



WORKING LANDSCAPE: AGRICULTURE AND FORESTRY

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Ware Farm: Tunbridge | Source: ©First Light studios

A. Introduction

The Two Rivers-Ottawaquechee (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 1800's, 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 is has today. Without good forestry practices, we would not have healthy forests. Without farming

we would not have open rolling fields. In order to maintain our working landscape and the occupations it supports, we must recognize their contributions to our region and be prepared to address the challenges to their sustainability.

B. Agriculture

In 2014, the Vermont Agency of Agriculture, Food & 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 entrepreneurship that extend well beyond the farm. As such, to continue to receive the benefits farming has to offer, the TRORC and our communities must continue to support agriculture.

Farming Trends

An analysis of the United States 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 away from the larger scale farms that developed as a result of trends toward consolidation. Between 2002 and 2012, the number of farms in Vermont increased by more than 11%. Growth in farms was at its highest among smaller farms, specifically in the 10 to 49 acre range.

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

The overall trend in farm growth in Vermont and the Two Rivers-Ottawaquechee region is in farms that are considered “small scale.” “Small-scale” farms are those 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% 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.

While the number of larger farms (between 180-1000 acres) has declined between 2002 and 2012, there has been growth in Vermont’s largest farms (2000 acres or more) as operating farms purchase the land and stock of neighboring farms when they 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. They’re 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 distributors, Vermont’s agricultural economy has

** Unfortunately, aggregated data at the regional level is unavailable.*

almost 9000 businesses employing nearly 30,000 people.* This economic boon is due in great part to the growing movement in sustainable diversified agriculture—which involves increased local food production and consumption, value-added processing, and diversified farms. In 2012, USDA data indicated the estimated agricultural revenue in Vermont to be \$775 million per year. That number increased to \$2.9 billion when food product output is also considered.

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

Challenges

Loss of Farmland:

Vermont has lost (on average) nearly 8000 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.¹ 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.

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 through agreements with the landowner. Much of the production on these lands is focused on the generation of feed through hay or corn, although some grazing takes place as well. The need to generate feed locally is a strong one, as grain costs are often unstable due to external market fluctuations (such as fuel costs). Local farmers are dependent on a wide range of property owners who are willing to lease their property for the purposes haying or growing corn for feed.

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This relationship can create potential challenges for the farmer. When landowners sell their property to someone who intends to build a home on it, it takes that farmable land 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.² While not without expense, local feed production is more cost-effective than purchasing feed. Keeping farmland in farming is a critical concern as good agricultural land is developed, it is permanently lost to farming and the production of food, forage, and fiber.

Aging Farmers:

The average age of Vermont farmers is 56 and over a quarter are 65 and older.³ 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.

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A growing number of young people are interested in becoming farmers or starting a food enterprise business. The challenge is that most farms 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 exceeds its economic value for agriculture purposes. These high property tax bills coupled with the low prices paid in this country for commodity agricultural products like milk, population growth and in-migration, a demand for more housing and accompanying 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 or commercial forest land 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.

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. This program requires that agricultural lands or working forests have management plans to ensure they are actually not just simply being left wild (there is no Current Use program for conservation purposes). The main incentive for Current Use is that it allows participating landowners to have their forest or farmlands valued for their productivity, rather than for development potential, creating a large tax savings. In order to keep the program from being used to simply avoid taxes, there is a penalty for withdrawing from the program, but it is widely seen relatively small, compared to the savings.

The primary objectives of the Program have been to preserve Vermont's agricultural and forestlands, and keep them in production, and achieve greater equity in property taxation based on use. Forty-six percent (46%) of the Region's total land is enrolled in some form of Current Use, a significant percentage of these lands are forested. Out of the total lands enrolled in Current Use, only 15% are agricultural lands. This is due to the Program's strict definition of agricultural use. However, land that is enrolled as agriculture receives a significantly greater tax benefit than forest land. Both figures under represent land actually in agriculture and forestry since not all owners take advantage of the program and

Table 6-1: Current Use Enrollment by Town, TRO Region

Town	Total Acres by Town	Total Enrolled Acres	Enrolled Forest Acres	% of Total Acreage Enrolled as Forest	Enrolled Agricultural Acres	% of Total Acreage Enrolled as Ag
Barnard	31,057	18,367	16,701	54%	1,667	5%
Bethel	29,282	16,410	14,665	50%	1,745	6%
Bradford	19,144	5,960	4,445	23%	1,515	8%
Braintree	24,680	14,632	12,454	50%	2,178	9%
Bridgewater	31,680	17,097	16,388	52%	709	2%
Brookfield	26,447	11,371	8,090	31%	3,281	12%
Chelsea	25,655	16,470	12,182	47%	4,287	17%
Corinth	30,943	15,992	13,836	45%	2,156	7%
Fairlee	13,467	6,619	5,636	42%	983	7%
Granville	32,626	13,210	13,033	40%	177	1%
Hancock	24,696	1,551	1,443	6%	108	0%
Hartford	29,434	5,557	4,431	15%	1,126	4%
Hartland	28,988	13,969	11,162	39%	2,806	10%
Newbury	41,294	16,979	13,076	32%	3,903	9%
Norwich	28,617	13,401	11,410	40%	1,991	7%
Pittsfield	13,418	1,432	1,335	10%	97	1%
Plymouth	31,118	7,491	7,415	24%	77	0%
Pomfret	25,251	17,583	13,684	54%	3,899	15%
Randolph	30,796	14,490	8,604	28%	5,886	19%
Rochester	36,560	13,895	12,396	34%	1,498	4%
Royalton	26,102	9,516	7,519	29%	1,997	8%
Sharon	25,797	12,713	11,776	46%	937	4%
Stockbridge	29,471	16,453	15,839	54%	615	2%
Strafford	28,328	16,264	13,305	47%	2,959	10%
Thetford	28,382	13,102	11,051	39%	2,052	7%
Topsham	31,369	12,972	12,041	38%	932	3%
Tunbridge	28,665	16,777	12,919	45%	3,858	13%
Vershire	23,136	15,231	13,664	59%	1,567	7%
West Fairlee	14,616	8,869	8,017	55%	853	6%
Woodstock	28,374	16,308	13,248	47%	3,059	11%

Source: Vermont Department of Taxes, 2016

some small farm operations are under the 25-acre threshold for the program.

Municipalities have the authority to enter into tax stabilization contracts with owners, lessees or operators of existing or new forest, agricultural, or open lands in order to promote agriculture and open space preservation. These contracts can be designed to stabilize taxes in a number of ways, including: By fixing property values, tax rates, or the amount or percentage of annual tax assessed. Local stabilization can be enacted by town vote or by Selectboard vote (although the Selectboard option has more limitations as to the scope). The choice to offer tax stabilization to farmers impacts the entire community as all other property taxpayers would bear the burden of any tax loss resulting from local tax stabilization.

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 non-regulatory method of farmland preservation is through 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 Two Rivers-Ottawaquechee Region. Partners in this process may include the municipality, Vermont Agency of Agriculture, Food and Markets (VAAFAM) and UVM's Center for Sustainable Agriculture. The Vermont

Housing and Conservation Board, which is the primary funder of land conservation projects in the state, may also play a critical role in local farmland preservation efforts.

Regulatory methods use zoning and/or subdivision rules to regulate the location, density and design of development within selected areas to minimize harmful impacts while allowing for a reasonable level of development. Regulatory methods include:

- **Overlay Districts** - The creation of overlay districts is the most common method of regulating specific areas for the purpose of protecting wildlife and other natural resources. Overlay districts can be used to exclude development on or to impose resource protection or conservation standards within overlay areas. These districts can be used to protect many types of resources.
- **Resource Protection Districts** - Protect wildlife resources and open space areas or resource based uses such as farming, forestry, recreation from incompatible development.
- **Large Lot Zoning** - Large lot zoning refers to the designation of a very large minimum lot size within certain zoning districts to accommodate resource-based uses, such as farming or forestry, or to require a pattern of very scattered, low-density development to limit, for example, impervious surfaces and protect surface and groundwater quality.
- **Fixed Area and Sliding Scale**
 - Fixed area and sliding scale

zoning are two zoning techniques (typically applied in association with subdivision regulations) that are used to differentiate allowed densities of development from district lot size requirements.

- **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.

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 on a whole supports the regulations.

Encourage the production of value-added products:

Farm innovation and diversification is essential to sustaining our working landscape. Instabilities in traditional markets such as dairy, means 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 farmer's markets, agritourism and the production of value added products.

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 of buying locally and regionally produced food (social, economic, environmental, etc.). Marketing and market development are key components to educating and encouraging new customers.

Utilizing on farm assets to develop agripreneurial enterprises beyond food production is a way to increase sustainability and encourage economic growth. Many farms are encouraging on-farm events such as weddings, concerts or festivals. Some farms have developed dining establishments that can take advantage of the types of food produced to create seasonally developed menus that focus on fine dining.

As farmers develop these new markets, it is important that existing land use regulation is capable of dealing with the potential impacts. Programs that support new and growing agricultural businesses can be stifled due to planning and implementation barriers at the regional or local level. Regulations that intentionally or unintentionally prohibit value added processing of products not principally produced on farm, on farm events, farm stays or other forms of agritourism where the public is invited on to a property must be reevaluated and the impacts of these potential uses must be balanced with the need to support these new innovations.

It is important to recognize that the “value added” concept goes beyond the development of products. 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 also allows for more sustainable agricultural production. Better quality soils can produce better quality products, whether through growing crops or grazing livestock. Better quality products will have an increased marketability and may ultimately bring additional income to the farmer.

C. Forestry

Healthy forests provide a significant number of benefits to our communities, including environmental services (such as clean water supply, clean air, mitigation against climate change, wildlife habitat and biological diversity), and economic benefits (such as tourism, recreation and the wood products industry).

Trends in forest health have been changing over the past decade. In the 2013 US Forest Service’s National Forest Inventory and Analysis Program (FIA) report, figures

indicated that since 2007 there has been a continuing, though gradual, loss of about 75,000 acres of forestland in Vermont. Developed land in Vermont increased significantly between 1980 – 2010 (67%), as well as subdivision of forest into smaller parcels. This pattern of development growth has led to significant forest fragmentation throughout the state.

Forest Resources

Vermont is one of the most heavily forested states with 4.6 million acres or 75% of its lands covered in trees. The Two Rivers-Ottawaquechee region 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 TRORC area: the Long Trail (which stretches from the northern to southern border of Vermont) and the Appalachian Trail (which cuts a path between Georgia and Maine).

At the local level, forestlands might be owned by the federal, state, or even local government, or by private individuals. 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 others are enrolled in the State’s Use Value Appraisal Program (UVA or ‘Current Use’).

These areas represent the “anchor areas” that provide for habitat connectivity. However, because they are not all

Table 6-2: Some of the Major Blocks of Forestlands in the Region

Name	Description
Brushwood Community 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 area is now owned by the Town of West Fairlee and protected from development through a conservation easement that is held by FPR. The Community Forest abuts the separate West Fairlee Town Forest and the large 1500 acre Fairlee Town Forest. The Community Forest comprises 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. The unprotected lands in the larger Brushwood Forest area are facing increasing residential development pressure.
Chateaugay No Town (CNT) Conservation Project	The CNT Conservation Project spans more than 50,000+ acres across Barnard, Bridgewater, and Stockbridge (in the TRO Region), as well as Killington (outside of the TRO Region). Town representatives convened the project in 1997 to encourage voluntary conservation of private lands in order to maintain current wildlife habitats, promote sustainable forestry, and further other objectives.
Coolidge State Forest (CSF)	CSF encompasses 21,500 acres of land in Plymouth and Woodstock. These lands are part of Coolidge State Park where campsites, hiking trails, and beautiful scenic views are abundant. CSF is the state's largest landholding, and is managed by the Vermont State Parks' Department of Forests, Parks, and Recreation (FPR).
Current Use Lands	Forty-six percent (46%) of the land in the TRO Region is enrolled in the State's Current Use Program.
Green Mountain National Forest (GMNF)	With over 400,000 acres, the GMNF is located within several Two Rivers towns, including: Woodstock, Rochester, Hancock, Pittsfield, Stockbridge, Granville, Bridgewater, Pomfret, Hartford, and Norwich. The lands contain portions of the Long Trail, Appalachian Trail, and the Robert Frost National Recreation Trail.
Orange County Headwaters Project (OCHP)	The OCHP 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 TRO Region. It spans the towns of Topsham and Newbury (within the Region), as well as Groton and Ryegate (outside of the Region). It is 2,274 acres in size, 95% 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.
Private Conserved Lands	Many privately-owned lands are protected through conservation easements held by one of the local land trusts, such as the Vermont Land Trust or Upper Valley Land Trust.
Taylor Valley	Taylor Valley is a forested area of approximately 18,000 acres that spans Chelsea, Vershire, Tunbridge, and Strafford. Approximately 1,200 acres of this have been conserved by The Nature Conservancy. The area is managed by the Taylor Valley Conservation Project, which includes private landholders, as well as members of the community who want to maintain what they see as an "ecologically rich and productive area for future generations."

connected, there is a significant amount of land between these areas that is being developed.

Challenges

Forest Fragmentation:

The health of many natural communities and wildlife depend on large,

uninterrupted areas of forestland, commonly referred to as “forest blocks.” Forest fragmentation is the division or conversion of forest blocks by land development (excluding recreational trails). These areas can be “divided or converted” through the clearing of land, building structures, and other activities associated with development. Even the seemingly simple act of installing roads can affect wildlife

movement and increase 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.

Since the 1980’s, Vermont has experienced “parcelization,” which is the result of larger tracts of land being divided into smaller ownerships or land holdings. The more individuals that own smaller parcels of forest, the more likely that the land will

ultimately be developed with infrastructure (such as roads and utilities) and buildings. The 2015 Vermont Forest Fragmentation Report identifies the following causes for this trend:

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

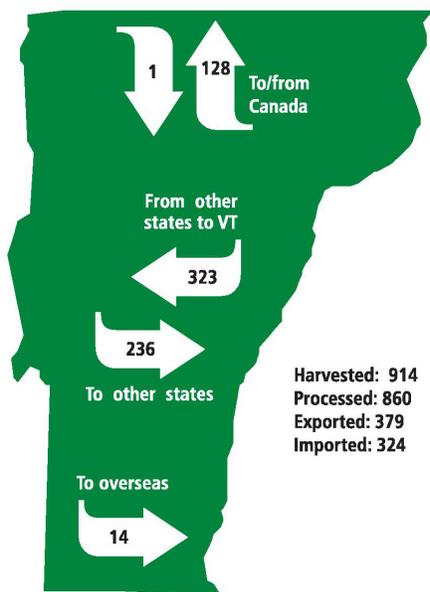
While development pressures have slowed in Vermont since 2010, the damage done to our forestlands has been significant. In several of our communities (including Randolph, Hartland and Brookfield), there are no longer large, contiguous, forested areas to serve as significant wildlife habitat or to act as connections to larger areas of habitat.

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, during the same year, forest recreation (e.g. skiing) generated 1.9 billion. Timber harvests are an essential component of the forest economy and for those landowners who are motivated to improve the health of their forestland.

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 for a majority of low-grade pulp wood, have stopped

**Wood Flows to and from Vermont
- in 1000 cords**



Source: North East State Foresters Association

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 off-sets 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. According to the US Environmental Protection Agency in recent decades, in both land and aquatic environments, 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 yards per year. This is significantly slower than the rate habitats are shifting northward. While this climate shift means a range expansion 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 limit of land suitable for their habitat.

Significant changes in our forest ecosystem will challenge our current forestry management techniques, and our forest economy. Without sound ecological forest management practices, adapting to new forest species and combating invasive species will be challenging.

Another separate, but related, 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) that could decimate these trees. Many other pests and diseases are on the rise that also threaten maple, beech, and even oak.

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 was comprised of 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:

1. The lack of personal and cultural connection 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.

Additional threats were also identified. These include: parcelization; fragmentation; property tax assessments based on the highest potential market value of land; the presence and spread of invasive species; the lack of social, cultural, and institutional support for young adults interested in pursuing a forest related career; state and federal estate and inheritance tax laws (which have placed family landowners into financial predicaments in which they need to subdivide or develop forest land in order to cover the taxes); vulnerability of timber and wood markets to short-term price fluctuations.

Solutions

Support Current Use:

Like Agriculture, one of the key state-based efforts to maintain forest lands across Vermont is the Current Use Program (Current Use). Funding of the Current Use Program has been identified by the Northern Forest Lands Council as vital to ensuring that landowners do not over-harvest 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 low taxes per acre (\$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 TRORC region (380,681 acres), a 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 non-regulatory 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 Resource Conservation Areas in the Future Land Use chapter.
- **Estate Planning** - Municipalities can encourage landowners to engage in estate planning so that forestland can be maintained over multiple 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” which can be used to help conserve land.

Regulatory methods, such as those mentioned in section #, above can also be utilized to protect forestland.

Encourage the Growth of 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 and 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 for both 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. Sufficient locations of contiguous forestlands ensures that all indigenous species have adequate access to necessities, including, but not limited to food, water, and varied habitat under a changing environment.
2. Agriculture and forestry continues 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 farms, forestry operations and value-added producers in the TRO Region not only feeds our citizens but also serves as a driver for Vermont’s economic development, providing jobs and prosperity in our rural communities.
4. An environment (physical, social, regulatory, and fiscal) that encourages entrepreneurship in agricultural and forestry activities, including those which add value to the Region’s agricultural and forestry products.

