodiesel, etc.) in the Region and modify the Regional Plan to include them as allowed uses in appropriate locations.	TRORC	Low	Long-term	Low	DPS
TRORC should support efforts to switch municipal medium and heavy duty vehicles to biodiesel blends.	TRORC	High	Long-term	Low	DPS
Thermal Energy					
TRORC will support programs such as Zero Energy Now!, Weatherize Upper Valley with Vital Communities, and GMP's eHome by providing outreach and education to local planning commissions and energy committees and their communities.	TRORC	Low	Ongoing	Medium	DPS
TRORC will support and promote the Energy Action Network (EAN) energy dashboard and educate towns as to its use and benefits.	TRORC	Low	Ongoing	Medium	DPS
TRORC will distribute information regarding the available financing mechanisms for weatherization assistance, including information about the financial advantages of energy improvements.	TRORC	Low	Ongoing	Medium	DPS
TRORC should seek funding for an energy planning staff person who can work with towns, homeowners, and businesses to implement weatherization, energy efficiency, and renewable energy projects.	TRORC	Moderate	Long-term	Low	DPS
TRORC will work with utilities to implement their Renewable Energy Standard (RES) Tier 3 fuel-switching mandates through education and outreach to help promote weatherization.	TRORC	Low	Ongoing	Medium	State
DPS should work with fuel dealers to encourage them to become energy service providers.	DPS	Low	Ongoing	Low	DPS

ENERGY *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Local energy committees should work with owners of rental housing to educate them on the financial benefits of weatherization investments and should connect owners with contractors to complete weatherization projects.	Local Energy Committees	Low	Long-term	Medium	N/A
DPS should support K-12, higher education, and vocational education initiatives to bring energy ideas and solutions into the classroom by working with organizations such as the Vermont Energy Education Program (http://veep.org/).	DPS	Moderate	Ongoing	Medium	DPS
Local energy committees should work with Neighborworks Heat Squad, COVER, and community action agencies to promote their weatherization services.	Local Energy Committees	Low	Ongoing	Medium	N/A
DPS should work with local educational institutions such as Vermont Technical College to encourage continued technical training related to energy efficiency improvements.	DPS	Low	Ongoing	Medium	DPS
TRORC and towns should support programs and initiatives that encourage the development of small homes (less than 1,000 square feet) as a way to reduce energy use.	TRORC	Low	Long-term	Medium	ACCD
TRORC will provide outreach to towns and contractors on the use and enforcement of residential and commercial building energy standards for all new construction.	TRORC	Low	Ongoing	High	DPS
TRORC will support statewide efforts to increase energy efficiency code standards and statewide energy code enforcement by communicating regional concerns about enforcement with the Legislature and encouraging communities that have zoning to include a certificate of occupancy when they revise their regulations if they do not already have one.	TRORC	Moderate	Ongoing	High	DPS
TRORC should provide outreach to communities with a COO to ensure that they are tracking submissions of the RBES certificate.	TRORC	Moderate	Ongoing	High	DPS
TRORC will partner with Efficiency Vermont, Green Mountain Power, HVAC contractors, and others to promote cold climate heat pumps.	TRORC	Low	Long-term	High	DPS
DPS should coordinate all outreach efforts with fuel dealers and electrical contractors (potentially creating opportunities for electrical contractors to work with fuel dealers).	DPS	Low	Long-term	Medium	DPS

ENERGY *(continued)*					
Action	**Lead/ Partner**	**Estimated Cost**	**Timeline**	**Priority**	**Potential Financing**
TRORC should provide communities with an analysis of potential areas that are suitable for geothermal ground source heat pumps when data is available.	TRORC	Low	Long-term	Low	DPS
Local energy committees should provide information to builders and developers regarding the benefits of geothermal systems (including heat pumps).	Local Energy Committees	Low	Long-term	Medium	N/A
TRORC, towns, and relevant nonprofits, including the Northern Forest Center, should conduct outreach and education by coordinating with advanced wood heat system vendors and contractors to hold informational public forums.	TRORC/ Municipalities/ NGOs	Low	Ongoing	Medium	Various
TRORC should provide outreach and education to communities to ensure residents are aware of existing incentives and rebates.	TRORC	Low	Ongoing	High	DPS
DPS should provide guidance to communities seeking to develop district heating systems.	DPS	Low	Long-term	Medium	DPS
DPS should conduct outreach efforts to public and nonprofit entities and housing organizations to provide information on biomass heating options.	DPS	Low	Long-term	Medium	DPS
Local energy committees should partner with project developers to promote the possibility of combined heat and power and district heating options.	Local Energy Committees	Low	Ongoing	Low	N/A
TRORC will support state efforts to provide additional funding for weatherization improvements, especially for low-and-moderate income populations.	TRORC	High	Ongoing	High	State
The State should support woodstove change, out programs to lower heat cost and reduce particulate emissions.	State	Moderate	Long-term	High	State
Utility-Scale Renewable Energy Siting					
TRORC will encourage communities and residents to identify areas with the potential for renewable energy siting.	TRORC	Moderate	Ongoing	High	DPS
TRORC should provide support for grid improvements that will allow improved renewable energy generation facility coverage in our Region by actively participating in the Act 250 and Section 248 review process.	TRORC	High	Long-term	High	DPS

ECONOMIC DEVELOPMENT: CHAPTER 12

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will provide grant management, Act 250 support, and local regulatory reform assistance to further the development of job growth and workforce housing in areas close to employment and service opportunities.	TRORC	Low-Moderate	Ongoing	High	Various
TRORC will participate in discussions to improve the regulatory system at the state level and improve permitting coordination between local and state levels of government.	TRORC	N/A	Ongoing	Medium	N/A
TRORC will assist towns with village and downtown designation to provide incentives in these areas.	TRORC	Low	Ongoing	High	Various
TRORC will work in concert with towns and development organizations to provide technical support (such as support with permitting, funding, or brownfield assistance) to businesses wishing to stay in or relocate to core areas.	TRORC, Nonprofits	Low	Ongoing	Medium	Various
TRORC will work with Vermont state agencies, regional and local development groups, trade associations, Chambers of Commerce, planning commissions, and other groups to integrate land use planning with economic planning and development programs based on our Region's assets.	TRORC, State, Municipalities, Non-profits	N/A	ASAP	High	N/A
TRORC will review and recommend revisions to zoning bylaws and other land use guidelines to ensure they actively support vitality in town centers, including infill, adaptive reuse of structures, increased height limits, and density bonuses.	TRORC	Low	Short-term	High	ACCD
TRORC will offer assistance to towns in asset management, capital budgeting, and shared services/purchasing in order to lower costs and stabilize taxes.	TRORC	Low	Ongoing	High	ACCD
TRORC will assist towns to apply for and manage grants and loans for infrastructure repairs and/or upgrades that bolster the livability of core areas.	TRORC	Low	Ongoing	High	Various

ECONOMIC DEVELOPMENT *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Public agencies, schools, and private businesses must expand workforce training and education that aligns with the strategic needs of our Region's current and future employers and expand linkages that allow the Region's youth to learn about local career opportunities and gain exposure to the workplace.	State, Municipalities, School Boards, Businesses	N/A	Short-term	Medium	N/A
TRORC and child care providers must work with member towns to address identified needs for child care facilities or services, including identifying publicly owned buildings throughout the Region suitable to serve as child care facilities.	TRORC, Municipalities, Businesses	Low-Moderate	Short-term	Low	Various
The State should map existing cellular and broadband services in the Region, identify gaps, and work with cellular companies to provide coverage in those gap areas, ensuring that all areas have good service that supports both current and future businesses and residents.	State	Low-Moderate	Short-term	Medium	Various
State, regional, and local economic development agencies should develop stronger financing/funding mechanisms for business expansion and entrepreneurship.	State, Nonprofits	N/A	Mid-term	High	N/A
The Small Business Development Center, Chambers of Commerce, and development corporations should develop a coordinated network of resources for businesses—including business coaching, financing, permitting assistance, and peer-to-peer networking—to equip current and would-be business owners with the skills needed to brand, promote, and effectively operate businesses.	Nonprofits, Businesses	N/A	Mid-term	Medium	N/A
TRORC will work with towns and development organizations in the Region to identify and inventory vacant and underutilized sites and buildings most suitable for near-term commercial and residential development in existing downtowns and villages where water, sewer, power, Internet, and roadways have capacity.	TRORC, Municipalities, Nonprofits	Low-Moderate	Short-term	Medium	Various
TRORC will support efforts to recognize businesses for excellence in creating better downtowns and villages.	TRORC, Businesses	N/A	Mid-term	Low	N/A