Goals, policies, and recommendations continued on next page

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

Policies

1. The development of renewable energy generation methods and facilities that utilize woody biomass is encouraged.
2. Forestry practices shall maintain or enhance the diversity of ecosystems existing in the Region.
3. 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 level should not unduly restrict the development of “home cottage” industries which complement farm and forestry.
4. 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; while farmers must meet state standards for Required Agricultural Practices.
5. It is the policy of TRORC to minimize or mitigate the loss of these resources to development. As an alternative to conventional methods, TRORC endorses use of off-site mitigation techniques to offset the loss of these resources. However, endorsement of off-site mitigation must be conditioned on finding that the project proposal is:
 - a. Consistent with this Plan and the Plans of affected municipalities; and
 - b. Provides an equal or greater public benefit than conservation of the development site itself.
6. Where important natural features, soil conditions, or special resources including, but not limited to, agricultural and forested land are identified, clustered or peripheral development is required to protect such resources and prevent fragmentation and sprawling settlement patterns.
7. Agricultural land and forested land form the separations between town centers, villages, and hamlets in the traditional regional settlement pattern. Tangible efforts shall be made to preserve this patch-worked balance of open and forested space, to promote compact settlements through creative regional planning, municipal planning, private initiatives, purchases, leases and transfers of development rights and efficient site designs. Contiguous forest and significant agricultural areas 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.
8. 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.
9. The construction of utilities, roads or other physical modifications should skirt tracts of productive agricultural and forest land rather than divide them.

Goals, policies, and recommendations continued on next page

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

Policies (continued)

10. 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 non-profit conservation organizations to identify options. Factors to be utilized in determining the relative conservation value of land should include:
 - a. Evaluation of an active farm operation, a sound financial plan for returning as a viable farm unit, or an active forest management plan with history of planned harvesting;
 - b. The project must conform to duly adopted regional and/or municipal plans;
 - c. The resource value of the site incorporating such factors as parcel size, soil productivity values, and accessibility;
 - d. Threat of loss or conversion to non-farm or forestry use;
 - e. Adequacy of existing infrastructure and public investments to serve the use;
 - f. Location of the use relative to similar uses; and
 - g. Adequacy of past resources management practices.
11. 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. Applications or injections of such products should only occur according to the protocols established and agreed upon by the State of Vermont and the affected municipality for public health and environmental protection.
12. Use of streambank and shoreline buffer strips are necessary for forestry and farming activities. To reduce erosion, buffer strips can consist of certain types of cover crops as well as woody vegetation. 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 to implement river-long coordinated stabilization programs. Efforts to revegetate streambanks eroded from natural or human activities are supported. Erosion control methods which use vegetation and other natural materials and which protect wildlife habitat are favored over other methods. Rip-rapping of shorelands can be used in appropriate circumstances to protect farmlands from erosion.

Goals, policies, and recommendations continued on next page

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

Policies (continued)

13. 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, the 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 which dictate that involved land should be converted to more intensive uses; and
 - b. The presence of parcel sizes or site conditions which affirm that conservation efforts to minimize loss of the resource result in marginal public benefit.
14. Support 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.

Recommendations

1. TRORC, as part of its on-going Technical Assistance Program, will provide planning advice and support to town Planning Commissions, Conservation Commissions, non-profit conservation organizations, and other groups interested in sustaining agriculture and forestry.
2. TRORC will evaluate proposed developments involving primary agricultural and forest lands, and their related industries. Where appropriate, it will provide information to federal and state agencies, town boards and commissions, and other parties regarding the probable impacts these resources have on the welfare of the Region.
3. Local land use planning activities and programs affecting agriculture and forestry should consider the following as ways to promote these industries:
 - a. Development of local plan components, including an inventory, and assessment of farm and forest lands. Although far from satisfactory, past use of the Land Evaluating and Site Assessment (LESA) method for identification of priority lands has been referenced;
 - b. As part of local bylaws, creation of farm and forest land conservation programs, including:
 - (1) Agricultural zoning;
 - (2) Area based allocation;
 - (3) Cluster development;
 - (4) Impact fees;
 - (5) Overlay districts;

Goals, policies, and recommendations continued on next page

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

Recommendations (continued)

- (6) Performance standards;
 - (7) Purchase of development rights;
 - (8) Transfer of development rights.
- c. Utilization of the Vermont Housing and Conservation Board program (VHCB) to acquire interests or easements on significant farm and forest lands. Such easements are perpetual voluntary agreements between landowners, the State, the Town, or a conservation trust, such as the Vermont Land Trust or Upper Valley Land Trust;
 - d. Setting up a town fund for conservation purposes to leverage other public funds or donations for conservation purposes. Note that farm and forest conservation may be a wise move for the long-term fiscal health of the community;
 - e. Stabilization of property taxes for farmers and timberland owners enrolled in the Current Use Program by agreeing to pay the difference that the State does not fully fund under the Program;
 - f. Purchase of lands outright by governmental agencies or conservation organizations; and
 - g. Support for local and regional marketing and value added industries to improve the economies of farm and forest operations;
 - h. Support of educational and community programs.
- 4. 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.
 - 5. TRORC should organize a regional committee of stakeholders to focus on how TRORC can support the local agriculture and forest products industries.

Working Landscapes End Notes

1. Sustaining Agriculture: Agricultural Land Conservation, Agriculture Land Use Planning Task Force, Farm to Plate Network, 2013.
2. Tunbridge Town Plan, 2013.
3. Farm to Plate Strategic Plan, Executive Summary, July 2013.

NATURAL RESOURCES

A. Introduction

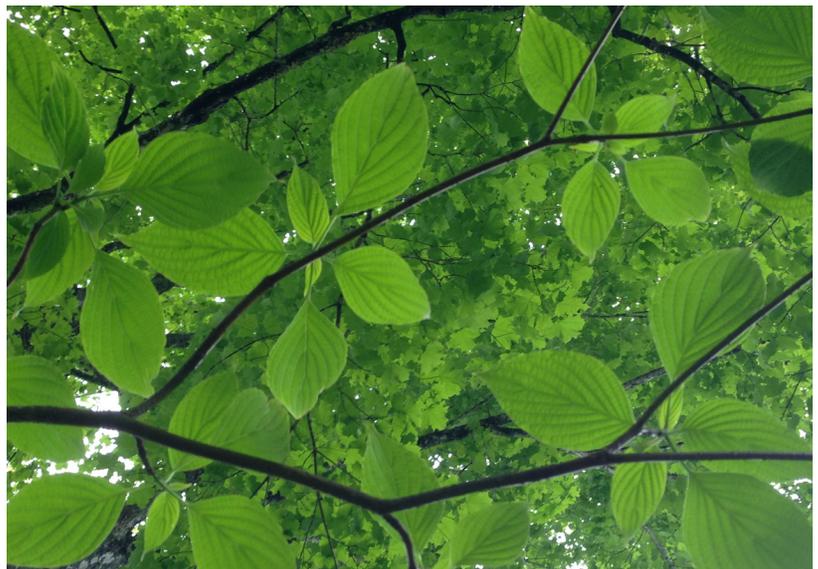
Town plans throughout the Region express a universal desire to maintain the rural character of their communities while allowing appropriate, compatible development. An essential part of the rural character is the quality and quantity of natural resources of the Region and the character of place they create. This character is appreciated by residents, and is a primary attraction to tourists, retirees and second home owners. 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. Wild plants in the Region provide us with a myriad of benefits. Trees alone supply us with fuel, lumber, air and water filtration, scenic beauty, and that sweet sign of spring, maple syrup. Healthy animal populations provide us with opportunities as varied as hunting, bird watching, and pest control. Clean surface waters support diverse aquatic plant and animal life and provide areas for swimming 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, which we take for granted, 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 shape than in much of the country, but vastly different than under pre-settlement conditions. The topography



Spring Leaves | Source: ©Kevin Geiger

has changed little, but rivers have been dammed and moved aside in valleys, enormous swatches of wetlands filled, virtually all of the timber cut over at least once, and immense amounts of soil 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 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 the Region.

This chapter consists of background discussion, goals, policies, and recommendations for the use and management of natural resources, including:

- Groundwater resources;
- Surface water resources;
- Fisheries and aquatic resources;
- Wetlands;
- Wildlife resources;
- Air quality; and
- Mineral resources.

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 ground water 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 through wells or springs. The surface area that drains into an aquifer is called a recharge area. Water tables are typically less than 10 feet below land surface, soils are thin except along valley floors, and fractured crystalline bedrock provides little in terms of filtration. Given the present level of ground water mapping in Vermont, there is little data to distinguish between the vulnerable and less than vulnerable resource.

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, and failed septic systems.

Many hazardous sites have been identified, and some cleanup actions or enforcement is taking place. On sites that need public assistance to bring them back into use,

these can be assessed and addressed with assistance from the state and the regional brownfields program so long as landowners provide permission. New underground storage tanks are much less prone to leaking, and sites must be tested when old tanks are removed to see if there has been contamination. 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 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.

On the more mundane side, infiltration into groundwater of pesticides or herbicides can occur, as well as nitrogen from manure. 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, though. The actual use on roads is a surface water issue. It is the salt leaching from uncovered storage piles that is a groundwater concern that Vermont and the Environmental Protection Agency are in the process of addressing. 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. With the passage of the Wastewater System and Potable Water Supply Rules in 2002 that closed the 10-acre loophole, and much more careful scrutiny of permits and installation, septic systems are becoming less and less of a source of groundwater pollution.

Goal, Policies and Recommendations: **Groundwater**

Goal

1. Maintain or enhance the quality and quantity of ground water resources.

Policies

1. Towns are encouraged 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 wherever possible in order to determine critical areas for protection of drinking water supplies.

Goal, policies and recommendations continued on next page

Goal, Policies and Recommendations: **Groundwater**

Policies (continued)

2. Water withdrawal from underground sources should be carefully monitored to insure that aquifers and surface waters are not significantly depleted and that water is properly allocated. Promulgation of specific laws and regulations to control water withdrawal and to ensure minimum flows are strongly encouraged.
3. Land use activities which potentially threaten ground water quality and should be carefully reviewed include 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. Such activities may require permits from the State; and
 - c. Junk yards and solid waste disposal sites.
4. Groundwater contamination from commercial/industrial uses should be remedied by the parties causing such contamination when feasible, and by 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 should 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.
3. The Legislature must keep the Petroleum Cleanup Fund at a level sufficient to meet all cleanup needs.
4. TRORC should work with the Agency of Natural Resources, town officials, and others on educational outreach about the proper use of floor drains, local spill response capacity, and proper administration of septic regulations.
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.

C. Surface Water

Background

The surface waters of the Region are important resources for economic vitality and physical health. The waters of Vermont are widely regarded as higher quality than most. High surface water quality 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 ground water, land cover types and land uses and should be considered in any decisions affecting those elements.

Water Quality Standards, Classifications, and Typing

The Vermont Water Quality Standards (WQS) are rules that concern surface waters throughout Vermont that 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 WQS, which are periodically updated, contain certain numeric and narrative criteria and describe the classification and water management typing of all waters. Water quality types and classifications (A1, A2, B1, B2 and B3), as administered by the State Department of Environmental Conservation, establish water quality goals

for each body of water in the state. These goals are expressed as "beneficial values and uses" or "designated uses" which are to be protected. 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 (not including wetlands) are currently classified as



Surface Waters – Streams
| Source: © K. Kanz, 2001

Class A or Class B, with an overlay Waste Management Zone in Class B waters for public protection downstream of sanitary wastewater discharge points (10 VSA Chapter 47). 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. 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 classified as Class B, with the exception of all surface waters above 2,500 feet elevation and a few reservoirs and sections of tributaries that have been classified as Class A and are designated as secondary sources of drinking water for the towns in which they are located. All Class B waters will be proposed for designation as B1, B2 or B3 during the basin planning process and

this will be acted upon by the Secretary of ANR and the Water Resources Panel of the Natural Resources Board (formerly Water Resources Board). All waters of the State are required to be fishable and swimmable under state and federal law, and the distinctions between A1 to B3 have to do both with the use of the water and its quality. B3 waters are the lowest legal classification, are generally below wastewater treatment plants or near dams. Nearly all of the Region’s surface water will be placed into either B1 or B2 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 Natural Resources Board. There are currently a few “outstanding” water resources in the Region, including Thetford Center Falls.

In classifying the surface waters of the state, the Panel considers any adopted basin plan, existing uses, background conditions, and the degree of water quality to be obtained and maintained. The Panel, 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 Degradation

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/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 VT DEC's basin assessments, 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, and intentional water level fluctuations from drawdowns harm bordering wetlands. Also, any entering rivers and streams can bring with it the above mentioned pollution.

Shoreline Buffer Strips 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 strips of naturally growing grasses, shrubs, and trees is essential to the health of streams and lakes. Appropriately, vegetated shorelines contribute to maintenance of water quality and shoreline protection in the following ways:

1. Provide bank support and stabilization;
2. Help prevent bank undercutting and bank collapse;
3. Provide food and shelter for fish and wildlife;
4. Intercept, absorb, and filter out pollutants such as silt, fertilizers, toxic chemicals, and livestock wastes;
5. Keep water temperatures cool during



Highway runoff, parking lot gravel, siltation and stormwater

| Source: © K. Kanz, 2001

-
- hot summer months when fish are susceptible to heat stress;
6. Slow surface water runoff;
 7. Increase wildlife diversity;
 8. Reduce flood and ice damage to stream channel, and adjacent lands and structures; and
 9. Preserve natural character of waters.

Watershed Management and Basin Planning

A watershed is all of the land that drains into a certain point. A “river basin” generally has the same meaning, except in Vermont the Water Quality Division of the Vermont Department of Environmental Conservation has actually divided the State into seventeen basin areas, determined by the watersheds of major rivers and lakes, some of which combine the watersheds of two or more rivers that drain to different points. The State has been required by federal law to adopt basin plans for decades, and State law required that each of these plans be in place, first by 2000, then 2006, and this will likely be extended again. A basin plan was adopted for the White River in 2002 and is in preparation

for Basin 14 (Wells, Waits, Stevens, Ompompanoosuc). Plans will be prepared for all of the other basins soon. These plans will expire every five years.

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 other efforts as well. In the development of plans, ANR shall seek public participation to identify and inventory problems, solutions, high quality waters, existing uses and significant resources of high public interest and shall consider approved municipal and regional plans. When necessary, 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 extent possible, contain specific recommendations by the Secretary of ANR regarding:



Streambank Vegetation During High Water | Source: © K. Kanz, 2001

- Existing uses;
- Salmonid spawning or nursery areas important to the establishment or maintenance of such 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.

In basins that include class B waters which have not been allocated into one or more Water Management Types (B1, B2 and B3), the basin plan shall propose these based on both the existing water quality and reasonably attainable and desired water quality management goals.

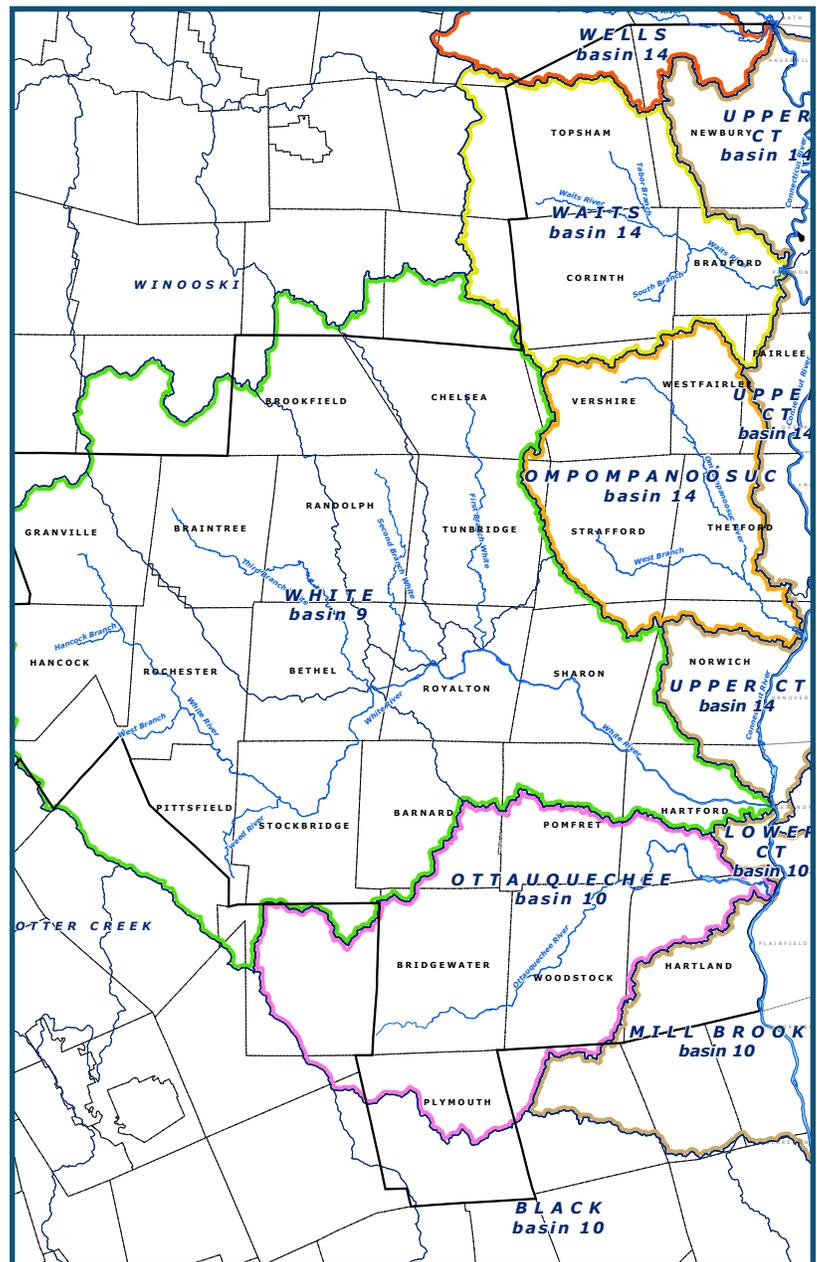
Basins in the Region include the Ottauquechee (#10); the White River (#9), the Upper Connecticut (includes many smaller streams that drain to the Connecticut River from Norwich to the Canadian border, #16); Mill Brook (part of the Lower Connecticut, #13) and the Wells, Waits and Ompompanoosuc Rivers (#14). Very small portions of the Black, Otter Creek, and Winooski rivers are also in the Region.

The Water Quality Division produces the State of Vermont Water Quality

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 or threatened.

Figure 7-1: Watersheds and Basins



Source: Vermont Agency of Natural Resources

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

Goals

1. Improve surface water quality and quantity for the purposes of recreation, aquatic habitat, and drinking water (where designated).
2. Promote a coordinated monitoring program for surface water quality and quantity that is supported at municipal, basin and regional levels as a network of natural resources.
3. Support and promote the use of multi-stage wastewater treatment and disposal systems; encouraging off-stream disposal of treated effluent, where possible.
4. Protect from risk and preserve in their natural state certain high quality waters including fragile high-altitude waters, and the ecosystems they sustain.
5. Encourage watershed based cooperation of towns and people that live, work, and play in the watershed in the protection and enhancement of surface water quality.

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 should protect these resources and serve to protect their existing and desired uses and conditions.
2. Within each of the basins in the region (see map 9), 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 basin as a whole;
 - 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; and
 - f. Existing water quality conditions and known public and private pollution sources.
3. Efforts of 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 State of Vermont - Agency of Natural Resources Basin Plans, Water Quality Assessment (305(b) report), and the Clean Water Strategy shall be considered high priority for abatement. These problems include:
 - a. Agricultural runoff;
 - b. Erosion, sedimentation, and water crossings from construction sites and other land disturbance, road and ditch runoff, streambank destabilization, impoundments, and logging;

Goals, policies, and recommendations continued on next page

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

Policies (continued)

- c. Infestation of nuisance weeds such as Eurasian water milfoil and animals such as zebra mussels;
 - d. Failing or inadequate community and individual onsite wastewater disposal systems;
 - e. Drainage of metals from abandoned copper mines; and
 - f. Elevated temperatures, low dissolved oxygen, and physical habitat degradation from poor flow regimes.
4. Effluent 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 the 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; and
 - c. To accommodate new growth and development which is part of a detailed and publicly reviewed and accepted growth management plan or designated growth center.
5. Pristine waters (Class A) are waters which are a) generally pure in nature with significant ecological value or b) are of high quality and used for public water supply. Pristine waters shall be protected from development and other activities which diminish their purity, natural flow or condition.
6. Vegetated buffer strips should be maintained in riparian zones and shoreland areas surrounding streams, 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. Commercial water withdrawal must be carefully monitored by the State and localities to insure that aquifers and surface waters are not significantly depleted.
8. The location, sizing and density of onsite sewage disposal facilities should be determined by the capacity of the soil and by the natural limitations of the site and underlying substrata conditions, such as depth to bedrock and seasonal high water tables.
9. Indirect discharges, such as off-stream disposal of treated effluents in spray fields, sand fields, or other alternative systems are encouraged over direct discharges where soil and site conditions permit.
10. Upland watersheds should be maintained predominantly in forest and low impact recreation use to ensure high quality of valley streams and their tributaries.
11. Preservation of the natural state of streams should be encouraged by the:
 - a. Protection of adjacent wetlands and natural areas;
 - b. Protection of natural scenic qualities; and
 - c. Maintenance of existing stream bank vegetation, together with wildlife habitat.

Goals, policies, and recommendations continued on next page

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

Policies (continued)

- d. Proper classification and typing that reflects the condition of high quality waters in areas with little development
- 12. Given the statewide recreational resource value of the free flowing White River, new hydropower development on that river should not be permitted, and is discouraged elsewhere except where it can be done in a “run of the river” manner that does not create any significant impounding or dewatering of bypass reaches.
- 13. Activities that are potential sources of non-point pollution, including but not limited to agriculture and silviculture, should be conducted as follows:
 - a. Logging practices shall follow at least the Acceptable Management Practices (AMPs) developed by the Vermont Agency of Natural Resources or other practices recognized by public agencies or professional associations. Prior to commencement of a logging operation, landowners and loggers should consult the Water Quality Handbook for logging jobs published by the Vermont Department of Forests, Parks, and Recreation or contract the County Forester for advice on erosion control.
 - b. Agricultural activities shall follow Acceptable Agricultural Practices (AAPs) for Agriculture. When feasible, farms are encouraged to follow Best Management Practices (BMPs), site-specific practices for farm management developed by the Natural Resource Conservation Service (formerly the Soil Conservation Service). They include guidelines for storage and spreading of manure, fertilizers, and pesticides; buffer strips, diversion of surface water runoff, and milk house waste management, among others.
- 14. All wastewater and stormwater run-off 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)
- 15. Graveled backroads by nature of their topography and design, if not properly maintained can contribute heavily to water pollution. Surface water run-off and sedimentation to streams and ponds from backroads has been identified as a major threat to water quality in the region. Municipalities should employ road maintenance techniques to prevent soil erosion and road surface deterioration. Towns are encouraged to utilize the procedures contained in the Vermont Better Backroads Manual (1995).
- 16. Land use planning and decisions should protect streamside and lakeshore soils and vegetation from physical damage by restricting access to livestock and excluding dumping, filling, and operation of construction machinery in these areas.

Goals, policies, and recommendations continued on next page

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

Recommendations

1. Municipalities should 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 are encouraged to play an active role in the basin planning process and to 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 should be targeted for immediate attention.
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 Agency of Natural Resources - Water Quality Division, Vermont Local Roads Program, and Agency of Transportation, should advise town officials on cost-effective backroad erosion and sediment control.
6. TRORC should be involved in watershed and basin planning efforts and encourage municipal involvement.
7. Unless there are overriding concerns in the local and Regional Plans, the Agency of Natural Resources shall adopt the highest possible classification and type for water bodies based on their actual condition and use.
8. Public and private sectors should refrain from activities that spread invasive plants such as: ill-timed roadside mowing, transporting invasive plants in ditch spoil, 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.
9. The Agency of Natural Resources and local groups are encouraged to monitor water quality, and when monitoring indicates a water quality violation, to promptly locate the source of degradation when possible.
10. In preparation for writing any basin plans, the Agency of Natural Resources should conduct a comprehensive assessment of water quality in such basins and identify the source of any known water quality problems.

D. Fisheries and Aquatic resources

Background

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 lakes and ponds, including 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 have been classed as warm water fish habitats.

Development and 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.

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 to the same breeding areas year after year, waterways must remain open to 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 in to the natural environment. Development and 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.



Concrete Box Culvert | Source: ©K. Kanz, 2001

The damming of streams to create a pond, 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 things damage the natural ecosystem of the stream and cause decreases in native fish populations.

Goal, Policies and Recommendations: **Fisheries and Aquatic Resources**

Goals

1. Assure the maintenance of water quality and quantity necessary to sustain existing aquatic communities.
2. Maintain or improve the natural diversity, population and migratory routes of fish.

Policies

1. Intermittent and diverted flows should be enabled only upon finding that these actions assure the downstream protection of water quality and quantity for aquatic communities and stream functions, based on an analysis of need and consideration of alternatives, and compatible with local and regional planning goals and policies.
2. The design and construction of dams on rivers and streams is discouraged except when the public interest is clearly benefited and the following criteria are met:
 - a. Projects operate as “run of the river”, ensuring that the natural flow regime is largely left intact;
 - b. Fish passage (where it historically occurred) and canoe portages are provided at dams. Also, recreational opportunities at hydropower facilities should be explored and developed, where appropriate; and
 - c. Water quality and minimum flows should be maintained.
3. 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.
4. In-stream ponds are discouraged on all stream segments that support fish life.
5. Naturally vegetated streamside buffer strips of at least fifty (50) feet should be preserved especially in those areas that are planned for dense development in connection with existing similar development such as adjacent to, or infill of, existing downtowns or village centers.
6. Proper erosion control procedures shall be applied for all construction activities and all stormwater shall be treated through natural or mechanical systems to remove nutrient and sediments and to attenuate flood flows to natural levels before any stormwater reaches streams.
7. The State and towns are strongly encouraged to adopt shoreland setback regulations in accordance with the state buffer policy.
8. New or replacement bridges and culverts should be adequately designed and constructed to handle stormwater, provide sediment transport, and accommodate fish and wildlife passage.

E. Wetlands

Background

Wetlands are a vital component in maintaining the ecological integrity of land and water. In addition, they provide an array of functions and values that support environmental health and provide benefits to humans. Benefits provided by wetlands include: flood and storm water control, maintenance of surface and ground water quality, open space and aesthetic appreciation, fish and wildlife habitat (including a large number of threatened and endangered species), ecological research and educational opportunities, and sources of nutrients for freshwater food chains. Wetlands are also important for recreational activities such as hunting, fishing, and bird watching.

Draining, filling, and development have resulted in the loss of more than thirty-five percent (35%) of Vermont's original wetland acreage, primarily due to agricultural and large-scale development projects. At present, roughly four percent (4%) 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 five or six percent of the state's land. The current rate of wetland loss in Vermont has been estimated at eight (8) 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 values associated with wetlands. 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 decades 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." 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 (1990) (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 as 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 Water Resources Panel of the

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."

Natural Resources Board (formerly Water Resources Board) to be significant.

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.” 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 addition to state protection, the U.S. Army Corps of Engineers 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 which encourage the protection of wetlands. However, recent amendments proposed to the Clean Water Act are intended to remove many of these federal protection mechanisms.

In the 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 been recognized as containing critical spring food sources for black bears.

Wetlands Identification

According to the Vermont Wetlands Rules, the boundary between a wetland and an upland shall be delineated by the methodology set forth in the most recent edition of the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. This methodology employs three parameters: vegetation, soils, and hydrology. (See Section 5 of Vermont Wetland Rules for more detailed description of wetlands delineation in terms of function and vegetation.) The Rules state that the most recent edition of The Wetland Plant List of the State of Vermont published by the U.S. Fish and Wildlife Service shall be used to determine the frequency of vegetation occurrence in wetlands. Wetlands must serve at least one of the following functions in order to be protected by the state:

1. Water storage for flood water and storm runoff.
2. Surface and ground water protection.
3. Fisheries habitat.
4. Wildlife and migratory bird habitat.

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.”

5. Hydrophilic vegetation habitat.
6. Threatened and endangered species habitat.
7. Education and research in the natural sciences.
8. Recreational value and economic benefits.
9. Open space and aesthetics.
10. Erosion control through binding and stabilizing the soil.

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 state Water Resources Panel of the Natural Resources Board (formerly Water Resources Board) 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.

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.

However, wetlands may be protected under several other sections of Act 250, including criteria dealing with water pollution (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), 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. 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.

Vernal Pools

Vernal pools are temporary bodies of water which usually occur in woodland depressions. They are small, usually less than one-half (1/2) acre, and vegetation is usually sparse or absent, although adjacent forest trees may shade the pool. 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 these and many other species return to the same vernal pool each year to breed, destruction or alteration of vernal pools may result in the loss of local populations of some species.

Most vernal pools in Vermont are filled by spring rains and snow melt and are 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 form where small depressions, swales, or kettle holes collect spring runoff or intercept seasonally high groundwater tables. Although many vernal pools are small, isolated “puddles,” they are often associated with more extensive wetland systems. In Vermont, most vernal pools occur in forested habitats, but can be found in meadows, sand flats, and river flood plains. It is estimated that each town in Vermont has at least one vernal pool.

Because of their small size and temporary nature, vernal pools are not protected under the Vermont Wetland Rules. They are a unique and vulnerable habitat area that must be identified and protected under municipal regulations.

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. 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 which 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 protected under the Non-game and Natural Heritage Program, however towns are encouraged to identify and protect fens and bogs in municipal plans and bylaws.

Goal, Policies and Recommendations: **Wetlands**

Goals

1. Identify and protect all wetlands which provide significant functions and values in such a manner as to achieve no net loss of such wetlands and their functions. In the long term, restoration and enhancement of wetlands should be pursued in order to improve the region’s wetland resource.
2. Identify and protect critical natural communities such as vernal pools, fens, and bogs through petitioning the Water Resources Panel of the Natural Resources Board (formerly Water Resources Board) or through local zoning legislation.

Policies

1. Significant wetlands should be protected from development by maintaining an undisturbed buffer strip of naturally vegetated upland, at least fifty (50 to 100) feet in width¹ (or wider according to the type of development and the wildlife species to be protected), around the edge and by preventing runoff and direct discharge into wetlands.
2. Vernal pools should be protected from development by establishing an overlay district that identifies vernal pools and their surrounding terrestrial amphibian habitat.

Goals, policies, and recommendations continued on next page

Goal, Policies and Recommendations: **Wetlands**

Recommendations

1. The State of Vermont should identify and map significant wetland areas not currently classified as Class 1 or 2 wetlands and petition the Water Resources Panel of the Natural Resources Board (formerly Water Resources Board) to have such areas reclassified at a higher level.
2. Encourage municipalities in the region to enhance zoning bylaws to protect wetlands that may not be protected under state or federal law.
3. Work with towns to establish a priority list of wetlands for protection and/or acquisition.
4. Encourage more accurate and thorough identification of wetlands areas through the use of best available data and the adoption of local wetlands regulations and updated maps by the municipalities in the region.
5. Encourage property tax relief to provide an incentive for the protection of designated wetlands.

F. Wildlife Resources

Background

Wildlife habitat is defined as the physical and biological environment in which a particular species of plant or animal



Mitigation corridors, critical for biodiversity of species like Monarch butterflies | Source: ©Rosalie Geiger

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 health of one species indicates health of all. To maintain or improve the populations and diversity of these species, the 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. And, many wildlife cannot live where there is any amount of development, no matter how seemingly unobtrusive.

Wildlife management requires controlling human activities around animals as much as management of animals around human activities. 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 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 of twenty-five (25) acres and less, if done according to Accepted Management Practices, can provide browse for moose, deer, and bear, and can be planted with trees such as oak, whose populations have become sparse.

The following sections describe important habitat protection and management issues for birds, deer, black bear, moose, bobcat, threatened and endangered species, and natural communities. In order to maintain the diversity of species in the Region, the areas, shapes, and pattern of habitat types across the Region must be considered as a whole. Large tracts of contiguous, undeveloped areas containing a diversity of habitat types should be preserved wherever possible.

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



Eagle | ©Rod Chronister

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 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 toward 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.

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. The 100 people attending the New River Birding Festival in 2004 injected more than \$100,000 into the local economy of Fayetteville, West Virginia. Communities can encourage birding and ecotourism and improve their local economies. Bird watching is an important economic driver in this Region, because of its unique habitat areas.

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The Bragdon Preserve in Woodstock is one of Vermont's IBAs. It is eighty (80) acres in size, privately owned by the Vermont Institute of Natural Science (VINS), and consists of hardwood and mixed coniferous forest, field, fen, sedge meadow, and a pond. Since 1981 more than 30,000 birds, representing over 117 species have been banded here by VINS naturalists, conservationists, researchers, volunteers and students.

Mammal Habitats

Black Bear

The black bear is native to Vermont and is found primarily in remote, forested habitat. An estimated 3,500 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 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", these 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 bears 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. Towns should attempt to identify critical habitat areas within the broader areas identified on the bear habitat maps and encourage landowners, foresters and developers to be sensitive to these areas in their management plans. Wherever possible, large tracts of undeveloped land

should be left as such for bear survival and reproduction. Buffer zones, up to a half-mile in width, should be maintained between land development and critical habitat.

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, south 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 over for a long period of time.

Residential, commercial, or industrial development that is within or adjacent to deer wintering areas decreases the amount of land available to deer and erodes a town's deer population.

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. Towns should consider deer wintering areas and their connecting corridors in planning for management and conservation of forested areas; development should avoid such areas wherever possible. Towns should also be vigilant in identifying other areas not yet mapped.

Moose

The Vermont Department of Fish and Wildlife's 1992 Moose Management Plan contained objectives to allow for controlled growth of the state's moose population in most parts of Vermont, and to monitor populations to determine when and if population regulation was necessary. The state's first moose hunt was held in 1993 and has continued annually since then. The Plan was updated in 1998, when the state's moose population was estimated at 2,000, a tenfold increase over the preceding eighteen years.

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 twenty 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. However, moose rely on a balance of forest age classes,

therefore widespread clear cutting could create an unfavorable balance of forest age classes and cause a decline in moose populations. 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 deteriorating effect only on moose.

Most moose in Vermont are located in the Northeast Kingdom, however many have been sighted in the 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. Additionally, widespread clear cutting should be discouraged, although occasional small clear cut patches no larger than twenty-five acres can be beneficial to moose populations.

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 bobcat 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 Region, bobcats are known to live in the Delectable Mountain range in the Chateauguay Notown 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

Bats rely on critical bat habitats to survive. These 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. A survey of the Strafford mine shows that it's very likely that thousands of bats hibernate there each winter. A recent winter survey of the Vershire mine also shows that it is a very significant hibernaculum. It included the greatest number of hibernating small-footed bats (122), which are listed as threatened in Vermont, and big brown bats (146) found in any Vermont cave or mine.