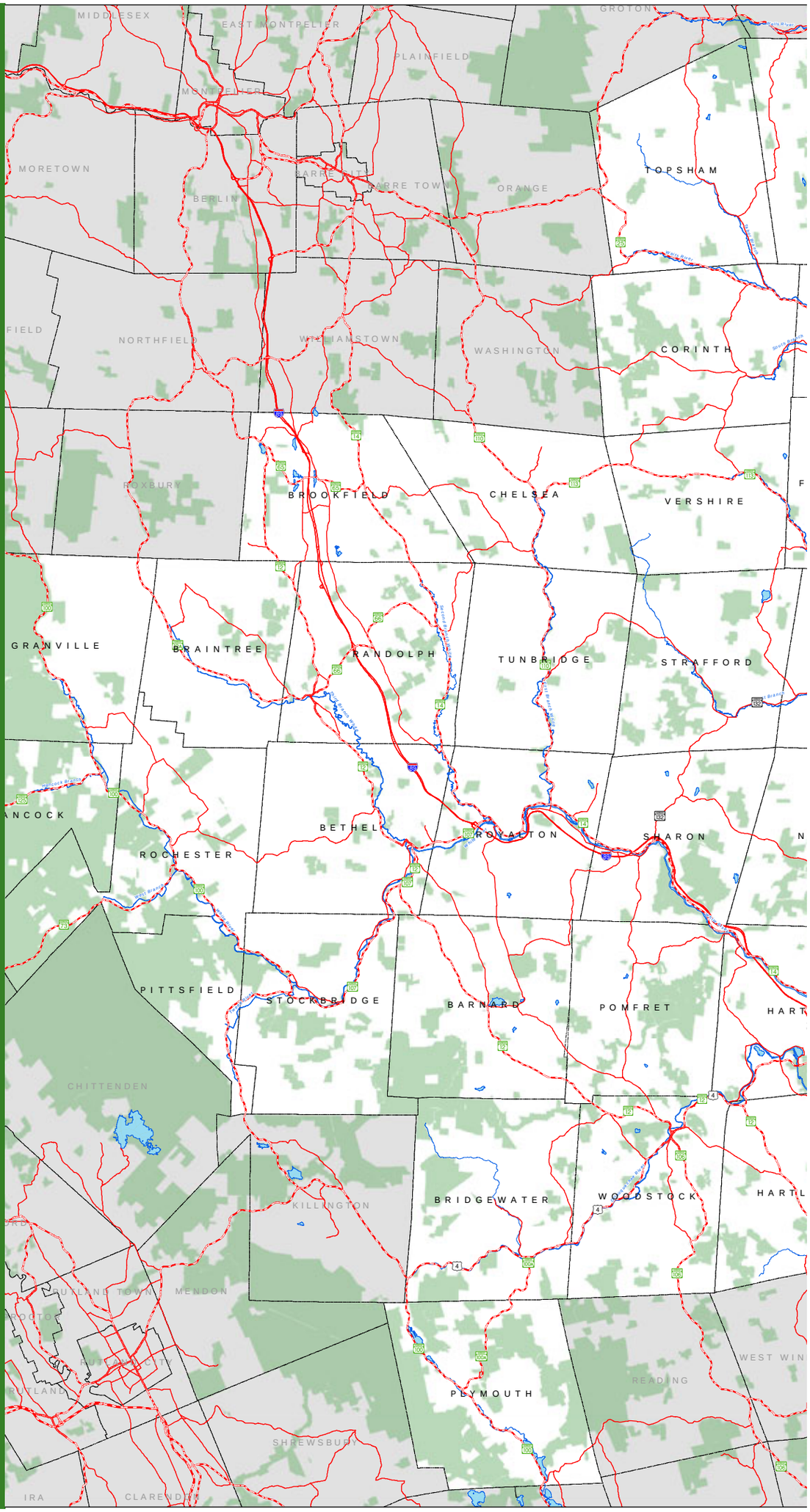
ECONOMIC DEVELOPMENT *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC should support and assist efforts that focus on how best to utilize our rivers as economic drivers while improving water quality and protecting the rivers' natural beauty, native animal and plant species, health, and unique character.	TRORC/Watershed Groups	N/A	Ongoing	Low	N/A
TRORC should work with local producers, development corporations, educational programs, the Vermont Agency of Agriculture and other organizations to identify and create needed processing, storage, and distribution capacity for locally made food and forestry products.	TRORC, State, Non-profits, Businesses	Low-Moderate	Short-term	Medium	Various
TRORC should work with land trusts and local conservation commissions to inventory farm and forest lands to understand where parcels are available that could provide opportunities for new farm and forest businesses and to assist towns in crafting regulations to reduce fragmentation and leave land available for farming, forestry, and other land-based businesses.	TRORC, Nonprofits	Low-Moderate	Short-term	Medium	Various
TRORC will work with the Vermont Arts Council to support regional and statewide creative zones.	TRORC/VAC	Low	Ongoing	Medium	Various

RELATIONSHIP OF TRORC REGIONAL PLAN TO NEIGHBORING PLANS: CHAPTER 13

Action	Lead/Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will continue to actively coordinate with neighboring commissions and other organizations to achieve planning goals.	TRORC	Low	Ongoing	High	State
TRORC will work with other regional planning commissions to influence state and national policies that support our communities.	TRORC	Low	Ongoing	High	State
TRORC will actively participate in the permitting and planning of development, infrastructure, or services outside the Region that can impact the Region.	TRORC	Low-Medium	Ongoing	High	State
TRORC will work with member towns when updating their Town Plans in order to consider being compatible with plans of neighboring towns.	TRORC	Low	Ongoing	High	State

BARNARD
BETHEL
BRADFORD
BRAINTREE
BRIDGEWATER
BROOKFIELD
CHELSEA
CORINTH
FAIRLEE
GRANVILLE
HANCOCK
HARTFORD
HARTLAND
NEWBURY
NORWICH
PITTSFIELD
PLYMOUTH
POMFRET
RANDOLPH
ROCHESTER
ROYALTON
SHARON
STOCKBRIDGE
STRAFFORD
THETFORD
TOPSHAM
TUNBRIDGE
VERSHIRE
WEST FAIRLEE
WOODSTOCK