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

Bats congregate to give birth and raise young during the summer in maternity

colonies. Tree cavities and trees with exfoliating bark are 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 recent summer netting survey of the Union Village Dam by the U.S. Army Corps of Engineers indicates 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 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 Indiana bat, the only endangered bat species in Vermont. 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. Towns are encouraged to map any newly discovered bat hibernacula and restrict access to the caves during the winter season.



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

Threatened and Endangered Species and Critical Natural Communities

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 important to a healthy functioning ecosystem. Many uncommon species will disappear if not recognized and protected.

These natural resources contribute to the natural heritage and character of the Region. Areas in the Region with significant natural features provide recreational and educational opportunities to town residents. 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 290 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 list of Threatened and Endangered Species of Vermont, 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.

Mast Stands

“Mast” is a term used by foresters and wildlife biologists to describe the fruit and seeds of trees and shrubs that is a source of food for wildlife. Hard mast, or 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.

Wetlands and Vernal Pools

Wetlands and vernal pools are important feeding and breeding areas for a variety of plant and animal species (see section on Wetlands above). 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 disproportionately high percentage of the threatened and endangered species in the state. Roughly thirty-five percent (35%) of plants and twenty-one percent (21%) of animals on the threatened and endangered lists are closely associated with, or are found



***Salamanders
—Integral Species in the
Region’s Ecosystem***
| Source: ©K.Kanz, 2002

exclusively in, wetlands. Vernal pools are breeding grounds for many species of amphibians, including two species of salamander currently on the Vermont Threatened and Endangered Species List.

A buffer zone is essential protection both for species in the wetland and 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 recommend a setback of at least 200 feet for wildlife habitat protection around wetlands and a continuous forested buffer of roughly 500 feet around vernal pools.

Riparian Zones

Naturally vegetated riparian zones (vegetated buffer strips next to surface waters) are essential to good water quality. Such areas serve multiple purposes in resource conservation. As mentioned in the Water Resources section above, buffer strips next to rivers filter silt and nutrient runoff from non-point pollution sources such as agriculture and logging. Tree canopy cover also shades the water, helping to keep temperatures in a healthy range for aquatic life. Plants along the banks provide woody debris that is a food source for macro invertebrates, the start of the aquatic food chain. Riparian vegetation also holds the bank in place, reducing erosion. Riparian woodlands are also a specific habitat type that is important to many amphibian, reptile, mammal and bird species. These areas also act as important travel corridors for wildlife between large habitat areas.



Wetlands and Riparian Zones | Source: ©K.Kanz, 2001

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

Goals

1. Maintain or enhance the biodiversity and population of wildlife, including natural predators.
2. Restore stable populations of state and federally designated threatened or endangered wildlife and their associated habitat areas.
3. Allow sport and subsistence hunting in an ecologically sound manner to provide continued success of the species.

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 significant and necessary wildlife habitat should not be approved.
2. Conserve large tracts of bear habitat when possible and to 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 ages and species of tree cover necessary for shelter and food supply for deer, black bear, and other large mammals, and birds.
4. Along waterways, developers, municipalities or private land owners must preserve or create vegetated riparian buffer zones that are consistent with state riparian buffer guidelines.
5. The rate of harvest of wildlife for sport or subsistence should not exceed the capacity of an area to replenish the species.
6. Wildlife populations and natural diversity should be maintained or enhanced.
7. Development, including roads and power line corridors within designated bear habitat areas should be minimized to avoid fragmentation of forest blocks and to maintain the connecting links between such blocks.
8. Preference should be given to developments that utilize existing road and field lines.
9. Large tracts of land with deer wintering areas should be protected from developments and other uses that threaten the ability of this habitat to support deer when necessary to support stable deer populations.
10. Critical habitat types in the region that shall be considered during development planning include, but are not limited, to the following:
 - a. Forested corridors or “greenways” used by songbirds during migration;
 - b. Grassland regions;
 - c. Cliff areas identified as potential or active nesting places for peregrine falcons;
 - d. Areas over 2,500 feet in elevation; and

Goals, policies, and recommendations continued next page

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

Policies (continued)

- e. Large tracts of contiguous forest land.
- 11. Landowners, foresters and developers must be sensitive to critical bear habitat areas in their management plans.
- 12. Widespread clear cutting is discouraged.
- 13. Development should not occur in wetland areas.

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 wetland, vernal pools, bogs and fens, mature oak trees; and critical habitats for birds, deer, bear, bobcat, heron, and threatened or endangered plant species.
2. 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.
3. Towns should work cooperatively and seek assistance from land trusts to maintain large tracts of undeveloped habitat that cross political boundaries.
4. Town plans and zoning regulations should protect significant natural features and sensitive habitat areas by using setbacks and buffers, particularly for wetlands and vernal pools, before threats to these areas develop. 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.
5. Towns should attempt to identify critical bear habitat areas within the broader areas identified on Vermont bear habitat maps.
6. Towns should adopt zoning regulations that would discourage development near wetlands and vernal pools, and prevent development within 300 feet in conservation districts, in order to protect their functions and native biological diversity and to prevent additional loss of habitat.
7. Protection of wetlands, riparian areas, vernal pools, the most critical deer wintering areas, and natural grasslands should be considered in revisions to local subdivision regulations.
8. To protect high-quality forested riparian (river bank, stream bank or lake shore) 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.

G. Air Quality

Background

The air quality of Vermont and this 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, trans-regional 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.

The Region has and will continue to have a traditional dependence upon wood burning stoves for heating of 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 longevity of older wood stoves is often several decades. These older, less efficient stoves will stay in use for many years to come and will continue to pollute. Use of newer catalytic stoves will probably be limited to new stove installations, with small rates of old stove replacement or retrofit at existing sites. The incremental rate of pollution per new stove will decrease, although the total load of particulates and gases into the airsheds of the Region will likely increase with population growth.

Pollution from wood stoves has not been a serious problem for most communities in the past, but with more and more development and an increase in the

percentage of new developments using wood stoves, the total volume of pollution may become severe in some areas and require management in the form of stove inspections, incentives for retrofit or replacement and stove operation scheduling. Pollution from wood stoves can be significant. Municipalities should be planning courses of action should the problem become unacceptable. A multi-town or sub-regional approach to wood stove pollution may be the most acceptable resolution to these potential problems since airsheds do not limit themselves to political boundaries.

Because of the implementation of solid waste disposal fees, there has been an increase in illegal open burning of garbage in the Region. Such activities release dioxin, toxic gases and heavy metals directly into the air. Municipalities are encouraged to adopt ordinances to control open burning at the local level.

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 and should be addressed by the state and federal government, as the Region's communities may be the recipients of pollution, which could affect them or their natural resources but will have little ability to deal with these issues.

With eighty-one percent of the Region being forested, it hosts a unique vegetative cover which 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 Region who produce them. Discussions about transportation, energy production, incineration, and other issues should consider the effect upon the production of such gases and the incremental impact upon the Region's air quality. Increases in carbon dioxide emissions, primarily as a result of combustion of fossil fuels, are considered by many to be a leading cause of the buildup of greenhouse gases in the atmosphere. Greenhouse gases are believed to warm the atmosphere by allowing sunlight to reach the surface

of the earth, but acting as an insulator that prevents some heat from escaping the earth's atmosphere. Forest growth naturally stores, or "sequesters", carbon and the carbon remains in the wood after it is processed into a product. Activities that increase the biomass accumulation in a forest or in forest products increase carbon sequestration. See the Carbon Sequestration section of this Plan for more information.

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, in effect selling another product off of their land, and thus increasing the economic viability of sustainable forest management in the Northeast.

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

Goals

1. Maintain or improve air quality in local and regional airsheds.
2. Install and maintain a regional air quality monitoring network in cooperation with the Vermont Agency of Natural Resources.
3. Reduce dependence upon fossil-fueled and single-occupancy automobiles for transportation.
4. Reduce the transfer of pollution into the Region from sites outside it.
5. Promote the development and use of more energy efficient devices and renewable energy resources.
6. Eliminate open burning of garbage by homeowners and renters.
7. Increase the number and size of the Region's park-and-ride facilities.

Goals, policies, and recommendations continued next page

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

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.
3. Air pollution impact review should include visual quality in addition to contaminant concentrations over time and distance.
4. Options for mitigation of air pollution effects will offer timing/scheduling of emissions based on time-of-day and/or weather conditions as well as technology-based solutions of Best Practicable Technology (BPT) and Best Available Technology (BAT).
5. 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.
6. Backyard burning of trash is illegal and local education and enforcement activities are strongly encouraged to eliminate this practice.

Recommendations

1. Air quality should be monitored in the Region as part of broader statewide effort 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 chipped, landfilled in acceptable areas, or left on site 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 which may potentially impact upon 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. The Region recognizes the need to balance the rights of the owner of these resources with the public's right to minimize the nuisance potential resulting from mineral extraction.

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; and

4. Improper management practices which result in unnecessary soil erosion and inadequate site restoration.

The Region is host to three 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. These sites are uncontrolled or abandoned places where hazardous waste is located, possibly affecting local ecosystems or people. Each mine was operated during the 19th and 20th centuries and extensive remediation is required by the U.S. Environmental Protection Agency according to CERCLA, the federal law that governs cleanup of these sites. A redevelopment study has been conducted for the Elizabeth Mine site through funding managed by the Region.

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

Goals

1. To enable wise utilization of mineral resources to accommodate growth and development of the Region and adequate maintenance of transportation infrastructure.
2. To encourage extraction and processing of the resource where such activities are appropriately managed and the public interest is clearly benefited.
3. To encourage remediation of extraction and mining sites in the Region that threaten human health or natural resources.

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;
 - Conflicts with pedestrians or bike users; and
 - Numbers and frequency of heavy vehicles traveling through dense residential areas.
 - d. To minimize loss of significant prime agricultural land; and
 - e. To minimize any adverse effects on water quality, fish and wildlife habitats, and adjacent land uses.
2. 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.
3. Extraction sites must be screened to the extent practical if topography and vegetation allow.
4. 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.
5. Mineral extraction and processing facilities should be planned and developed so they do not place an excessive or uneconomic burden on local and state highways and bridges.

Natural Resources Endnotes

1. “How to Include Fish and Wildlife Resources Into Town and Regional Planning.” Vermont Department of Fish and Wildlife. 1992, page 6.

HISTORICAL, CULTURAL, ARCHAEOLOGICAL AND SCENIC RESOURCES

A. Introduction

Growth provides significant advantages for Vermont and the 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 of these losses 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 which addresses appropriate and legitimate standards for change. Criterion 8 of Act 250 embodies these values. The Governor's Commission on Vermont's Future (1987) expressed the belief that Vermonters were supportive of maintaining many of the values expressed above. Passage of amendments to the Municipal and Regional Planning and Development Act (1988) reaffirmed the commitment of the legislature to support a planning process which furthers these goals [24 VSA § 4302(c)].

B. Historic Resources

Advantages of Historic Preservation

By definition, historic preservation is the thoughtful management of the built environment, but this is such a simplistic



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

explanation it does not reveal the importance of the historic preservation movement in the region and Vermont as a whole. The reasons for the preservation of our architectural heritage are varied.

“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

To business owners, preservation is a mechanism to maintain a community’s interest and support in local economy. Community leaders and preservationists see historic preservation as a means to curb the decay of the traditional village center. The efforts taken in the villages of Bethel, Bridgewater, Randolph, Wells River and White River Junction to revitalize their business districts into functional economic centers serve as meaningful examples for this region. Nationally, many business owners have found that they can produce higher quality space for shops, offices, and housing through the adaptive reuse of existing buildings with less cost than new construction.

Preservation of historic buildings can increase the market value of property and increase tax revenues to towns. 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, Rochester Inn, and Corinth Meeting House contributes to sense of place and community pride. Once work has begun in a community, other efforts follow, often heightening community betterment and identity.

With little exception, local planning focuses on protection of rural character and open land. Preservation and revitalization encourages more private investment in the region’s villages and hamlets, helping to reduce sprawl. Likewise, 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.

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.

[The National Register and State Survey](#)

Beginning in the late 1960s, the Vermont Division for Historic Preservation (Division) conducted a Historic Sites and

Structures Survey for towns. Federal and state law mandate that Vermont inventory all structures and districts in the state which have historical and architectural significance. Although a building needs to be generally fifty years old, a building does not need to be an architectural landmark to qualify for inclusion in the survey;

the survey includes simple homes and buildings, as well as elaborate structures.

More than 3,000 of the region’s historic structures have been inventoried by the Division; the records are on file with the Division and are available in digital format. Planning commissions, local historical

Table 8-1: National Historic Register Landmarks, 2006

Town	Landmarks
Plymouth	Calvin Coolidge Homestead
Strafford	Justin S. Morrill Homestead
Woodstock	George Perkins Marsh Homestead

Source: Vermont Division for Historic Preservation

Table 8-2: National Historic Register Districts, 2006

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	Stockbridge	Stockbridge Common
Hartford	Christian Street Rural	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
Newbury	Bayley District	West Fairlee	Camp Wyoda
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 8-3: Vermont Historic Districts, 2006

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/Franklin/Summer Streets 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

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 conservation 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 federal list of culturally important

properties worthy of preservation. 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 an 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 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 Register is that owners of income producing buildings are eligible for tax credits on rehabilitation work, provided such work meets with certain prescribed standards.

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 non-profit 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. As part of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for

Users (SAFETELU), enhancement grants are available for a variety of projects including bridge rehabilitation and restoration, downtown transportation facilities, pedestrian and bike trails.

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. The Program provides technical support to communities interested in using historic preservation as an economic development tool. Nationally, such programs have been very successful. In 2000, Vermont expanded the scope of the Downtown Program to allow smaller villages to participate, known as “Village Designation”.

Yet another innovative program is the Vermont “Barn Again” program which awards matching grants on a competitive



*President Theodore Roosevelt
Visiting the Region in 1902
| Source: Roylton Historical Society*

basis to farmers for maintaining historic agricultural buildings. This program is sponsored by the Division for Historic Preservation, National Trust for Historic Preservation, and Vermont Agency of Agriculture, Food and Markets.

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 making such a determination, the commission must first evaluate the nature of the proposal against specific design criteria to insure that it does not impair the special character or significance of the surrounding area. Within the region, four such bylaw provisions exist and appear to be functioning well. They cover historic districts in Chelsea Village, White River Junction, South Woodstock and Woodstock Village. Throughout Vermont communities have similar provisions in effect. Interest in design review and

approval for historic preservation purposes has been on the increase throughout Vermont.

Under the provisions of Act 250, Criterion 8 protects historic sites along with other resources. Before granting a permit, the District Commission or Environmental Court needs to find that the 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. Local historical societies should continue the research, documentation, education, and advocacy efforts that they have pursued in their communities. Developers should be encouraged to incorporate historic structures and important architectural details into their project planning. 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.

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

Goals

1. To preserve and to enhance the unique characteristics of historic sites or areas, where the public interest is clearly benefited thereby.
2. To enable and support the renovation of existing or construction of new structures when they are found to be consistent and compatible with historic character of the site or area.
3. To promote sensitive economic development in areas of historic value such as in town centers, villages, and hamlets.
4. To promote improvements to historical transportation facilities, instead of replacement.

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 insure that the design of the project fits the context of the dominate 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. Unnecessary 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 should be designed to avoid unnecessary degradation of recognized historic sites or areas. Public investments of regional or statewide significance should 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.

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 which affect register properties or places to assure that such publicly assisted projects are planned with due consideration to the resource.

Goals, policies, and recommendations continued on next page

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

Recommendations (continued)

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. Archaeological Resources

Background

Archaeological evidence found throughout the state colors a history of human occupation that dates back 12,000 years. Most native 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. River basins defined community and hunting territories, and provided geographic markers and access to the region. These basins are generally areas that possess suitable characteristics such as slope, exposure, topography, distance to water and access to food sources to make them likely archaeological sites.

White settlers first used the rivers for access routes into the wilderness and later cleared the river banks and floodplains for agriculture during the eighteenth century. The early industrial period of the nineteenth century harnessed the rivers' power to supply local mills, water systems, tanneries, forges, and furnaces. Statewide, there are more than 370 historic sites

located within a quarter-mile of a river, including historic districts, mills, and covered bridges.

The archaeological record provides the only evidence of pre-European human occupation. In addition, the record can provide information about past environments, climate, and landscape changes. Although only a few archaeological sites in the region have been designated on the Vermont Archaeological 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 archaeological sensitivity. As described in the Town of Bennington's Archaeological Survey, prominent resources include the following:

1. ***Current or relic water supplies*** – including streams, rivers, lakes, ponds, and springs. Topographic clues to relic water supplies include kettle holes and dry ravines. Long-term occupation or camp sites were

always located near a water supply.

2. 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.

3. Rock-shelters — Often located in limestone outcroppings, these sites were often transient sites used for generations.

Most prehistoric sites are located within 300 to 500 feet from 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 archaeological importance. However, Act 250 only covers larger developments and many archaeological sites may be located on private land. For areas of potential archaeological significance, private landowners need to know how best to

preserve important resources on their land. Since many archaeological 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 conservation project, purchase of land and acquisition of development rights are important methods for preserving archaeological sites.

Public awareness, appreciation and understanding of the region’s archaeological resources is limited. This is due partly to incomplete documentation of the resources, and partly to a narrow perception of what constitutes archaeological 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 landowners that the protection of archaeological resources invariably means more restriction on the use of their property without much benefit.

Table 8-4: Predictive Factors for Locating Pre-Historic Archaeological 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

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

Goals

1. To preserve archaeological resources within the region, and to promote an appreciation of their value as a vital aspect of the region's historic and cultural past.
2. To better integrate comprehensive planning and land use development with archaeological resource protection at the federal, state, regional and local levels.

Policies

1. Archaeological resources are recognized as important links to the region's prehistoric and historic record, and are important components of our landscape. Such known and potential 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 archaeological resource of state or federal significance.
2. Within archaeologically 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 unduly impact these resources should be discouraged or redesigned so as to mitigate the impact. Project planners are encouraged to contact the State Archaeologist for further information.
3. To preserve significant archaeological 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 which serve multiple conservation purposes.

Recommendations

1. To increase public awareness of archaeological resources, TRORC encourages archaeologists, local and regional groups, towns, and landowners to organize educational programs focused on Vermont. 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 archaeological plan for their community as part of the overall master planning program. Such a plan could contribute to 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 Archaeologist within the Division for Historic Preservation.

D. Scenic Resources

Background and Goals

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 conservation of our visual resources can be traced to the late 1960s with the passage of Vermont's anti-billboard legislation. This legislation was strongly endorsed by the Vermont Hotel and Motel Association which recognized the direct economic relationship between land conservation and a growing tourism sector. 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 which, if reasonably followed, will minimize or mitigate any 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 its mountains and river valleys. Over the past thirty years, development patterns have emerged which propagate highway strip development. 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. Continued emphasis and restructuring of municipal planning and zoning administration, that addresses the delicate balance of the landscape elements mentioned above, can effectively preserve the landscape heritage in many areas of the region. Act 250 is not the answer. It is



Red Barn, Quechee: An illustration of "rural scenic character." | Source: ©Jericho Hills Photography

not intended to ensure a specific pattern of development, but only to evaluate projects on an incremental case-by-case basis.

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 which can permanently alter or pressure that landscape. TRORC supports a land use planning concept which encourages a pattern of development that complements the traditional settlement pattern clearly recognized and existing in the region.



View from the Beidler Family Farm in Randolph Center: An illustration of diversity, harmony, focal dominance, and intactness.

| Source: ©J. Colby, 2006

Determining scenic significance 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. Projects which are planned in areas of scenic significance are more likely to impact the resource. It is appropriate that municipalities, TRORC and other entities employ a process for evaluating impacts and to recommend design characteristics to be considered by those involved in the review and preparation of development proposals.

Prominent 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, mountain tops, or excessively steep slopes that can be readily viewed from public corridors;
4. Exceptional agricultural and historic areas, recognized as outstanding resource values;
5. Areas within or immediately adjacent to natural areas (i.e. wetlands) designated by the State; and
6. Areas of high scenic quality which are publicly recognized as exceptionally unique or are

noted examples of the dominant characteristics of an area in the region.

There are several kinds of scenic landscapes ranging from villages, urban centers to distant mountain views. Their relative importance is dependent on the several characteristics which make some landscapes more scenic than others. These characteristics are:

1. **Landscape diversity** - a combination of scenic elements which increases the effect, including:
 - a. topographic variation;
 - b. mixture of open meadows and woodlands;
 - c. water;
 - d. distant views; and
 - e. mixture of vegetative types.
2. **Extent of Order or Harmony in the Manmade Landscape** – Landscapes that contain a sense of order or logic, such that a clear sequence of villages and surrounding rural countryside exist. The cultural landscape that is represented by sprawl becomes indistinguishable and often chaotic. Order is heavily influenced by the following:
 - a. scale of building;
 - b. pattern of buildings; and
 - c. architectural similarities in form, size, or other factors.
3. **Focal Dominance** - Natural or man-made landscapes that are clear and dramatic focal points are more sensitive to scenic disruption; and

4. **Intactness/Uniqueness** -

Landscapes that have retained traditional patterns or forms or have absorbed modern development with minimal disruption are unique and are more likely to contribute to the scenic quality of an area.

Prominent Ridgelines or Mountain Tops

Where land development or subdivision is proposed on a prominent ridgeline or mountain top and visible from a scenic corridor, design plans should work toward the goal of retaining its prominent natural appearance. To accomplish this, structures or buildings are encouraged to locate away from the highly visible ridgeline to a lower backdrop on the hillside and structures should be partially hidden within existing wooded hillsides, where possible, and avoid excessive use of reflective glass.

Highly Scenic Areas with Distant Views

Where land development or subdivision is proposed in the foreground of a highly scenic location with distant views, design plans should work toward the goal of retaining or enhancing the view. New buildings or structures should be as unobtrusive as reasonable. To accomplish this, structures or buildings are encouraged to be designed so as to be compatible with the traditional pattern, scale, size, form, etc., and not unnecessarily block distant views from highways noted as especially scenic. Buildings or structures are encouraged to be sited in less visible areas such as at the edges of or within wooded areas rather in open meadows.

Clustering of buildings or structures is encouraged to leave vistas open on the site. Design of structures which is not excessive and do not unduly compete with the existing natural or cultural focal point is encouraged.

Scenic Agricultural Land

Where land development or subdivision is proposed on highly scenic agricultural land within a scenic context, design plans should work toward the goal of retaining the overall quality of the scenic area and of minimizing loss of the agricultural potential of the land. To accomplish this, structures or buildings are encouraged not to be sprawled over the entire site, leaving areas that are unusable for agriculture. In the alternative, development or subdivisions should be planned so that structures are clustered or located in a manner that remaining land is made available for practical use as open land, cropland, or hay-land. Common access drives to properties are encouraged. Location of utilities and common access drives is encouraged on the site away from productive agricultural land and in a manner to minimize visual impact on the scenic resource.

Scenic Areas Highly Visible from a Public Corridor

Where land development or subdivision is proposed in scenic areas highly visible from a public corridor, design plans should work toward the goal of minimizing the adverse visual impacts often associated with large-scale box-like buildings and/or large lot parking areas. To accomplish

this, structures, buildings and other site improvements should be planned so that building form, massing, and other features are compatible with dominant patterns of the area or site and in ways that reduce the apparent scale of the project on the site. Design planners are requested to break large parking areas into smaller lots with ample landscaping or screening from off-site views, and to locate the project on the less scenic areas of the site. Prominent grade changes that starkly contrast with existing or surrounding contours are discouraged.

Built Environment with Scenic Value

Where land development or subdivision is proposed within or adjacent to a built environment noted for its exceptional scenic value, including historic sites or areas recognized by the State of Vermont or municipalities, design plans should work toward the goal of minimizing contrast with the exceptional resource and to enhance visual quality. To accomplish this, project planners are encouraged to site buildings and structures that are compatible with the scale, massing, texture, or otherwise respect the pattern of nearby structures. Plans that promote large box-like structures which sharply contrast with existing scenic resource values are not recommended, particularly where the composition of the overall project is highly visible from public viewpoints.

Industrial or Commercial Development in Areas of Scenic Value

Where single purpose developments such as industrial or office parks, or

shopping centers are proposed in areas of exceptional scenic value, design plans should work toward a goal which reflects the traditional settlement pattern and characteristics of the area. To accomplish this, project planners must design the site so the development does not appear to be grossly out of scale with its surroundings. It must not extend or enlarge existing patterns of development that are deemed unacceptable (e.g. strip development).

Design solutions should respect location and design of the project to minimize visual intrusion on the most valuable scenic attributes of the site. They should respect the natural contours of the land, utilize, where necessary, landscaping which harmonizes with existing vegetation to create project buffers and screening of buildings, and to encourage pedestrian access and internal circulation.

Policies: Scenic Resources

Policies

1. Where development is proposed 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;
 - e. Reflect traditional settlement patterns.
2. Certain areas immediately adjacent to major highways are examples of development sprawl. They adversely affect scenic resource values of the traveler. Generally referred to as strip development, buildings, parking lots, and signage are oriented to the automobile rather than the pedestrian. Because strip development lacks focus or orientation, it is generally considered confusing and inhospitable. Such forms of development are generally considered contrary to the preferred development pattern of this region.
 - a. In spite of the general policy that strip developments are to be discouraged and contrary to the spirit of this Plan, it is recognized that certain areas have been or will be developed or redeveloped principally for commercial or industrial uses.
 - b. To the extent feasible, project planners are encouraged to minimize the adverse effects of strip development on existing visual resources by consideration of the following design principles:
 - Provide pedestrian and vehicular links between projects;
 - Reduce impacts of parking areas by breaking the lots into small groups with integrated landscaping;
 - Encourage compact and densely developed projects which utilize land efficiently;

Policies continued on next page

Policies: **Scenic Resources**

Policies (continued)

- Preservation of open space, if appropriate, be of a distinct area of visual or functional importance rather than useless bits of greenery between buildings, etc.;
 - Placement of street trees which act as buffers between traffic arteries and internal drives;
 - Use of signage and other structures that effectively communicate the desired message or use of the site without being garish;
 - Layout of the project site to allow for coordinated future use of the entire parcel;
 - Reduction of apparent scale of excessively large buildings by varying the pattern, number, size, and location of structures within the site;
 - Employ screening plans for visually objectionable features on the site, including dumps, refuse disposal sites, and building equipment; and
 - Minimize access roads or curb cuts onto public highways and use of common access drives.
3. An integral scenic element of the rural countryside is the extensive network of roads which comprise town and state highway systems. These roads are often characterized by relatively narrow roadways of diverse and contrasting features in close proximity. These characteristics combined provide a unique visual experience and awareness of the landscape. With some exception for principal arterials, it is in the public interest to retain these special features. Given their unique visual experience, roads exhibiting exceptionally high scenic and cultural values, and determined to be of local or state significance should 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 which unnecessarily destroy the special characteristics of such roadways are not consistent with this Plan. Use of appropriate design standards is encouraged and should be related to highway functional classification.

E. Scenic Values and Telecommunications Facilities

Background

TRORC recognizes that transmission towers are necessary telecommunications facilities, but as land uses, these towers have emerged as planning concerns. To

ensure adequate transmission of signals in mountainous areas such as this region, towers and related facilities need to be confined to hilltops or high elevation points. Thus, due to their higher visibility from multiple vantage points, conflict with scenic landscapes has become an issue.

Over the years, the District Environmental Commission III, in its administration

of Act 250, and some municipalities as part of their zoning review, have had to evaluate these uses. Some cases have been contentious, resulting in delays and expensive appeals. Most local plans and bylaws lack definitive policies, standards of review, or key information necessary to enable a fair and comprehensive evaluation of the impacts posed by these issues.

TRORC is aware of the potential problems and opportunities associated with these uses and have devised land use policies and standards to assist in mitigating conflicts and to give constructive guidance to the industry and affected municipalities. As a result, municipalities have begun adopting telecommunications tower language in Town Plans and have adopted zoning provisions.

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. Under Vermont law (24 VSA Chapter 117), municipalities may require that certain standards be met prior to the erection of telecommunication facilities. Local bylaws may regulate the use, dimension, location, and density of towers, however, FCC rules are preemptive of local and state law where conflicts exist. Current practice within the FCC is not to specifically regulate the location, height, or design of individual owners. However, FCC uses the “central point doctrine” that provides for the location of transmission

antenna to be at the “most central point at the highest elevation available”. Given, this rule and others promulgated by the FCC, municipalities and the State may not be overly restrictive of or prohibit these types of facilities. In sum, the extent of local and state regulation is limited, must be reasonable, and serve the public interest.

TRORC has devised land use policies and standards to assist in mitigating conflicts and to give constructive guidance to the industry and affected municipalities.

In late 1994, the Cellular Telecommunications Industry Association requested the FCC to push state and local governments out of the siting process entirely. Additionally, bills were introduced in Congress to limit local and state authority over telecommunications. Most of these actions have been opposed by state and municipal organizations, and are viewed as unnecessary invasions of state and local control. TRORC does not favor preemption and supports cooperative efforts between the industry, the State, and municipalities to plan and regulate the future build-out of the telecommunications system affecting the region. The 1996 Telecommunications Act ensures a local voice in siting decisions.

Goals and Policies: **Scenic Values and Telecommunications Facilitates**

Goals

1. To improve telecommunication coverage in the region.
2. To support the enhancement of telecommunications network when such facilities do not have significant adverse environmental, health, or aesthetic impacts.

Policies

1. In order to minimize tower proliferation, it is the policy of TRORC to encourage applicants to exhaust all reasonable options for sharing space on existing towers or tower sites prior to proposing new towers sites and related facilities. The principle of co-location is the favored alternative. In making such a determination on the feasibility of co-location, proposers should evaluate space available on existing towers, the tower owners ability to lease space, geographic service area requirements, mechanical or electrical incompatibilities, the comparative costs of co-location and new construction, and regulatory limitations.
2. One of the region's principal scenic qualities are 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 nor adversely affect these scenic values. Protection of these areas from insensitive developments are matters of public good. To minimize conflict with scenic values, co-location is the first choice, followed by an analysis that provides the least impact for the desired coverage. Facility design and construction should employ the following principles:
 - a. Use the minimal height necessary, and where feasible, be sited in areas not highly visible to the traveling public, or from residential areas, historic districts, and public use areas or outdoor recreation areas such as hiking trails and beaches;
 - b. 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;
 - c. Utilize materials, architectural styles, color schemes, lighting fixtures, mass and other design elements to promote aesthetic compatibility with surrounding uses and to avoid adverse visual impacts;
 - d. Where prominent views of a site exist, be located downgrade of the ridge so as not to exceed the elevation of the immediate ridge;
 - e. Where construction of access roads, power or phone lines are involved, minimize their visibility by constructing them along the contour of the land and avoiding any open fields or meadows. This is also intended to reduce their ability to encourage secondary development;
 - f. Avoid peaks and ridges which function as regional focal points.

Goals and policies continued next page

Goals and Policies: **Scenic Values and Telecommunications Facilitates**

Policies (continued)

3. In planning for telecommunication facilities, consideration should be given to the environmental limitations of any given site. Impacts of the use on wildlife habitats, soil erosion, forestry and agricultural lands, and similar resources should be carefully addressed. Projects which materially impact these resources are discouraged.
4. For telecommunication projects situated on lands owned by the State, design plans should be compatible with current Management Plans for Public Lands adopted by the Agency of Natural Resources.
5. Towers, antennae, and related fixtures that fall into disuse, or are discontinued should be removed to retain the values set forth above. Local and state land use permits should incorporate such as an approval condition.
6. When facilities and tower configurations are dependent upon others being constructed along a corridor, then the entire string of facilities should be considered as a whole so that piece-meal permits do not preclude more amenable options.
7. The clearing of land associated with site development for tower and facility construction should not negatively impact the scenic views present.
8. Towers or facilities that are designed to resemble trees or natural features should not be placed conspicuously higher than the tree line.

F. 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. These include new parking lots, brighter street lighting in our towns and villages, floodlights on commercial and industrial complexes, and lighted gas station canopies at our interchanges and along our major roads. 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,” affects our ability to view the night landscape as well as creating an adverse impact on the character of our historic villages.

With the advent and increased use of new lighting technologies since the 1950s, commercial enterprises, industry, towns, and others have new tools to shape the nighttime environment. Many of these new lighting installations are well-designed, provide good night vision at reasonable levels and fit well into their immediate surroundings. Others do not. Problems of glare, over-lighting, light escalation, sky-glow, and energy waste have become more common.

Planning commissions, developers, and regulatory review agencies often lack information and expertise to adequately review design lighting schemes that reflect the basics and principles of good lighting design. This Section is intended to provide guidance and standards to assist policymakers in evaluating lighting issues, opportunities, and costs. It is also intended to provide communities with clear policy statements to enable them to evaluate new lighting installations located on public and private property.

Lighting is more than a functional part of the region's infrastructure. It is a design tool that can influence and shape the night landscape in our villages and outlying areas. Choosing the 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 sound transportation strategy for the region. Thus, functionally, good lighting design will lead to enhanced night environments.

In May, 1996, the Chittenden County Regional Planning Commission published: *Outdoor Lighting Manual for Vermont Municipalities*. The study was funded by the U.S. Department of Energy, The Vermont Department of Public Service and several of Vermont's electric utilities. This study is a valuable resource to the region and its communities interested in managing outdoor lighting, improving lighting designs, energy conservation,

and preservation of the night landscape. The suggestions and recommendations contained in the Manual form the basis of many of the design principles and issues are reflected in this Section of the Plan.

The purpose of an outdoor lighting installation should be to enhance the visibility necessary to provide lighting for a given task or need. Using a large quantity of light does not guarantee good visibility, however. Over lighting can cause glare and other problems that hinder good vision. Lighting problems 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 it look dark by comparison. Studies have shown that this leads to "competitive" lighting - more light is added to reduce the risk of not being seen. This results in more lighting equipment, and higher electric bills for businesses, and the loss of character in an area.

Excessive light levels can vary according to the use. Conventional parking lots generally need higher light levels than passive recreational parks. 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. Excessive brightness makes it difficult to see. Good visibility can be accomplished with less light. Glare is caused by misdirected fixtures or unshielded lamp sources. Light that is not directed toward the ground or toward the intended surface

can shine into the viewer’s eyes, impairing vision causing potential safety problems.

With the advent of many new types of lamps, modern lamps come in a variety of colors depending on type and lamp intensity. Color is an issue for exterior lighting. Certain lamps color differently and can significantly change the natural color of an object or make it difficult to distinguish one color from another. 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 fixtures (HPS). This has resulted in the orange-yellow light that significantly changes the color of the night landscape.

Sky-glow or reflected light from surfaces is visible in the night sky over towns or large commercial/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. Reducing sky-glow is a desirable objective for the region. Techniques to reduce the amount of illumination shining directly into the sky can reduce sky-glow and the overall level of lighting to be used.

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. (See Chittenden County Regional Planning Commission “Outdoor Light Manual For Vermont Municipalities”, May, 1996, pp. 19-20). Other factors, such as gates, locks, alarm systems, and guards are far more effective means to deter crime. In spite of this, lighting can act as a deterrent to crime by psychologically increasing the chance to an offender 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 to produce glare or to create shadows.