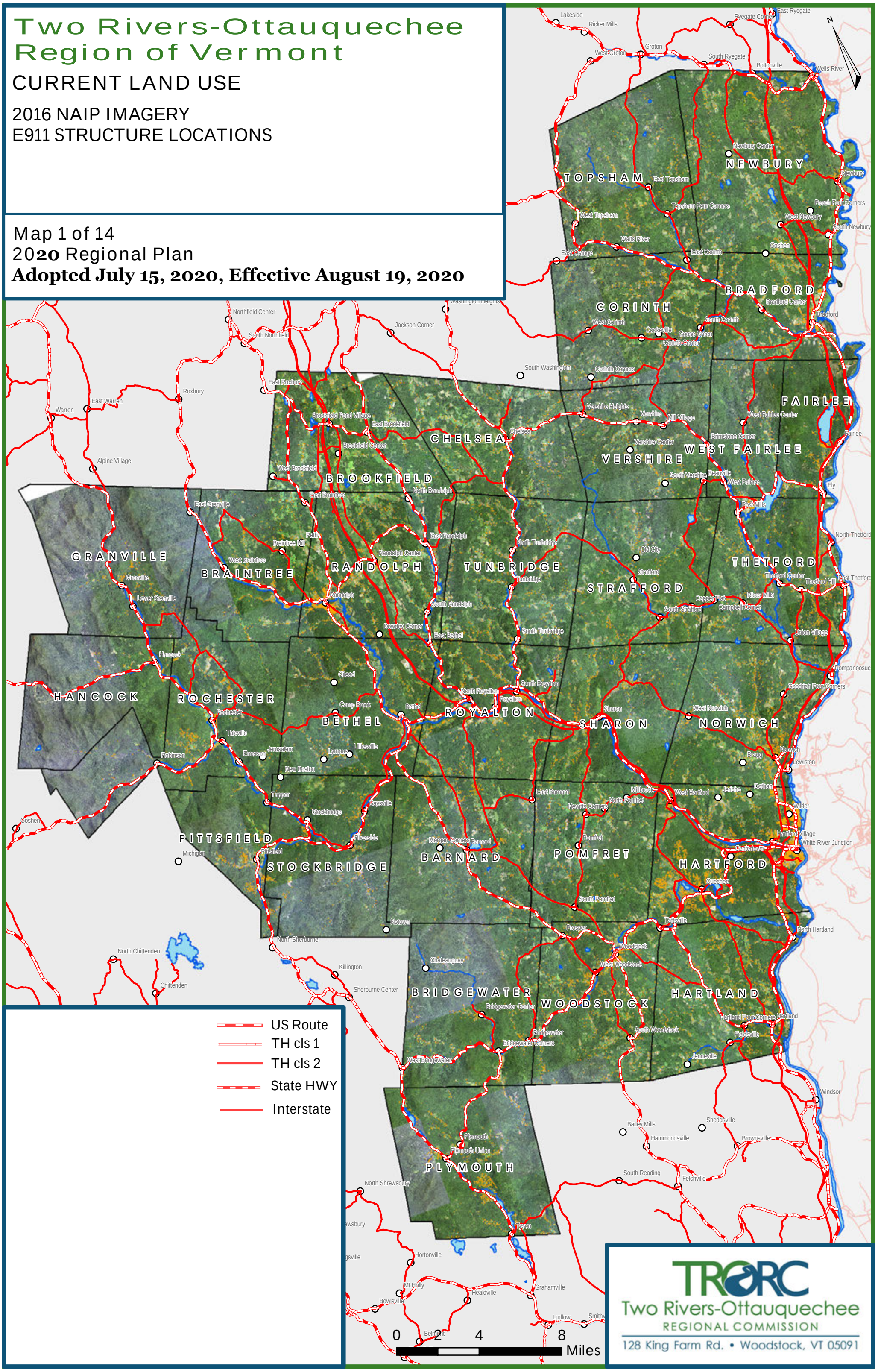


Two Rivers-Ottauquechee Region of Vermont

CURRENT LAND USE

2016 NAIP IMAGERY
E911 STRUCTURE LOCATIONS

Map 1 of 14
2020 Regional Plan
Adopted July 15, 2020, Effective August 19, 2020



Two Rivers-Ottauquechee Region of Vermont

STATE DESIGNATION DISTRICTS

Downtown, Growth Center, Village and TIF

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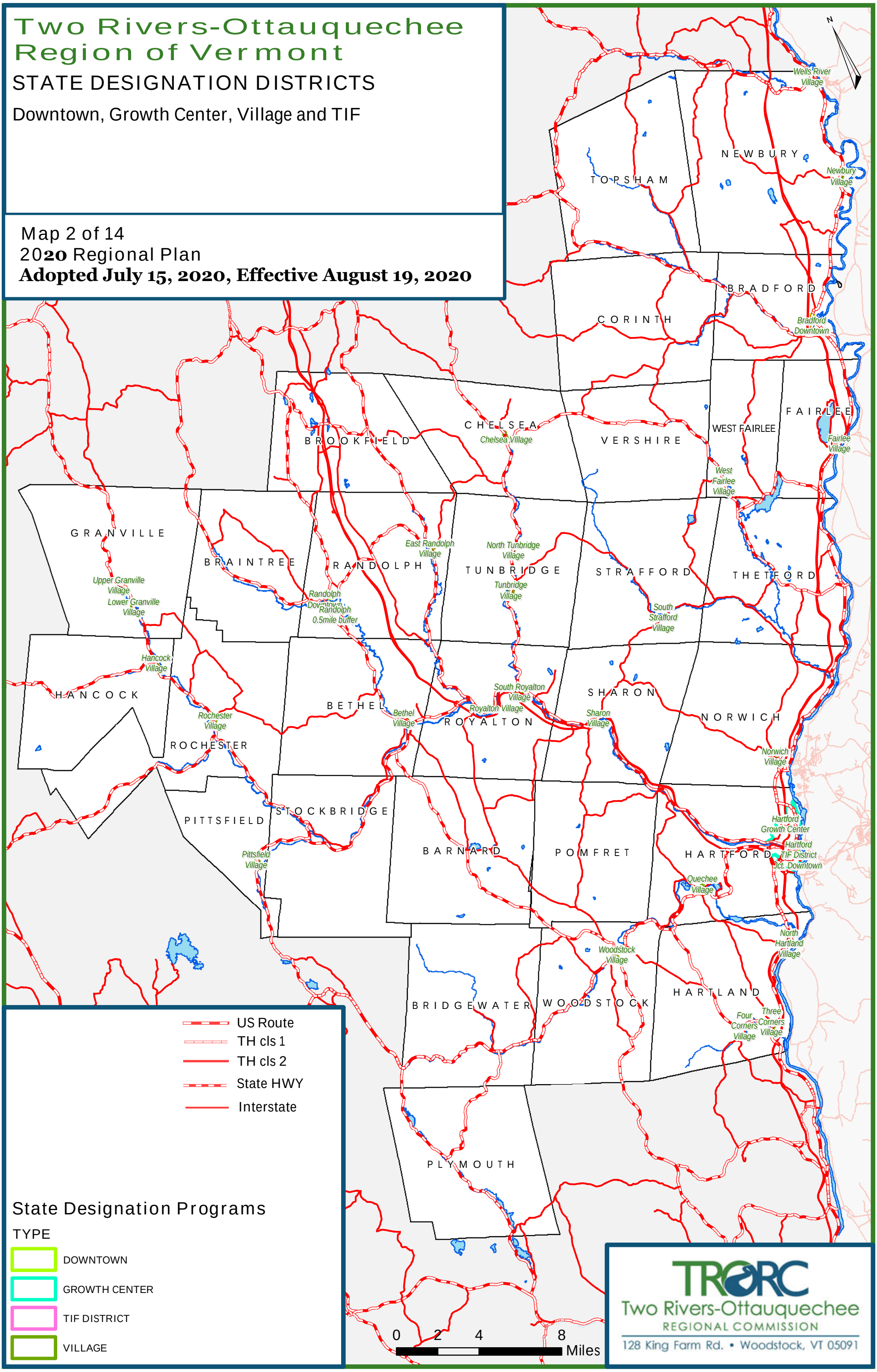

Two Rivers-Ottauquechee Region of Vermont

FUTURE LAND USE

TRORC Board designated future land use areas

Map 3 of 14
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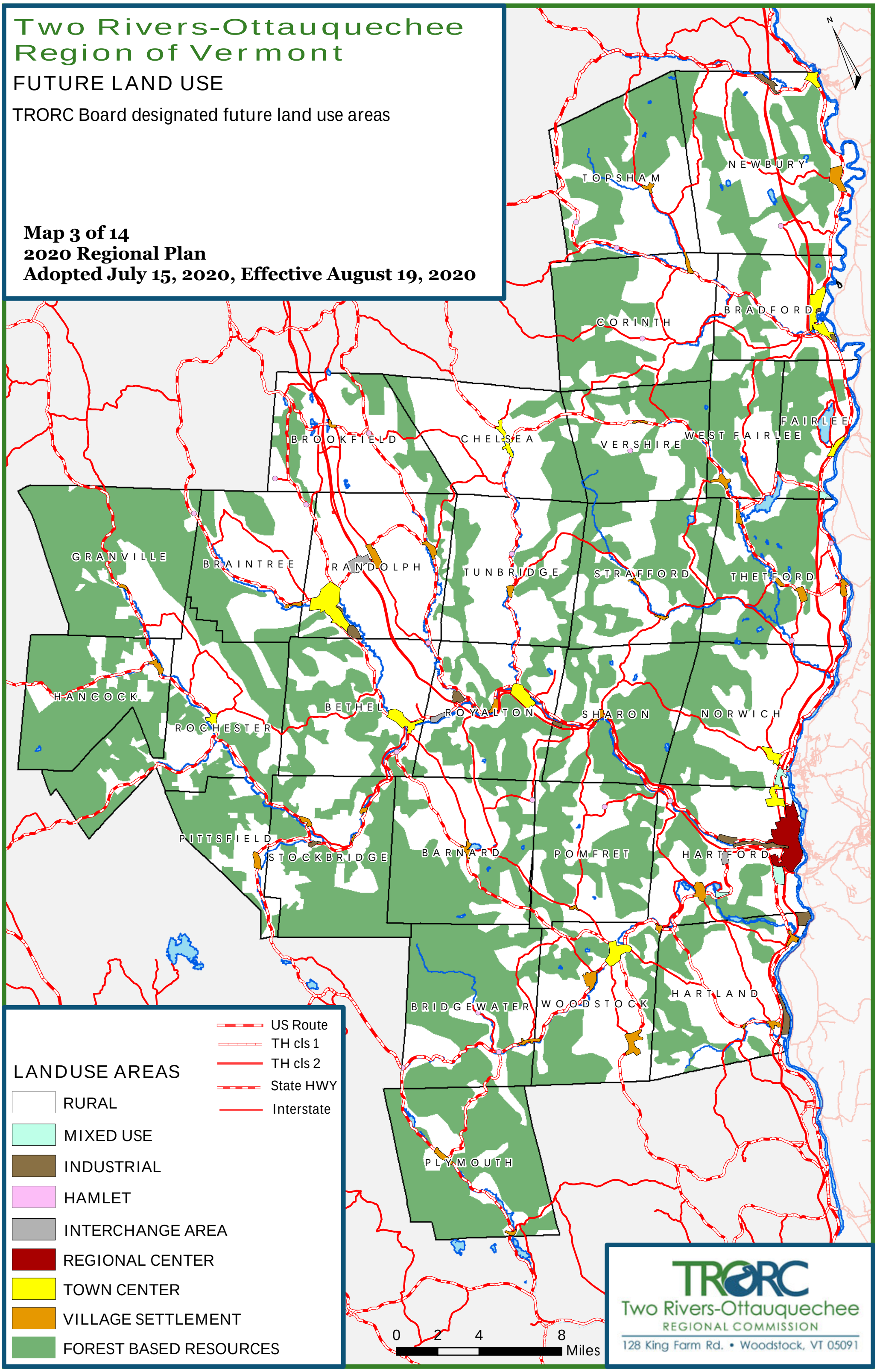