Goals, Policies and Recommendations: **Outdoor Lighting Design and Management**

Goals

1. To preserve the nighttime ambiance and aesthetic qualities of village centers and other places by illuminating them for safety and convenience in ways that enhance the best qualities of streets, architecture, and public spaces.
2. To enable outdoor lighting systems that conserve energy and minimize life cycle costs.
3. To encourage lighting design that is creative and functional consistent with these lighting goals and policies.
4. To provide technical guidance and support 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, observance of good 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). Such information will be useful in evaluating and developing lighting schemes for particular uses and settings, but not necessarily in all situations. Additionally, project planners should give due consideration to the guidelines set forth in the “Outdoor Lighting Manual for Vermont Municipalities”. Design criteria that exceeds IESNA recommendations for outdoor lighting should be evaluated for conformity with this Plan, particularly as they may relate to the effects on the character of the area and aesthetics.
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 on the amount of light being generated is encouraged. Such a practice should utilize lighting more efficiently, minimize the amount of wasted light, and reduce energy costs.
4. Excessively high lighting levels for uses in rural or very low residential areas are inappropriate. Where neighborhoods are characterized by heavy traffic, larger facilities (i.e. schools, and industrial plants), or high parking turnover rates, higher lighting levels may be appropriate. Where high ambient or background lighting levels are adjacent to planned uses, such levels should be considered when evaluating light levels for new installations.
5. The lighting of gasoline stations and convenience stores, and some types of commercial establishments (e.g., automobile sales) have or may become lighting problems in the region. Such facilities are typically far more brightly illuminated than neighboring properties to attract attention and business. Glare is produced which hinders visibility for pedestrians and drivers on nearby highways. Lighting levels for these uses 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 bright 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.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations:

Outdoor Lighting Design and Management

Policies (continued)

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 low pressure sodium lamps;
 - 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 its harmony with its 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. Public interest in outdoor lighting issues and opportunities is growing. TRORC should assist local and state policymakers in evaluating lighting options. TRORC should consider sponsorship of educational workshops for planning commissions, design professionals, and others to acquaint them to 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 the Vermont's public utilities and design professionals to evaluate lighting technologies and efficiencies.



HOUSING RESOURCES

A. Background

General Trends

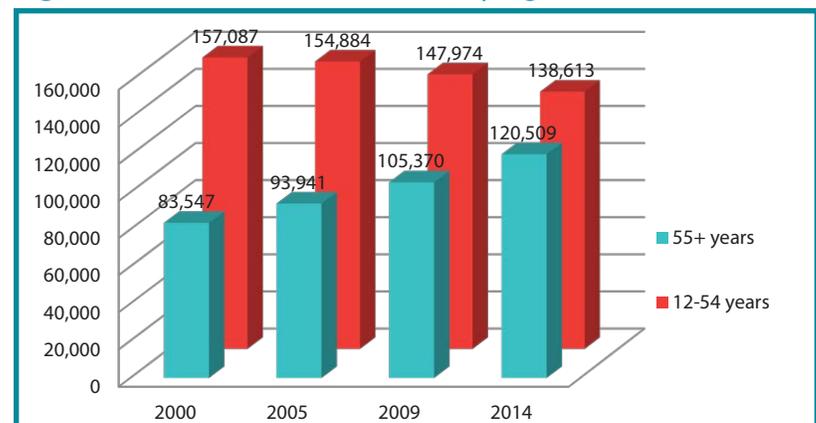
Over the past decade, the TRO Region has seen moderate growth in the housing sector, in spite of the economic downturn of 2008 and Tropical Storm Irene in 2011 (see Table 16, Appendix E). The region, as a whole, is typified by an increasingly tight and costly housing market that does not adequately provide the housing necessary to promote continued growth or provide needed workforce housing units. At the same time, the region is seeing the second-home market become an even larger component of the regional housing market, according to 2010 Census data.

Continued increases in housing costs, coupled with the limited housing supply, have restricted first-time home-buyers from getting into the market. Additionally, many who successfully attain homeowner status do so to find their income does not adequately support the costs of their housing needs (see Tables 17 and 18, Appendix E). Today, a new generation of municipal employees, teachers, service workers, and skilled trades' people are confronted with limited housing options and high costs. The problem is not only a problem for low-income households; rather, the skilled workforce and young professionals increasingly find themselves burdened by housing costs in the region.

According to the 2010 U.S. Census, the state of Vermont's population is projected to increase by 88,000 residents by 2030. At the same time, the elderly population in the state is projected to increase to 91,000.¹⁴ 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 is possible, particularly in light of the rising costs of elder care facilities.¹⁵ Given the lack of residential housing options for the elderly, promoting 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. It serves as an holistic measure that helps communities to keep the aging populace in place, preferably around town centers, as opposed 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.¹⁶

Figure 9-1: Vermont Households, by Age of Householder



Source: VHFA Analysis of US Census Bureau 2000 SF1 Table P-21; American Community Survey 2005 Table 25007; and Nielsen Claritas estimates (2009, 2014)

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 housing development throughout the region.
- Weak social and built infrastructure in towns, making it harder for towns to attract in-migration and sustain housing growth throughout the region.
- A lack of developable flat land in the region, particularly in areas serviced by municipal water and/or sewer systems.
- 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 at any age while at the same time balancing age-restricted housing needs with affordable housing for a wider audience across the board.
- A scarcity of affordable housing, both for purchase and for rent, to accommodate the region's workforce.

Roadblocks toward the provision of “affordable housing” are pervasive, perhaps, in part, due to the misconceptions commonly associated with workforce housing.

- Limited adaptive reuse of buildings in town centers, housing conversions, and creation of accessory dwelling units, particularly in growth centers.
- The prevalence of scattered housing in the region away from compact,

designated growth centers, which puts a strain on municipal resources and furthers fragmentation.

- Regulatory burdens restricting housing development, such as zoning limitations and permitting processes that make new housing construction difficult.
- The large number of residents burdened by the costs of housing (see Figure 9-6).

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 an integrated, mixed-income region.

Role of TRORC in Housing

The following information outlines TRORC's policies relative to its role in regional housing issues:

Act 250 and local appeals process

- Support changes in Act 250 that would create incentives and requirements for the inclusion of affordable housing development in economic development proposals without compromising the Act.
- Advocate for the maintenance of reasonable appeals processes at both local and state levels.

Local Technical Assistance

- Mitigate and manage growth, without compromising quality of life.

- Continue assisting towns with zoning and planning.
- Encourage ordinance, bylaw, and plan language which allows multi-family housing development, inclusionary zoning, mixed uses, and planned unit developments (PUD).
- Work with towns to understand the Federal Fair Housing Law, its implications, and how to comply with it.
- Adaptively reuse non-housing properties to create more housing units.
- Support the rehabilitation of defunct second and third floors above downtown commercial spaces.
- Support the development of housing for all ages.
- Encourage sustainable development, where development which is properly scaled to the community's ability to support it.
- Encourage compact development and infill near existing centers; prevent sprawl.
- Encourage the protection of biodiversity, by preventing the fragmentation of habitats.
- Encourage towns to have state-designated "downtowns," "village centers," or "new town centers" to trigger housing incentives for developers.
- Assist towns with public sewer and water improvement projects.

Regional Planning

- Work with adjacent regional planning commissions to understand our neighbors' growth pressures and plan

to mitigate the impacts that they may have on the region, including those in New Hampshire.

- Support the work of the existing housing trusts which serve the region, where there is a need for housing and the project is in accordance with the region's priorities.
- Plan dynamically, understanding that the choices we make on each regional issue (transportation, economic development, basin planning, etc.) impact the supply and cost of housing.

Statewide Initiatives

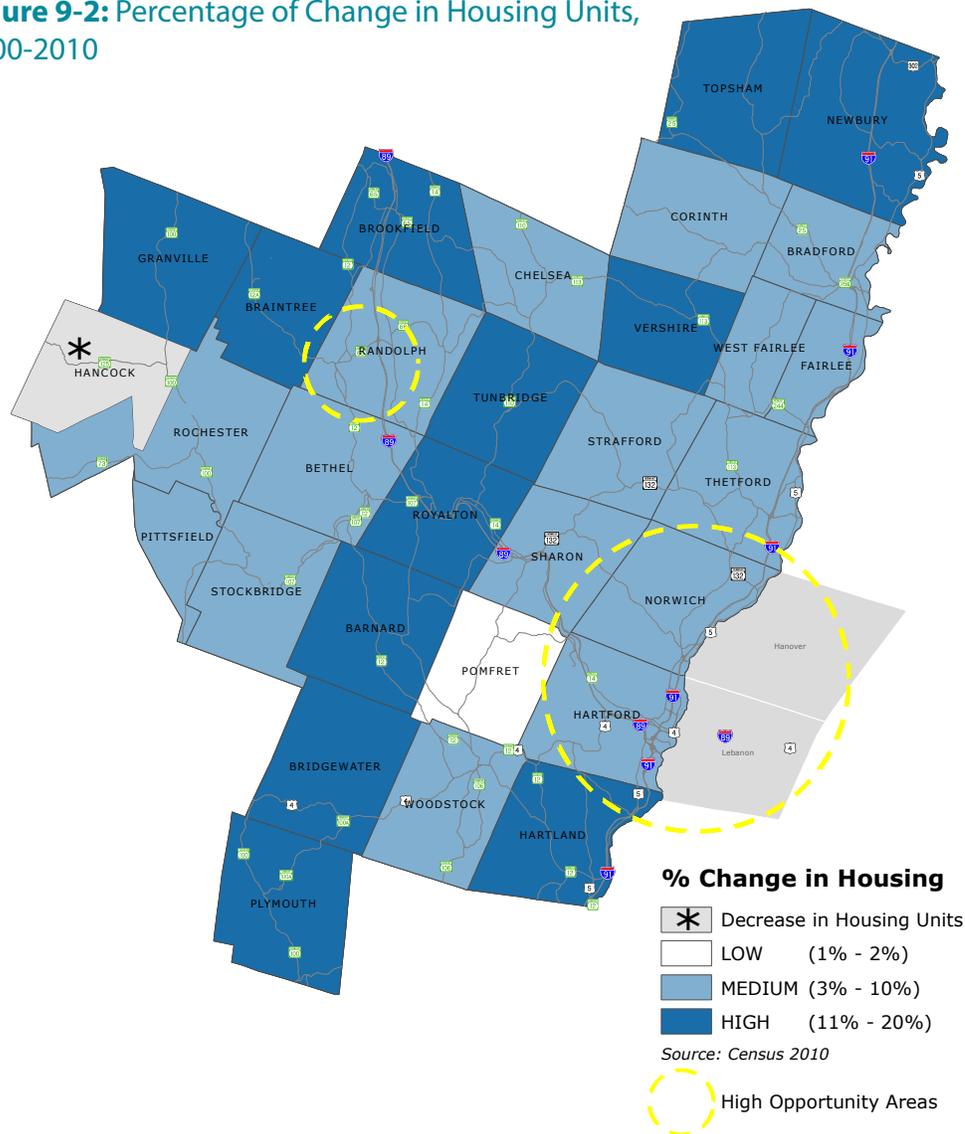
- Represent TRORC's housing policies to the Vermont State Legislature.
- Support the Public Awareness Campaign of the Vermont Housing and Finance Agency.
- Work with the Vermont Department of Housing and Community Development to facilitate the education of our towns on the Federal Fair Housing Law.

B. Housing Characteristics

Number of Housing Units

The U.S. Census defines a "housing unit" as conventional houses, apartments, mobile homes, and 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. As of 2000, the total number of housing units in the region stood at 28,822, meaning there was a 9.2% increase in units from 2000 to 2010. The 1990s, by comparison, only had a growth rate of 7.2%, and the 1980s saw a 22.8% boom in growth. The region gained 1,933 total units over the 1990s, and 5,000 total

Figure 9-2: Percentage of Change in Housing Units, 2000-2010



units over the 1980s. 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) saw a decrease in housing units between 2000 and 2010 (see Table 16, Appendix E). Many of the towns that had the highest growth between

2000 and 2010 are within close range of designated high opportunity areas, which are the areas in our region that are noted as having the strongest job markets, infrastructure, services, and education institutions. High opportunity areas, even across states lines, are hugely important drivers for growth throughout the Two Rivers region.

During the 2000s, housing unit numbers in most towns in the region rose, although often at a modest pace. Newbury experienced the most dramatic change: this town of 1,153 housing units added 225 new units and experienced a growth rate of 19.5%. The number of housing units in Newbury grew over 20% in the past two decades, and growth exceeded 40% over the past three decades. The following four towns experiencing the next highest rates of growth in housing units from 2000-2010: Bridgewater (18.2%), Brookfield (16.6%), Vershire (15.1%), and Royalton (14.8%). As noted, the only town to have declining housing growth from 2000 to 2010 was Hancock, which saw a loss in six properties despite having grown 6.5% (thirteen houses) in the preceding decade.

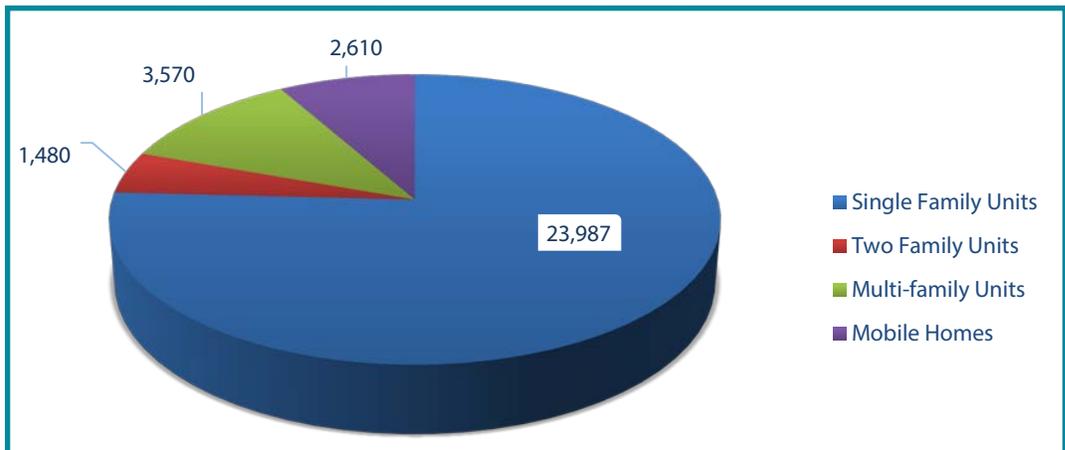
The primary factors influencing new housing growth in the region since the 1960s were the relative cost and availability of real estate, evidence of a healthy and vibrant economy, and the comparative ease of access to employment centers. Certain towns have seen growth in second homes, which is partially attributable to access to recreational opportunities in the region and other scenic and cultural opportunities. VHFA's "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 an increased need of 20 households per year at a rate of 1% growth and Orange County will see an increased need of 90 households per year at a rate of 8% (an anticipated 1% growth

drop from the 2000-2010 estimates). However, the study also highlighted the current, pressing need for 675 additional elderly housing units and a further 4,409 workforce housing units. Finding the most suitable locations for the region's current and anticipated housing needs is imperative to accommodate the needs of the aging region's 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 F).

Housing Unit Types

The 2010 U.S. Census for the region indicated that 23,987 units (or 75.8 % of the total housing stock) consisted of single-family homes, an increase of nearly 2% from the 2000 Census (see Table 19, Appendix E). The second most common type of housing unit was multi-family units with 3,570 units, or 11.3% of the regional total. The larger communities with defined centers and in closer proximity to employment centers have the largest proportions of multi-family housing units: Hartford (30.7%), Royalton (24.4%), Randolph (13.5%), Bradford (11.2%), and Norwich (9.8%). Duplexes, or two-family units, constitute only 7.8% of the housing stock in the region, with the majority of towns (24 in total) having less than the regional average. Royalton, Woodstock, Fairlee, Vershire and Pittsfield exceed the average (9.3%, 8.8%, 8.6%, 8.4%, and 8.1%, respectively).

Figure 9-3: Types of Housing Units in the Region by Structure, 2007-2011



Source: U.S. Census, 2007-2011 American Community Survey 5-Year Estimates

Mobile homes only constitute 8% of the overall housing stock throughout our region, but these homes offer low- to moderate-income homeowners a valuable housing opportunity. The towns with the largest percentages of mobile homes in 2010 were: Braintree (23.4%), West Fairlee (20.2%), Sharon (19%), Topsham (17.8%), Hancock (17.2%), Hartland (14.7%), and Royalton (14.3%), 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 may come at the expense of thermal and energy efficiency. It is estimated that manufactured homeowners in Vermont pay up to 66% more of their income on energy than brick-and-mortar home owners do.¹⁷ In response to the ownership cost associated with older mobile home units and the fact that 15% of 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, featuring numerous energy saving design elements and priced at under \$80,000 per unit. These homes are currently being constructed in the TRO 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.¹⁸

The prevalence of single-family homes in the region is higher than that of the state overall. Conversely, the TRO Region has significantly lower percentages of two-family and multi-family housing opportunities throughout the region, particularly with respect to multi-family housing (11.3% for our region and 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.

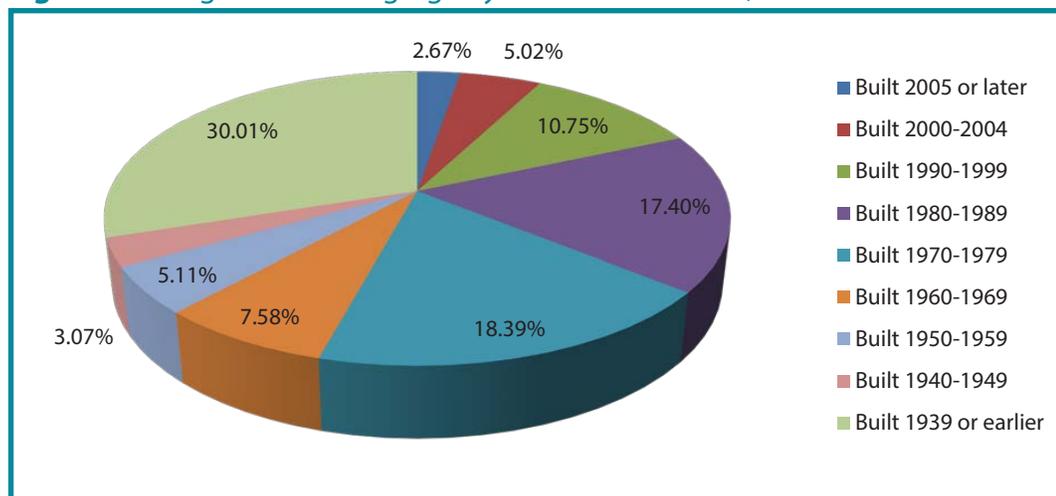
Housing Age

The age of the region’s housing stock is skewed heavily toward older homes that are increasingly more costly to maintain and heat and may be financially burdensome on their owners. The greatest percentage of housing in this region was built prior to 1939 (30%); the region’s slowest growth era was 1940-1960 (8.2% cumulatively). Nearly half (45.77%) of the region’s housing stock predates 1970, which is roughly equivalent to the statewide percentage (46%). Renovation, retrofitting, and general maintenance on these properties are imperative in order to ensure the health and well-being of residents in as much as it is imperative to maintain house values and overall aesthetic appeal.

The 2010 U.S. Census shows that only 7.7% of the region’s housing stock has been built since 2000, which is less than the state total of 10.3%. Eleven towns experienced higher than average rates of housing construction over the last decade, with three much higher than the regional percentage: Topsham at 14.3%, Tunbridge at 12.7% and Bradford at 11.3%. Three towns experienced significantly below-average rates of construction in the 2000s: Fairlee (3.9%), Pittsfield (2.9%), Randolph (2.9%) and Pomfret (2.7%). Pittsfield is a fairly remote community, which lends to its slow pace of growth. Randolph and Fairlee, conversely, can be reached quickly and easily, but prime lots in the town center are largely accounted for. With respect to Pomfret, buying land or housing requires financial assets which are not available to the majority of the region’s population, thereby contributing to slow growth.

Viewing the region’s existing housing stock by the age of the units illustrates that the

Figure 9-4: Regional Housing Age By Construction Date, 2007-2011



Source: U.S. Census, 2007-2011 American Community Survey 5-Year Estimates

majority of houses (81%) were built prior to 1990, exceeding twenty or more years in age. As a consequence, many houses in the region are increasingly costly to maintain and repair, and, in many cases, houses are not energy efficient, placing added financial strain on households that are overburdened by housing expenditures. Figure 9-4 depicts the breakdown of new housing construction in the region by selected timeframes:

Housing Occupancy

The region is currently experiencing 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 E). 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 no vacant units at 3% or less because, of the units that may be available, obstacles like sub-standard conditions keep the vacant units from being inhabited.

Vacancy rates in the Upper Valley are some of the lowest in the state, outstripping

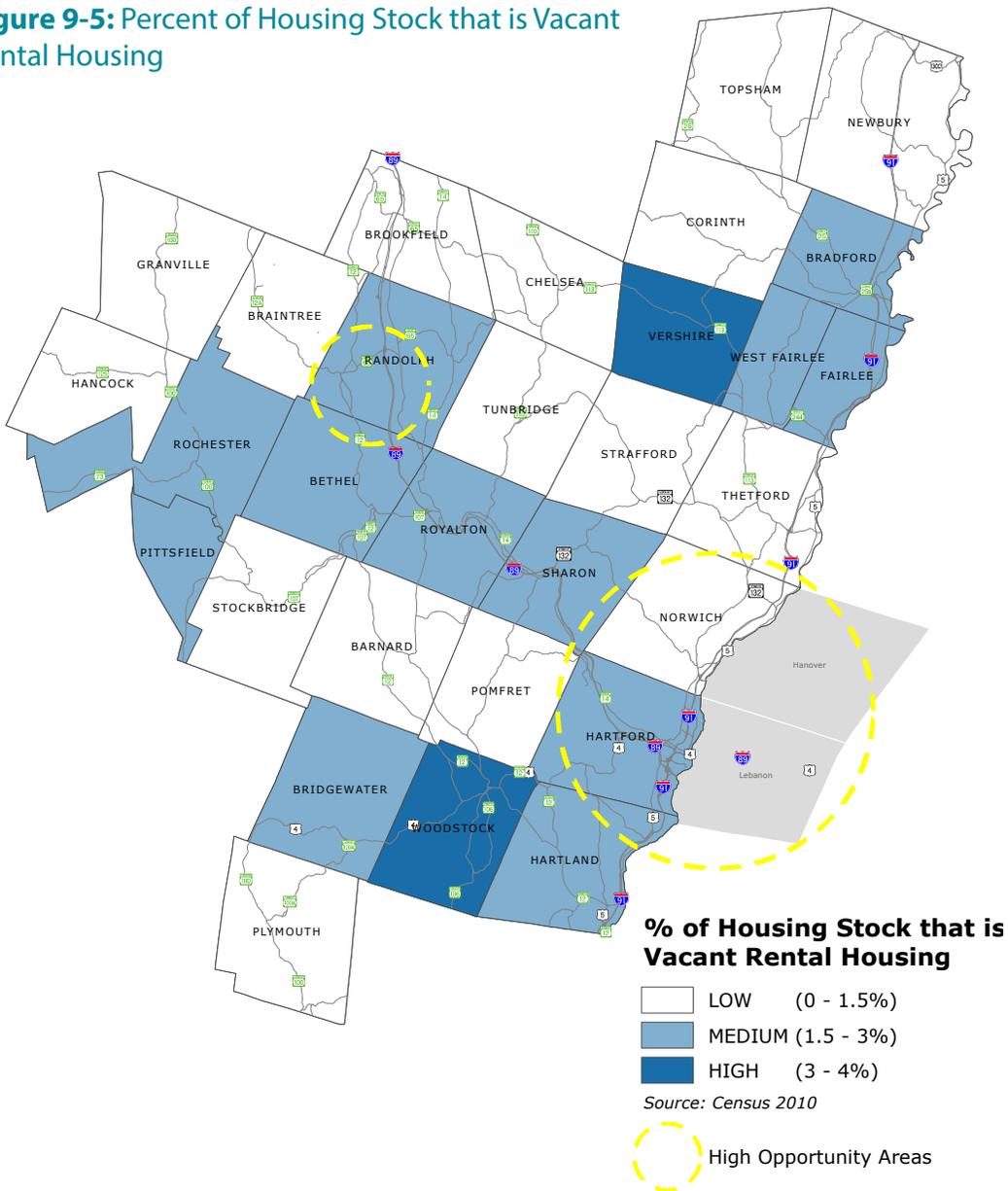
demand for properties in the region. The lack of stock exacerbates demand, which in turn can increase prices for financially burdened residents.¹⁹ Steady job growth and a shortage of housing development (especially housing that is affordable to low and middle income earners) have given us a very tight housing market. The lowest vacancy rates in the region were in these seven towns: Strafford (1.5%), Thetford (1.8%), Chelsea (1.9%), Newbury (2.6%), Topsham (2.6%), Braintree (2.7%) and Pomfret (2.7%). Vacancy rates this low were a new development across the board, though Strafford and Braintree both previously had rates below the "functional zero" threshold in the preceding decade, per the 2010 U.S. Census. The highest vacancy rates were in: Woodstock (7.8%), Rochester (7.33%), Plymouth (6.71%), and Vershire (5.9%). Proximity to work and affordability play a role in maintaining the above-average percentages of vacant housing in these towns.

Vacant seasonal units are a measure of the secondary housing market. Over the past decade, the number of vacant seasonal units has increased in all but four of the region's towns. Many homes that were originally built for seasonal use, be they rental or for purchase, can inflate vacancy rate figures in seasonal recreation and resort areas, particularly in Windsor County towns near to the Killington and Sugarbush ski areas.

Housing Tenure

Historical Census figures on housing tenure reveal the relationship between owner-occupied housing units and

Figure 9-5: Percent of Housing Stock that is Vacant Rental Housing



Map Source: TRORC

renter-occupied units. Between 1990 and 2000, the region's housing stock became even more invested in owner-occupied units, a trend that has steadily continued since 2000, with growth in owned

units continuing to outpace rental unit opportunities (see Table 21, Appendix E). 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. By extension, owner occupied units are those where the owner(s) lives in the unit, be it mortgaged or owned outright.

In 1990, nearly 78% of the region's housing stock was owner-occupied (more so than the State average of 75%), including all currently owned units, seasonal units, and units on the market. This trend continued in 2000, and slowly increased by over .5% from 2000 to 2010. Only eight towns in the region have less than the regional percentage of owned-homes: Bethel (76.4%), Bradford (69.7%), Fairlee (75.2%), Hartford (71.8%), Randolph (71.7%), Royalton (59.5%), Sharon (76.1%), and Woodstock (76.1%). Of these, only four towns have a higher percentage of rental units than the state's average (Bradford, Hartford, Randolph, and Royalton). These statistics are largely attributable to access to major job centers in the region, access to major highways, and, in the case of Royalton, the glut of rental housing opportunities for Vermont Law School students and faculty population compared with for-sale properties.

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 in this region because the housing market is so tight. 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.

C. Housing Affordability

Housing affordability is measured based on the amount 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. 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. 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. Key to this is being able to access housing that is near compact growth centers, as they are more likely

to benefit from better infrastructure and public services, including transportation links and health centers. Both younger and elderly populations are best served by increasing the numbers of apartments, condominiums, small starter homes, 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, often outside of the TRO Region. While some housing development has occurred in traditional centers, most of the single-family development has occurred

in the towns which border these centers. Land and homes are more favorably priced in outlying towns, but there are costs associated with longer commutes, the clearing of undeveloped land, road construction, and construction of private water and septic systems. A recent 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 or 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 (<http://www.locationaffordability.info>).

The ability of rural communities to absorb the costs associated with new growth can be a challenge. As a consequence, voters in

Figure 9-6: Average Housing Costs as a Percentage of Income in TRO Region



Source: HUD Location Affordability Portal, 2014

rural towns have often been more inclined to support the development of second-homes/vacation-homes because they are seen as a net-gain. These homes are seen to contribute to the tax base without requiring many services beyond road maintenance. Several towns in the region have been assuming a disproportionately larger share of the fiscal impacts of the region's tight housing market.

The trends associated with housing demand and growth are anticipated to continue. The issues of fiscal impact will not disappear, regardless of whether housing is characterized as affordable or not. The decision facing town governments is whether they will take affirmative steps to welcome the development of affordable housing and participate in programs that benefit Vermonters who are at-risk in terms of housing but who offer valuable contributions to the ongoing vitality and character of the region. For additional information on local, state, and federal affordable housing organizations that are available to communities, please see Appendix G.

The State of Regional Homeownership

Most residents in the TRO region own their homes. Home ownership rates are generally a reflection of the rental and home ownership options in the market, whether there is an adequate supply to meet residents' demands, and whether properties can be deemed affordable in relation to income. 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 E). 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 nor Orange Counties qualify as being affordable when housing and transportation are considered together. Taking into consideration the market price levels and costs of living, greater emphasis must be placed on providing housing that is adequate, both in standard and location, for low to moderate income households while not compromising the householders' basic needs. An integral part of this requires working to provide housing with monthly carrying costs that can be afforded on a long-term basis.

The True Costs of Housing in the TRO Region

In recent years, the cost of housing throughout Vermont has increased along with increases 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 socio-economic sectors means that financially burdened households paying at or in excess of 30% of their income on housing will be forced to 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.

According to the 2011 update of “Between a Rock and a Hard Place,” produced by the Vermont Housing Finance Agency, Vermonters earning the 2009 median income of \$52,000 and equipped with a \$14,000 down payment (including closing costs) could afford a home priced at approximately \$175,000.²⁰ However, the median home price in the state as of 2010 was \$195,000, requiring an income of at least \$58,000 and a down payment of at least \$18,000. Additionally, 81% of Vermonters, per VHFA’s analysis, are earning wages below the state median wage. Coupled with rising costs of goods and services that produce a small decline in real income, fewer residents are able to affordably ascend the property ladder in Vermont.

In the 2000 Census, the Census Bureau collected a new piece of information: “Housing Costs as a Percentage of Income.” As stated, the standard measure of “affordability” is that a household should not pay more than 30% of its income on housing and associated housing costs. Listed in Table 18 (see Appendix E) are the percentages of households in the region that do not live affordably, paying 30% or more for their income on rental or ownership costs. The highest percentages of renters paying more than 30% of their income on housing were in Topsham (100%), Bradford (83.4%), Corinth (80%), Plymouth (78.6%), Tunbridge (71%),

Hancock (64.1%) and Barnard (62.1%). The highest percentages of home owners paying more than 30% of their income on housing were in Plymouth (43.2%), Pomfret (41.9%), Topsham (40.2%), Pittsfield (39.3%), Fairlee (38.5%), Norwich (36.5%), and Royalton and Vershire (both 36.2%).

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 nine of our region’s thirty towns have both municipal sewer and water facilities (Chelsea, Randolph, Bethel, Rochester, Royalton, Woodstock, Hartford, Norwich, and Bradford). Lacking both of these, or even lacking one, places logistical and practical restrictions on property lot sizes by requiring more land to accommodate on-site water and waste treatment. Smaller lots that would be more affordably priced for low and moderate income households (e.g., parcels of one acre or less) may not be adequate to build on if the landowners are required to install water and septic systems for a property, assuming such lots are even available in towns. Consequently, towns that lack these services may limit the number of future residents who cannot afford larger parcels of land to build on.

More “affordable” properties that have lower asking prices often have additional hidden costs built into their purchase and rental prices because their attractive price tags tend to obscure the true ownership and lifestyle costs associated with their physical location, including energy/heating efficiency, environmental and lifestyle costs. With respect to increased

Except for flood hazard and fluvial erosion area bylaws adopted pursuant to section 4424 of this title, no bylaw shall have the effect of excluding as a permitted use one accessory dwelling unit that is located within or appurtenant to an owner-occupied single-family dwelling.

~24 V.S.A. §
4412

commute times, there are unseen impacts of affordable housing being located at a greater distance from employment centers. Quality of life is directly affected by longer commutes that cut into time spent with family, friends, civic engagement, and cultivating interests outside of the workplace. The increased costs of commuting and other house-related needs divest income that could otherwise be funneled into local businesses in the community. Furthermore, there are detrimental environmental consequences from these commutes for the entire region as a consequence of fossil fuel consumption.

Regional Housing Concepts, Fair Share Housing, and Fair Housing

Low and moderate-income households continue to have difficulty finding affordable housing in desirable locations, and the housing shortage throughout the Upper Valley has made the market even tighter and more expensive. Land-consumptive large-lot, single-family home development and land conservation are taking place in many of the region's towns. As stated on the preceding page, some of the region's villages have public water and sewer systems, but many of our smaller villages rely on private water supplies and septic systems. If the region is to provide for a full range of housing choice, financial and otherwise, growth should be directed toward growth centers that can support new housing, taking into consideration the needs of the lowest income residents of our region.

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. Therefore, a municipality cannot foreclose the opportunity for any class of people, especially low and moderate-income families, to acquire affordable housing. Local regulations must afford all persons the opportunity to access such housing in as much as is determined to be the municipality's fair share, taking into consideration both present and prospective need. Mount Laurel's principal argument in support of its zoning plan that limited affordable housing was advanced as a fiscal argument, designed to limit an increasingly heavy burden on homeowners for local taxes and school costs. While the Court was sympathetic with 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). [See: *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)].

Vermont Statutory Housing Requirements

Federal law prohibits housing from being denied 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 or because a person receives public assistance.

Where appropriate, towns should explore cooperative agreements with their neighbors and housing providers to promote a cooperative team approach to housing planning and development in the region. No single town should be burdened with the responsibility of addressing affordable housing needs alone. It is in the region's interest to affirmatively advance the concept of fair share housing.

The Vermont Municipal and Regional Planning and Development Act (24 V.S.A. 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 § 4412. Exclusionary zoning practices are expressly prohibited. All housing is to be treated equally, including accessory dwelling units, multi-unit residences, mobile homes, mobile home parks, modular or prefabricated housing, and residential care or group homes. Additionally, as stated in § 4382 of the Act: “[a] plan for a municipality...shall include the following: (10) 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.”

The Act was amended in 2004, further supporting the development of affordable housing. One of the 2004 updates is the change in permit status for “accessory dwelling units” (ADU). An ADU is defined as an efficiency or one-bedroom apartment that is clearly secondary to the owner-occupied residence, but does not need to be physically attached to it. As of September 1, 2005, ADUs are protected, by State law, as permitted uses anywhere in the state.

A new section was added to the Act empowering the Vermont Attorney General to investigate complaints. From § 4453 – Challenges to Housing Provisions in Bylaws: “The attorney general or a designee shall 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 being told to correct them, the court shall order the municipality to grant all requested permits and certificates of occupancy that were wrongly denied.

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.

A further addition to the Act was the creation of powers and duties for municipal housing commissions. From §4433 - Advisory Commission and Committees: “Municipalities may at any time create one or more advisory

commissions...or a combination of advisory commissions to assist the legislative body or the planning commission in preparing, adopting, and implementing the municipal plan.” Subsection 4433(5) 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.