Two Rivers-Ottauquechee Region of Vermont

AGRICULTURE SOILS

USDA Prime, Statewide and Local Soil Designations

Map 4 of 14
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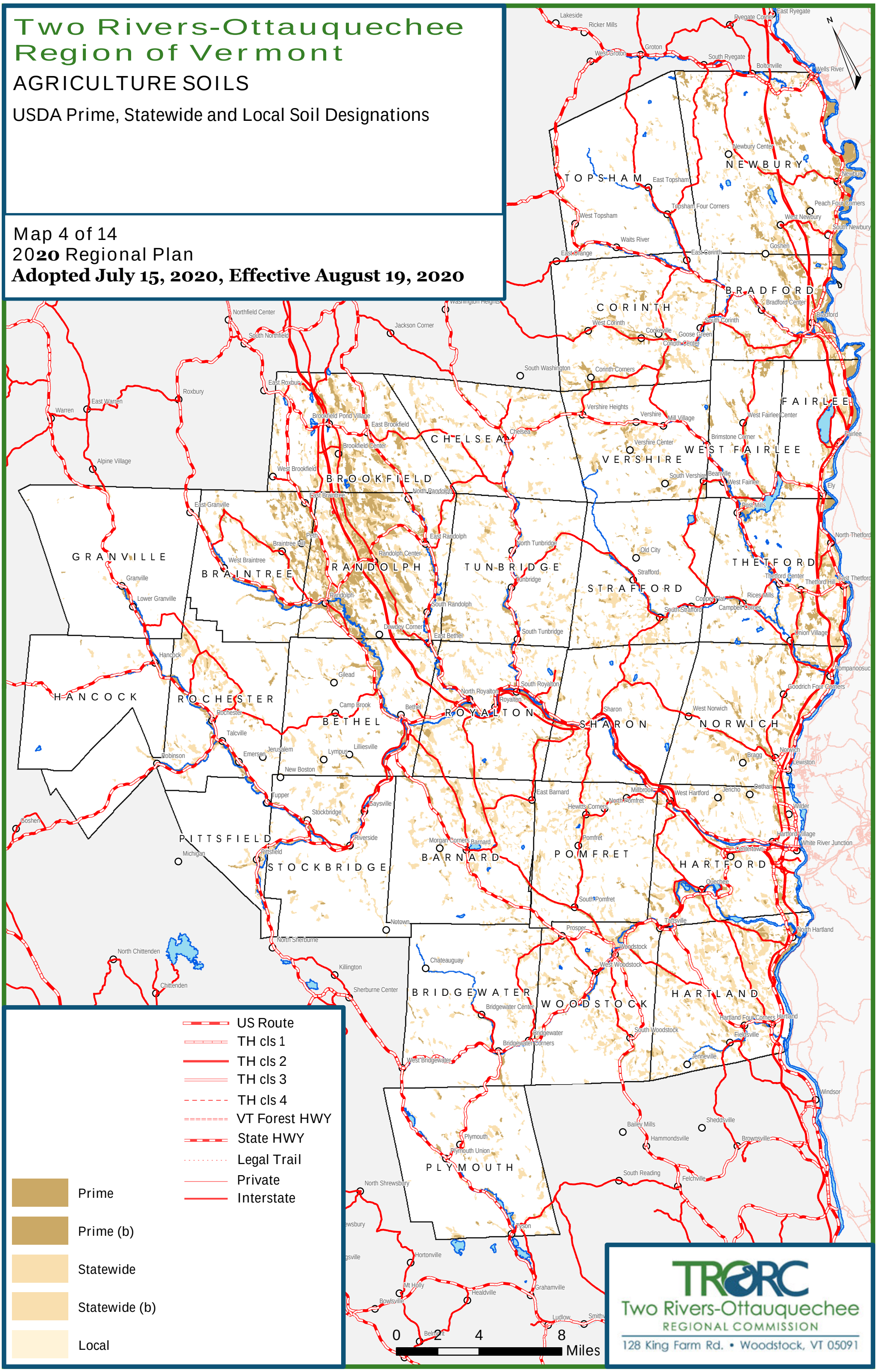

Two Rivers-Ottauquechee Region of Vermont

NATURAL RESOURCES

Rare, Threatened, Endangered Species & Natural Communities
Significant Natural Communities
Uncommon Species and Other Features
Highest Prioirity Interioir Forest Blocks
Highest Prioirity Connectivity Blocks

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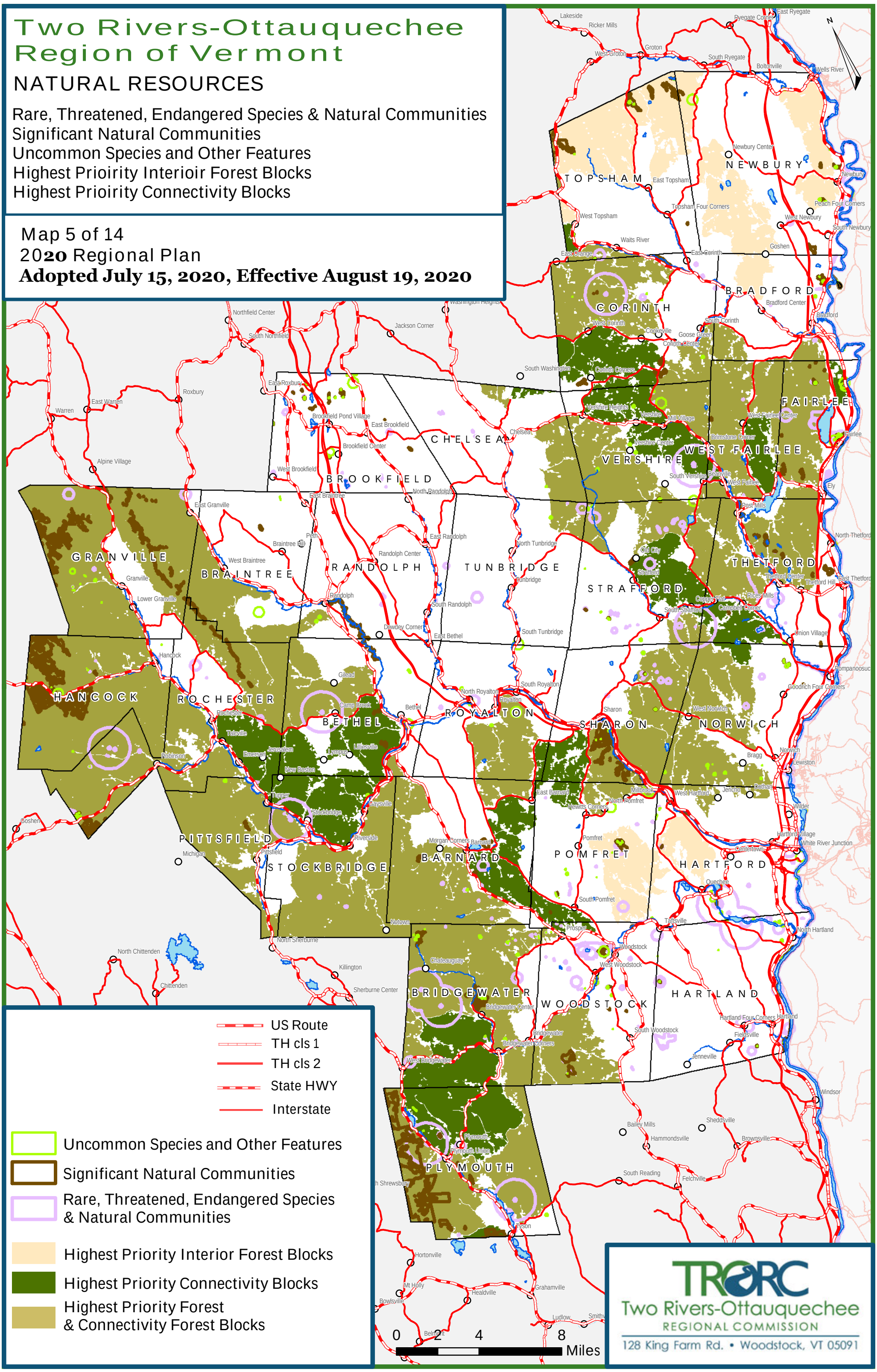

Two Rivers-Ottauquechee Region of Vermont

Watersheds and River Corridors

Watersheds
VT State River Corridor designations

Map 6 of 14
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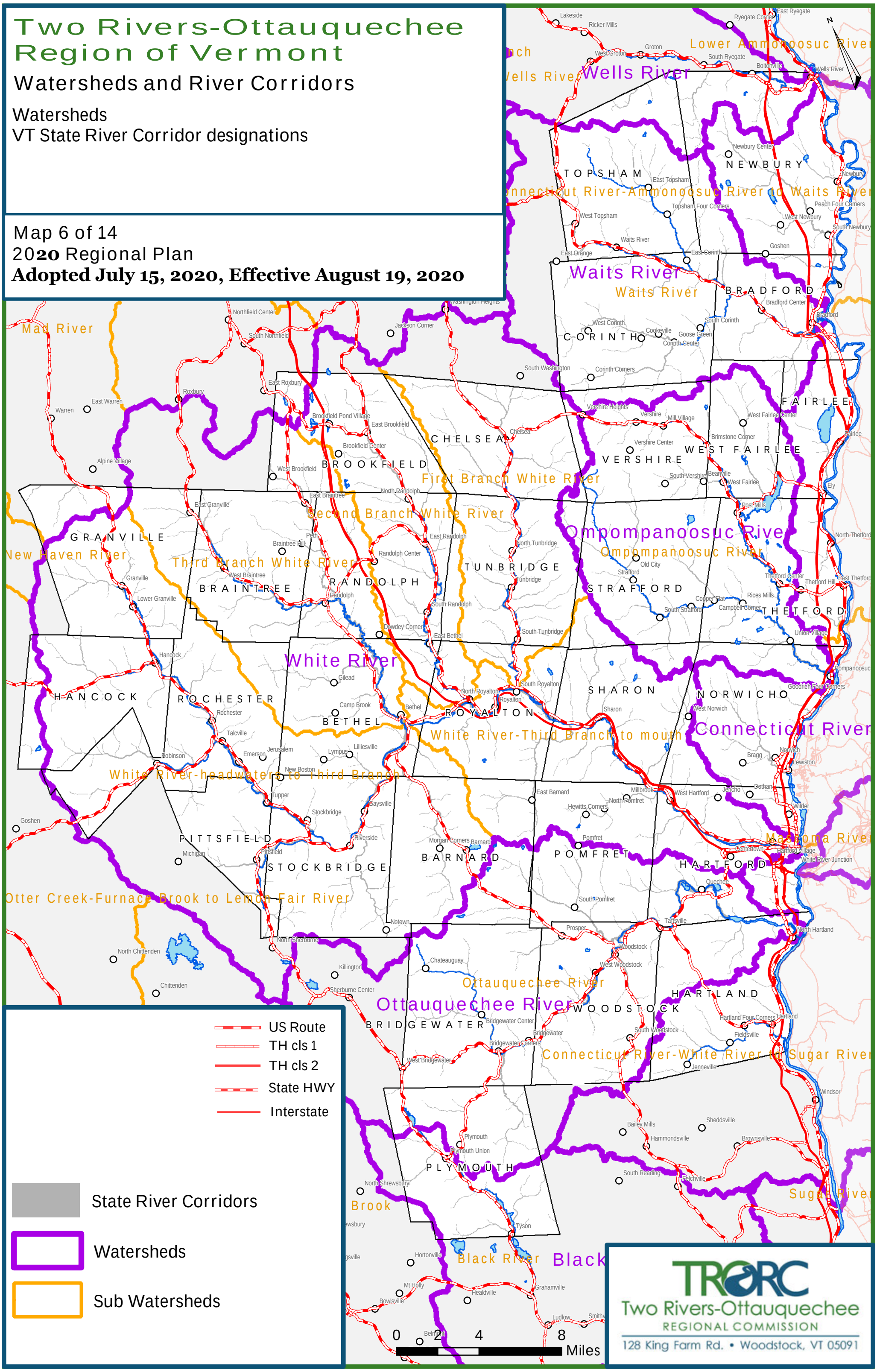

Two Rivers-Ottauquechee Region of Vermont

Water Resources and Protection

Surface Source Protection Areas
Groundwater Source Protection Areas
Vermont Significant Wetlands Inventory
Water Systems
Sewer Systems

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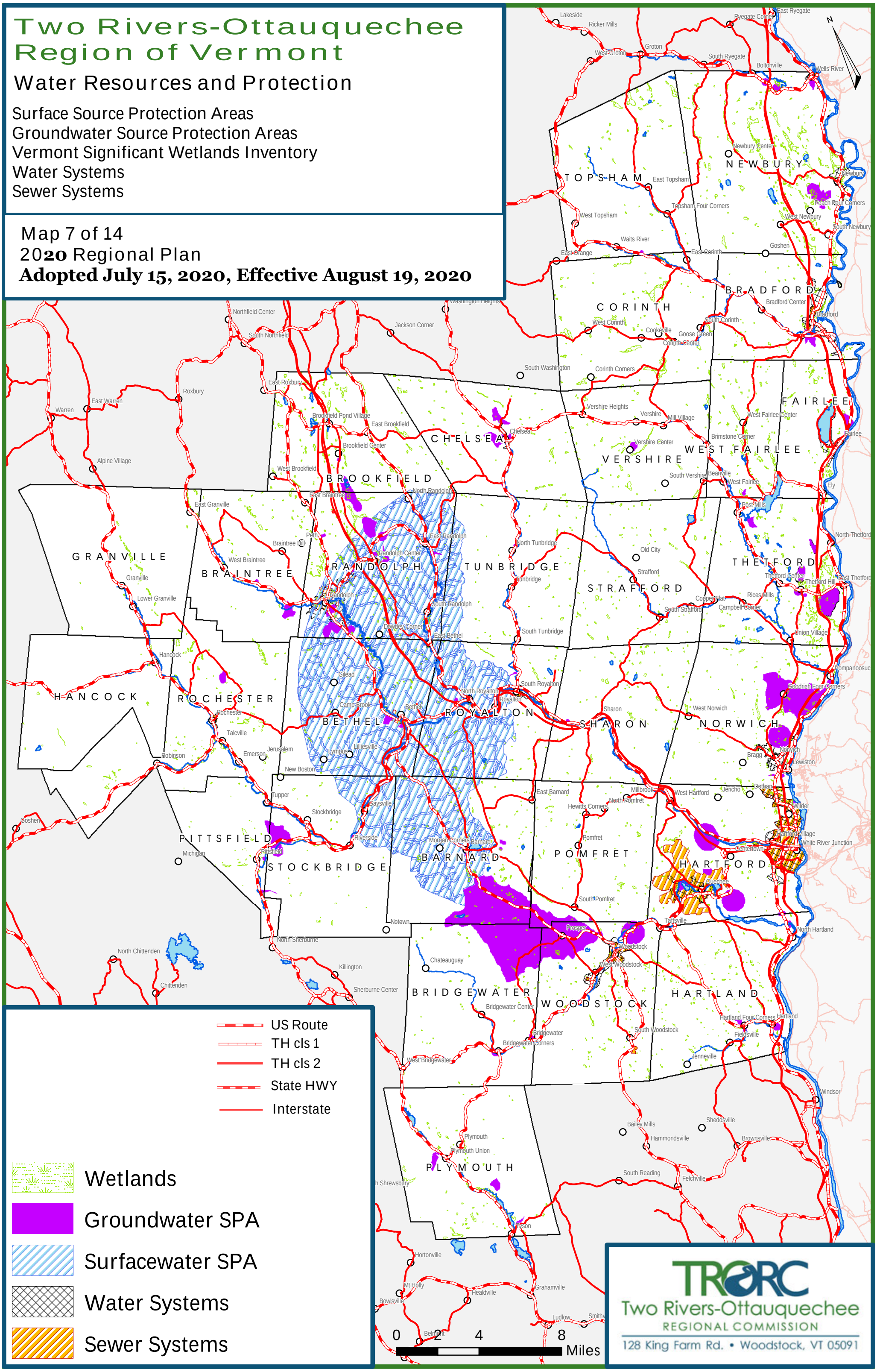

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Two Rivers-Ottauquechee Region of Vermont

Regionally Significant Transportation Facilities

Park and Rides
Transit Providers & Rail
AT and Long Trails
Bike Lanes and Paths
Federal & State Highway Systems

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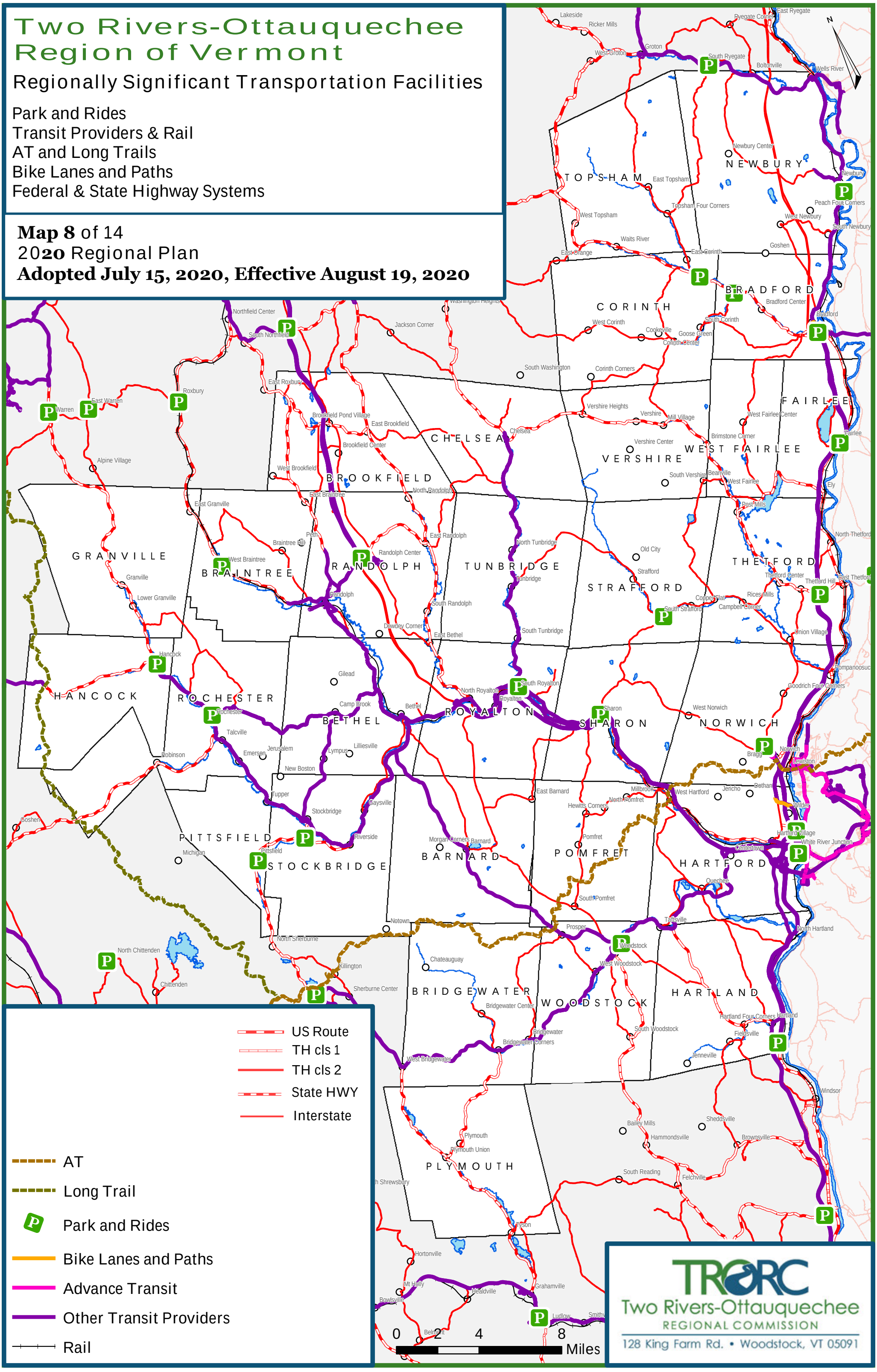

Two Rivers-Ottauquechee Region of Vermont

Regional Facilities

Municipal Facilities and WWTF
EOC/Shelters
Fire/EMS Services
Police Stations
Hospitals and Clinics

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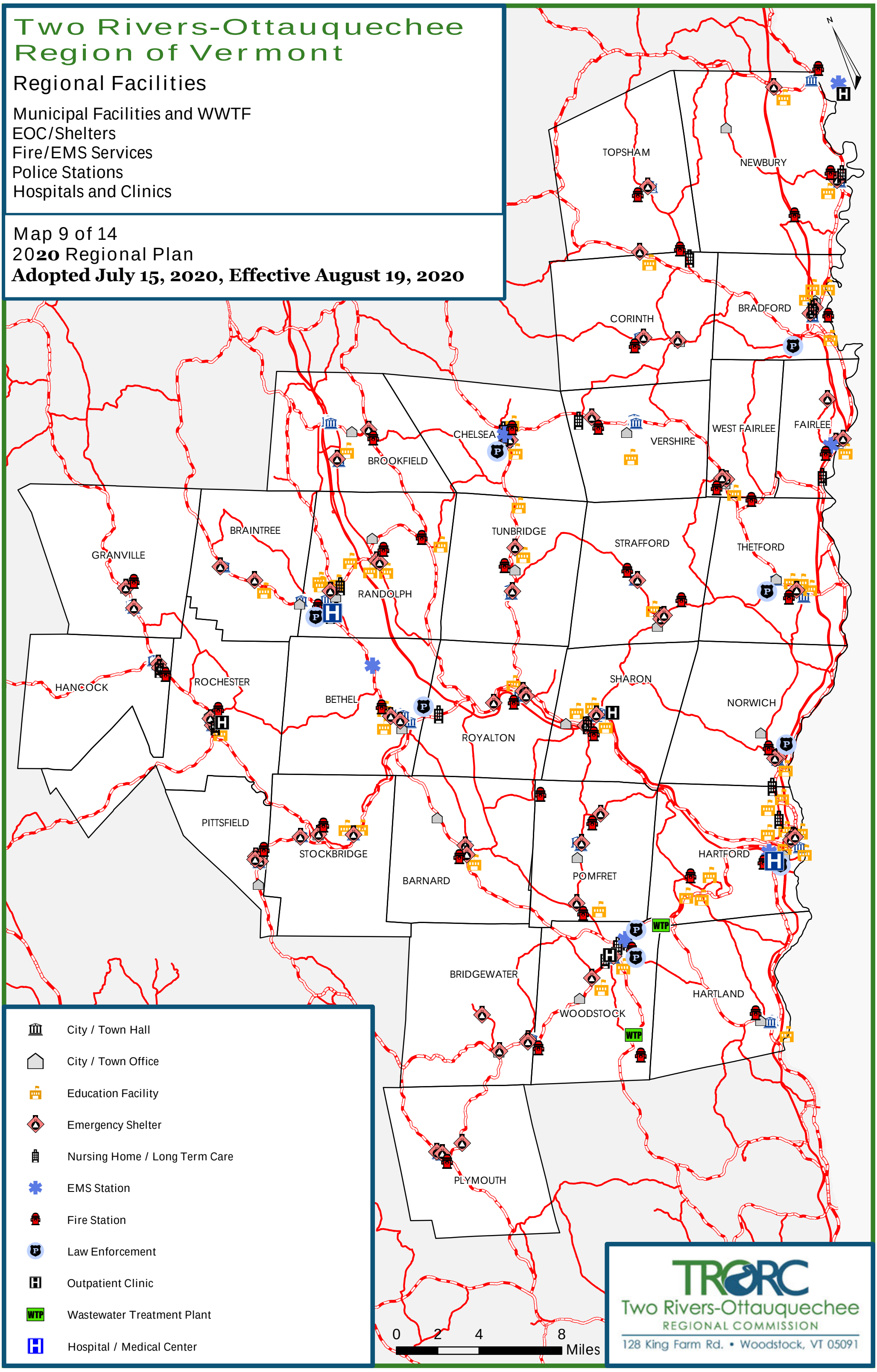

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Existing Energy Generation

Biomass, Hydroeletric, Solar, Substations,
3-Phase Power Lines, and Transmission Lines

Map 10 of 14
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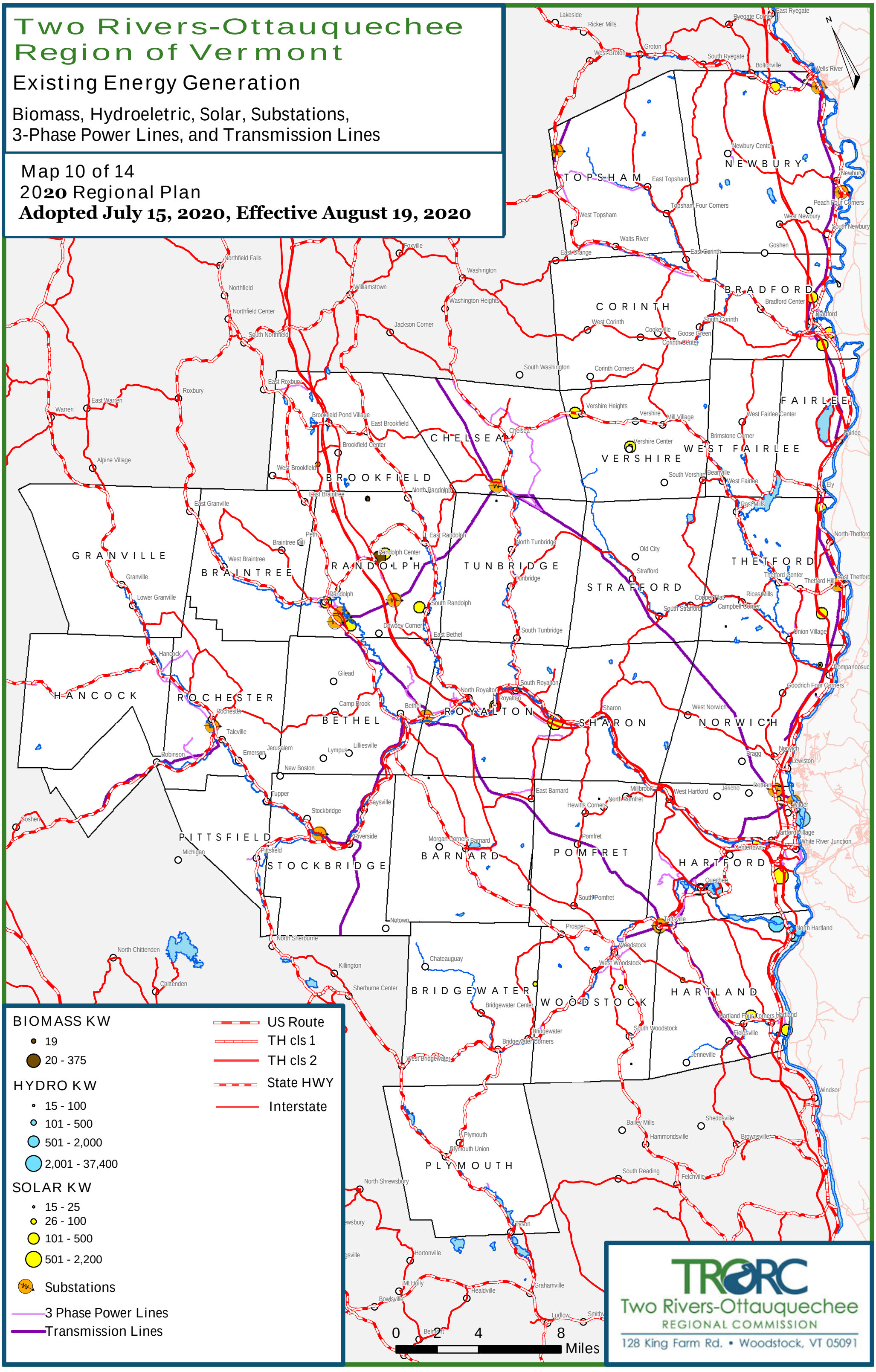

Two Rivers-Ottauquechee Region of Vermont

Hydroelectric Energy Potential

Operational Hydroelectric Facilities & Potential Hydroelectric Facilities

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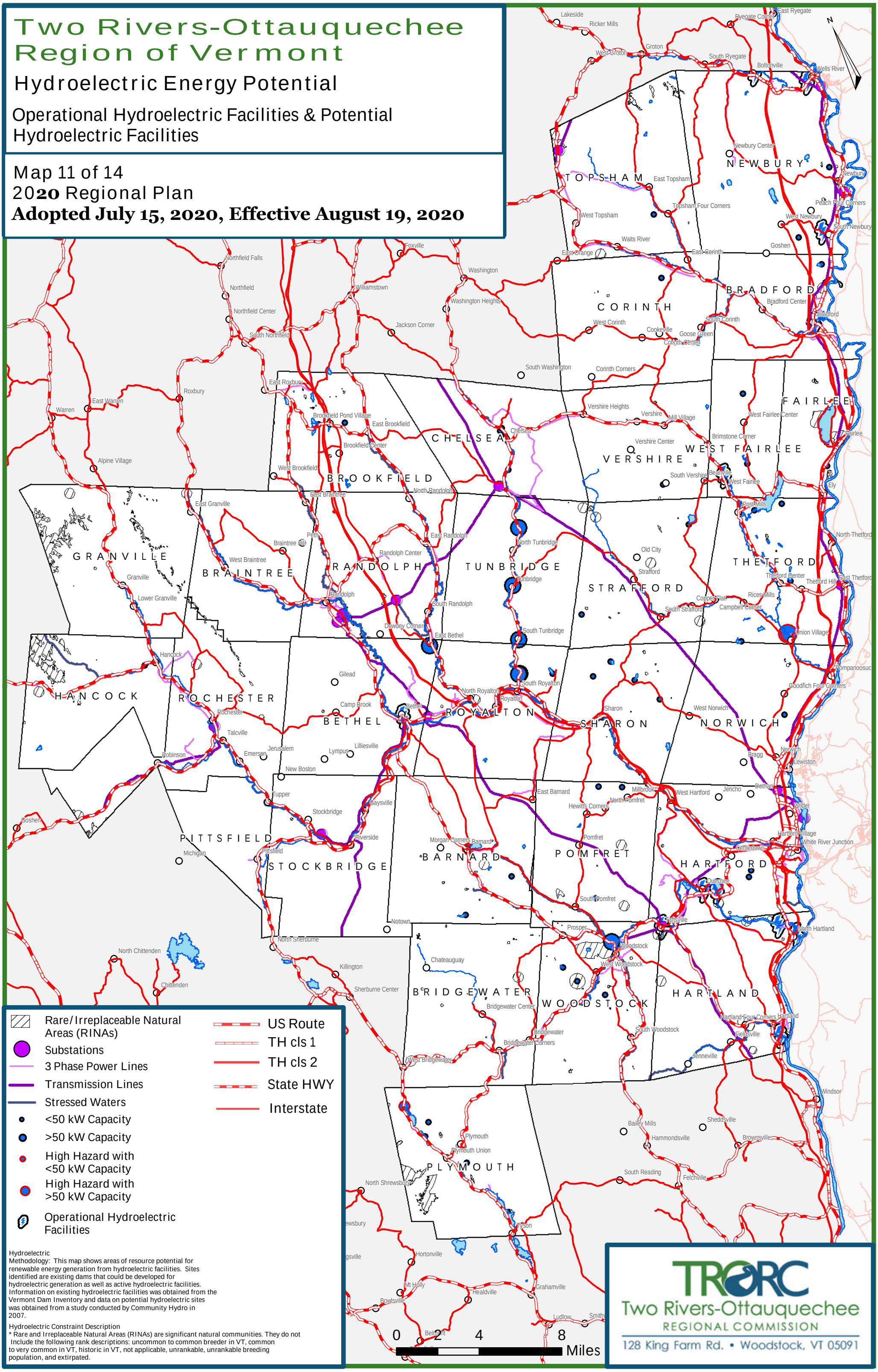

Hydroelectric
Methodology: This map shows areas of resource potential for renewable energy generation from hydroelectric facilities. Sites identified are existing dams that could be developed for hydroelectric generation as well as active hydroelectric facilities. Information on existing hydroelectric 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.

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.

Two Rivers-Ottauquechee Region of Vermont

Biomass Energy Potential

Woody Biomass

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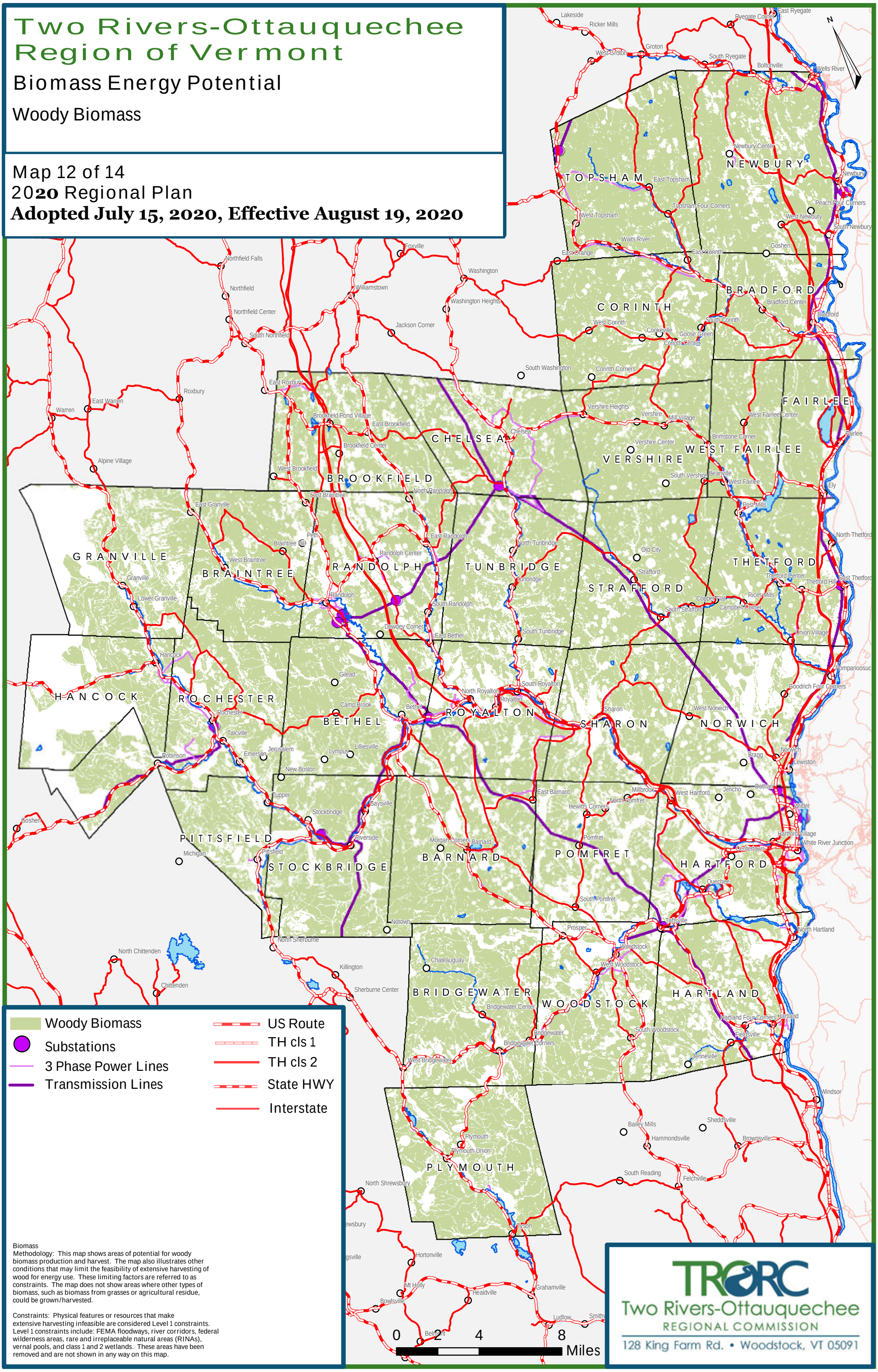

Biomass
Methodology: This map shows areas of potential for woody biomass production and harvest. The map also illustrates other conditions that may limit the feasibility of extensive harvesting of wood for energy use. These limiting factors are referred to as constraints. The map does not show areas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

Constraints: Physical features or resources that make extensive harvesting infeasible are considered Level 1 constraints. Level 1 constraints include: FEMA floodways, river corridors, federal wilderness areas, rare and irreplaceable natural areas (RINAs), vernal pools, and class 1 and 2 wetlands. These areas have been removed and are not shown in any way on this map.

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Solar Energy Potential

Prime solar, solar with constraints, prime solar within 1 mile of 3 phase transmission lines, and RAW solar

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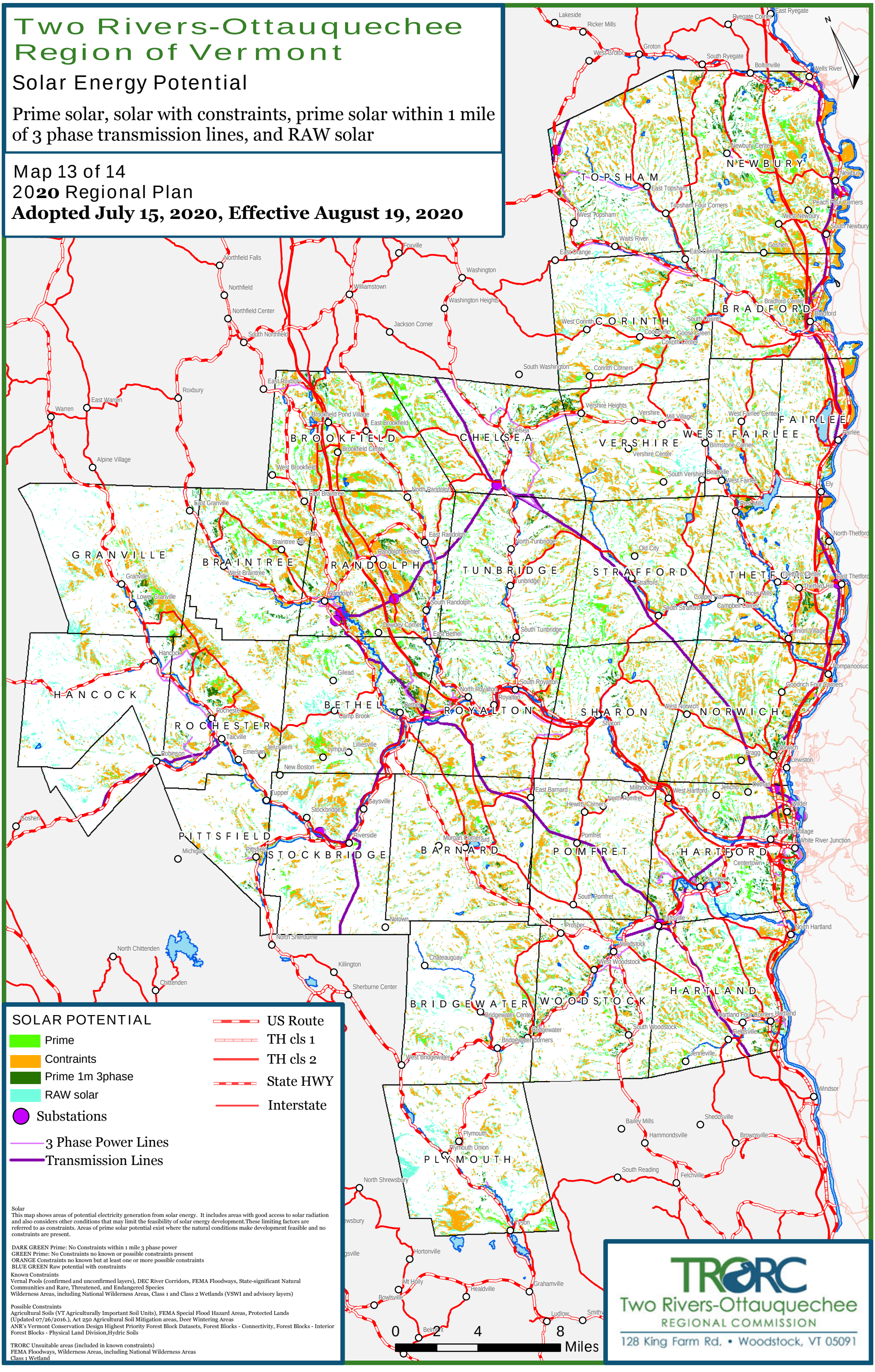

Two Rivers-Ottauquechee Region of Vermont

Wind Energy Potential

Prime wind, wind with constraints, prime wind within 1 mile of 3 phase transmission lines, and RAW wind

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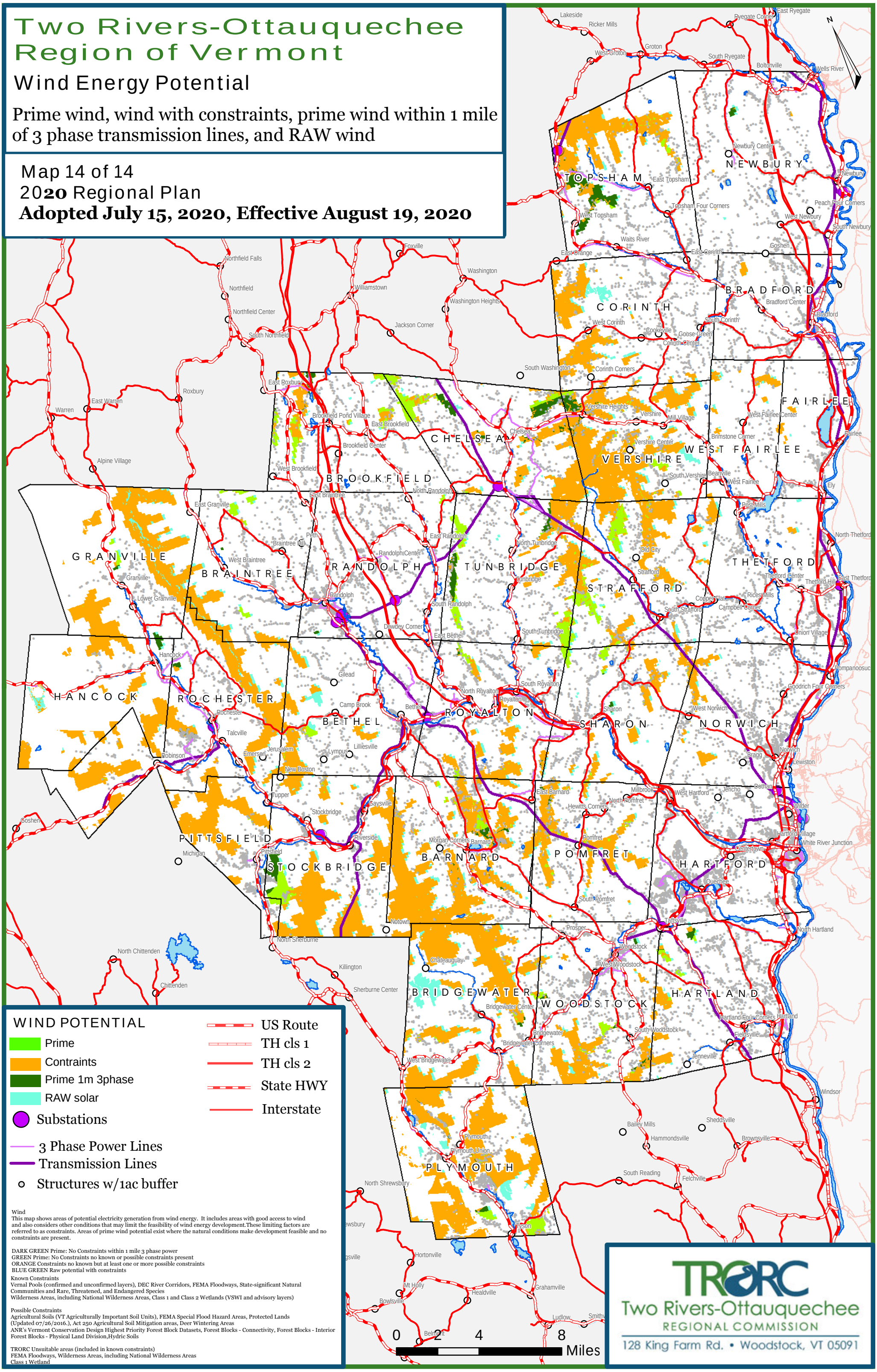

Wind
This map shows areas of potential electricity generation from wind energy. It includes areas with good access to wind and also considers other conditions that may limit the feasibility of wind energy development.These limiting factors are referred to as constraints. Areas of prime wind potential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

DARK GREEN Prime: No Constraints within 1 mile 3 phase power
GREEN Prime: No Constraints no known or possible constraints present
ORANGE Constraints no known but at least one or more possible constraints
BLUE GREEN Raw potential with constraints

Known Constraints
Vernal Pools (confirmed and unconfirmed layers), 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
Agricultural Soils (VT Agriculturally Important Soil Units), FEMA Special Flood Hazard Areas, Protected Lands (Updated 07/26/2016.), Act 250 Agricultural Soil Mitigation areas, Deer Wintering Areas
ANR's Vermont Conservation Design Highest Priority Forest Block Datasets, Forest Blocks - Connectivity, Forest Blocks - Interior Forest Blocks - Physical Land Division,Hydric Soils

TRORC Unsuitable areas (included in known constraints)
FEMA Floodways, Wilderness Areas, including National Wilderness Areas
Class 1 Wetland