Status of Existing Programs in the Region Supporting Fair and Affordable Housing

Subsidized housing is any housing that is publicly funded or supported, and comes in the form of financial assistance to help individuals afford housing. This support can come in a variety of forms, including public housing, subsidies, non-profit

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 home ownership or rental costs. The second approach involves direct subsidies through either a housing authority, private developer, or a tenant to cover the difference between 30% of a tenant’s income and rent.

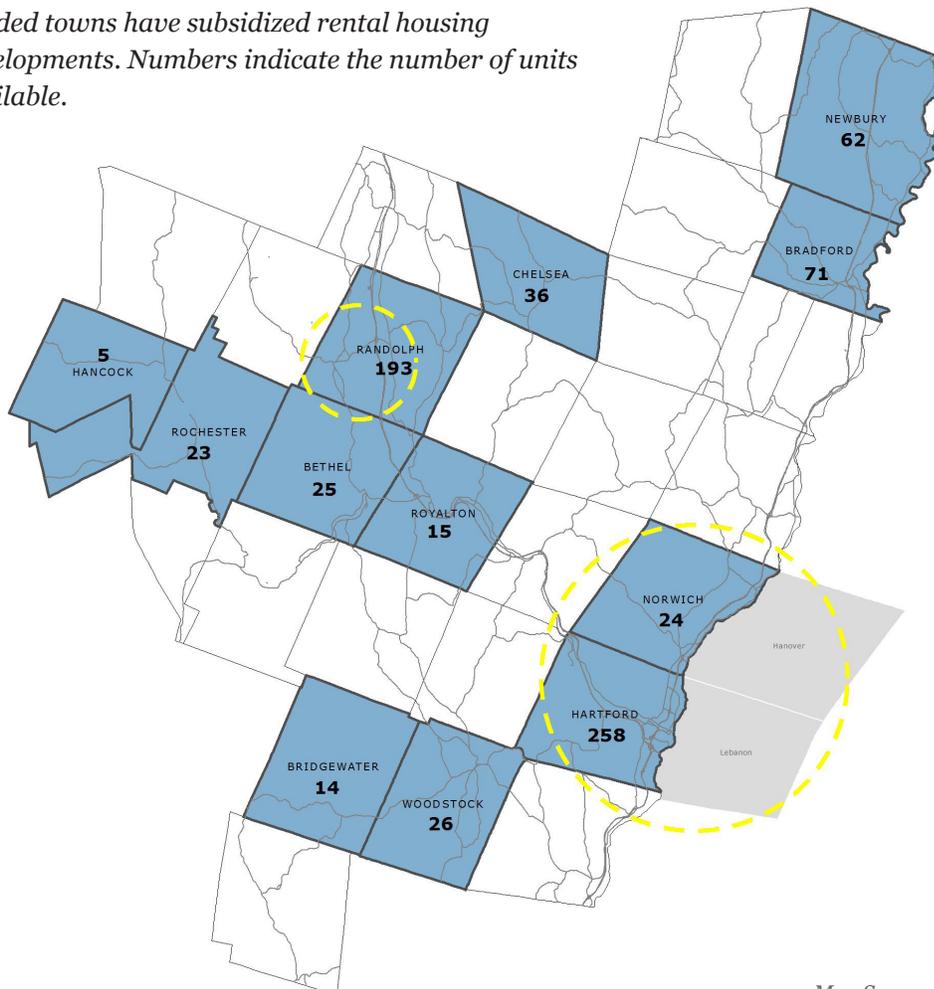
Examples of this approach are the Section 8 Public Housing and Fannie-Mae Rental Assistance Programs. These subsidies may either be project-based (tied to a specific development) or tenant-based (tied to an eligible tenant). In some cases, both approaches are combined into one project when rental housing is involved. In these situations, the owner/developer secures below-market interest financing from a federal or state program and provides housing units to tenants that have been pre-qualified to receive a subsidy in housing rents. However, earlier in 2013, Department of Children and Families Commissioner Dave Yacavone was quoted by VPR as saying that Vermont lost 774 Section 8 vouchers, stymying access to affordable housing to some of the most economically vulnerable families in our region and elsewhere in the state.²¹ 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:

- TRORC
- 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

The Vermont State Housing Authority (VSHA) was created by the Legislature in 1968 to improve housing opportunities for families of low and moderate incomes. As a non-profit organization, the VSHA manages rental housing, provides rental subsidies, and works toward rehabilitation and development of affordable housing. It manages a variety of programs, many of which involve housing in the region.

Figure 9-7: Geographic Distribution of VSHA Housing in the Region, 2013

Shaded towns have subsidized rental housing developments. Numbers indicate the number of units available.



Map Source: TRORC

D. Housing Needs and Planning Implications

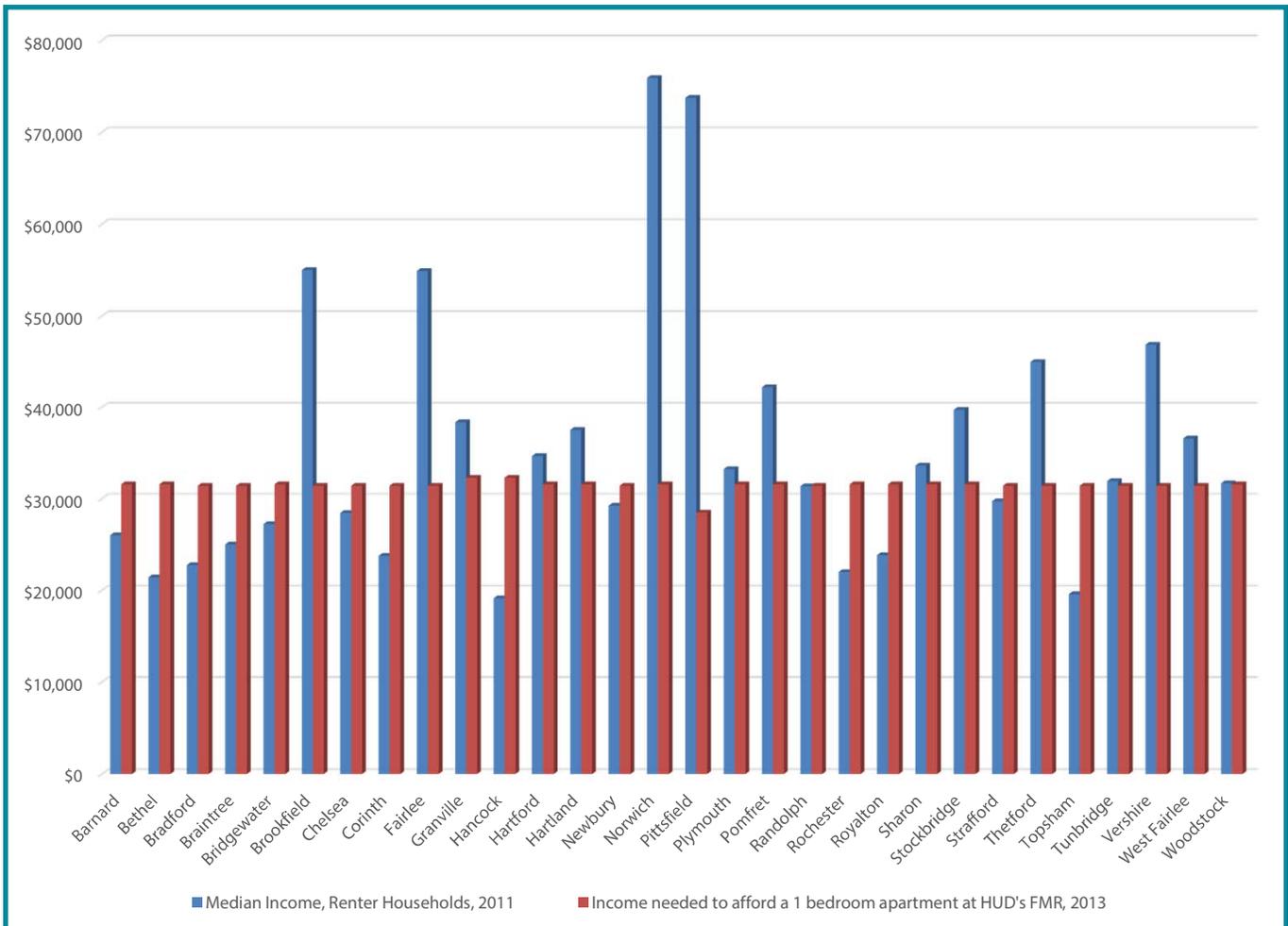
Housing Needs in East Central Vermont

The “Housing Needs in East Central Vermont” report was published in October 2013 by VHFA to highlight the challenges the region’s residents face in finding housing that is both affordable and within reach of job centers and essential services (see Appendix F). The report demonstrates

the difficulty a significant portion of the region’s residents face in finding adequate, affordable housing that does not place considerable strain on income that would otherwise be allocated toward other subsistence and savings requirements.

The report, in part, analyzes policy recommendations drafted by of the East Central Vermont housing workgroup as part of East Central Vermont HUD Sustainable Communities Regional

Figure 9-8: Workforce Rental Housing Income Requirements



Source: U.S. Census, American Community Survey; National Low Income Housing Coalition

Planning Grant. In their analysis, VHFA emphasizes the need to rethink housing issues that rural municipalities face, and, to that end, recommends the region capitalize on myriad tools and approaches that may be underutilized at present in areas of high opportunity. Key undertakings that the region should consider include: expanding the supply of perpetually affordable housing stock; targeting new housing growth in areas with municipal sewer and water infrastructure in place; and prioritizing the provision of safe, affordable housing for all sectors of the market, including the elderly and disabled, in line with smart growth and equitable principles.

According to the VHFA report, the scarcity of rental options throughout the region compounds affordable housing constraints in the region. The East Central Vermont region, which includes the TRO Region and ten towns from the Southern Windsor County Regional Planning Commission region, is short 4,400 housing units to serve the needs of low-income residents.²² Additionally, Windsor County has a markedly high proportion of seasonal properties, which serve to tighten the market for year-round residents while also driving up the costs of rental properties.

What the VHFA report demonstrates is that there is a clear need for more workforce housing, region-wide. Workforce housing generally refers to affordable housing that is in close proximity to employment centers. Issues arise for workforce housing when earned income is insufficient to secure adequate, quality housing within close proximity to

the workplace. The people who require workforce housing are, as their name suggests, members of the community who are gainfully employed in roles that often require advanced certification or degrees, including police officers, nurses and other medical staff, and school teachers.

Subsidies benefiting the elderly are discussed at length in the paper as well. The general consensus is that the region, if not the entire state, may be best served by increasing support to the state's housing trust fund, the Vermont Housing and Conservation Fund, in an effort to create more perpetually affordable housing across the board. This would help the elderly by subsidizing more elder housing opportunities throughout the state as well as increasing funding for home accessibility modifications that may be used to help the elderly age in place more effectively. VHFA's analysis heavily promotes providing "more service enriched housing opportunities for elders."

Density and the Location of the Region's Housing Opportunities: from Sprawl to Smart Growth

Historically, our region's development was characterized by growth around compact neighborhoods. It was commonplace for towns to be built around central services and a village green area at the heart of the community. Today, 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 historic settlement patterns around compact villages. Directing growth back toward

village 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 V.S.A. § 2790), emphasizing the economic, social, health, and other benefits of strong downtowns. The statute promotes growth that reflects Vermont's traditional settlement patterns to avoid unplanned development throughout the countryside.

One major issue that has impacted our region is the trend toward sprawl around our communities in the latter half of the twentieth century. Sprawl can be defined as rapid and uncoordinated growth outside of compact growth areas. In Vermont, sprawl has increased

dramatically over the past half a century or more, as major roads (such as I-89 and I-91) have increased accessibility to more remote areas, as cars have become more readily available, and as fuel has (until recently) been a comparatively cheap commodity. 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. Businesses in local, historic downtown areas can feel the financial impacts of this growth as people living further afield from downtown areas rely increasingly on larger shopping areas that provide access to box stores and malls.

Smart growth directs 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, and growth centers throughout the region, with more equitable distribution of housing and employment opportunities and the necessary transportation links to connect these interests. Smart growth decreases burdens on municipal services, concentrating housing growth in areas that have access to public water and sewer



Waits River Apartments Community, Bradford | ©Housing Vermont

and 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.²³ Promoting adaptive reuse of vacant buildings (ex: through brownfield reclamation), 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 V.S.A. § 4302), which seek to plan development in compact village and urban centers, as typified by historic settlement patterns. TRO communities can directly address growth issues through local regulations by promoting the use of density bonuses and clustered development incentives. A large hurdle that can be surmounted to aid such growth is to target specific, suitable locations for development or expansion of existing village centers, especially those that have municipal water and sewer systems and capacity for growth.

Inclusionary zoning, whereby a municipal or county ordinance that 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 a reduction in economic segregation. These housing policies ensure young professionals, young families, the elderly, and other cost-burdened populations have adequate housing in competitive areas so that they are not forced out of our communities to less accessible areas that may, on paper, appear more cost-effective or to other states entirely.

Another way to augment affordable housing stock, as mentioned above, is by creating more accessory dwelling units. ADUs, as defined by HUD, are additional living quarters that exist on a single-family lot and are independent of a primary dwelling unit.²⁴ ADUs are currently permitted uses by right across the state; however, while permitted by state statute, ADUs 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 to create ADUs in the short-term, their long-term benefits, namely as a revenue stream, 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.

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

Goals

1. Sufficient, decent, and affordable primary housing is available in compliance with Vermont State legislative mandates and the directives of existing legal precedents.
2. Innovative planning, design, and construction of primary housing that minimizes energy consumption and environmental impacts.
3. Preservation of the existing housing stock, particularly in regional growth areas.
4. Coordination between public and private agencies involved with planning, financing, and development of affordable housing is the norm.
5. Housing growth in a manner that does not increase parcelization and fragmentation of productive or ecologically important farm and forest lands.

Policies

1. Municipalities shall evaluate their role in supplying the region's housing stock by assessing their capacity for growth around historic settlement patterns, and TRORC will look for this evaluation in reviewing local plans.
 - Suitable locations in both towns with infrastructure as well as those without.
 - Collaboration with neighboring towns, regional planning commissions, housing trusts, and other non-profit housing groups (e.g., housing authorities).

Consideration should be given to:

 - Aging in place;
 - Accessible, safe housing;
 - Low-income housing;
 - Work-force housing;
 - Fair housing that advances integration and inclusion;
 - Energy efficiency; and
 - Connection to transit routes or walkable to services.
2. Public housing assistance funds shall be allocated on the basis of local housing or fair share needs as determined by town plans. Where local plans have not adequately addressed current and prospective needs, regional needs assessments (when available and current) should be the basis on which agencies allocate such funds.
3. Encourage multi-family housing, assisted living facilities and group homes (including Single Room Occupancy facilities), and senior housing in close proximity to services in village and town centers/along public transport routes, in areas with adequate public sewer and water service, or in areas of soils suited to onsite wastewater technology.
4. Provide incentives to property owners to rehabilitate existing vacant structures for housing in town and village centers that are compatible with existing neighborhoods.

Goals, policies and recommendations continued on next page

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

Policies (continued)

5. Incentivize affordable housing through a variety of methods:
 - Expedited permitting review (if specific conditions are met-e.g. a percentage of fair share housing included);
 - Investigate consolidated permitting methods (that is, consider how multiple layers of required permitting might be satisfied);
 - Bonus densities (and fee waivers) ; and
 - A review of uses, minimum lot sizes, lot coverage, heights and densities in districts.
6. Provide a balance of housing for a mixture of incomes that is driven by the housing market through a variety of mechanisms, such as:
 - Raising awareness and support of affordable housing issues among the public;
 - Transfer of Development Rights (TDRs);
 - Cluster development/waivers;
 - Planned unit development;
 - Inclusionary zoning;
 - Density Bonuses;
 - Accessory dwelling units (including educating homeowners about their right to build ADUs);
 - Adaptive reuse of larger buildings to multi-family;
 - Reductions in development fees; and
 - Conversion of single-family to multi-family homes.
7. Create additional state housing credits to supplement the limited supply of federal credits, which can finance the creation of senior housing units.
8. Support higher density neighborhoods and mixed-income housing (including multi-family) in the region's villages and downtowns by:
 - Encouraging mixed income housing development to avoid concentrating affordable units in a limited number of areas;
 - Creating funding mechanisms and alternatives for infrastructure (at least wastewater) in smaller, rural towns;
 - Going to smaller lots and reducing other requirements in larger town areas with public sewer or water; and
 - Encouraging infill and second story residential in mixed residential and commercial-use districts in town and village centers.
9. Encourage inclusionary components in new large-scale housing development projects, wherein a specified percentage of units built will be allocated toward mixed-income bracket households.

Goals, policies and recommendations continued on next page

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

Policies (Continued)

10. Promote innovative construction and renovation design techniques that enhance affordability, energy efficiency, occupants' health and environmental suitability near employment, transportation lines and/or service centers.
11. Ensure that newly developed or rehabilitated housing that has been subsidized with public funds (such as grants, loans, or subsidies) remains perpetually affordable for a period of at least 30 years.
12. Work with land trusts, regional conservation partnerships and other housing providers including housing authorities to allow compatible residential development on farm and forest parcels.
13. Perpetuation and development of mobile home parks to meet the need for housing in communities are encouraged, subject to equitable town planning requirements. TRORC accepts use of public funds, in the form of loans or grants, to enable mobile home parks to remain affordable over the long-term.
14. New housing projects must be designed and located to minimize the additional financial burden on municipalities and taxpayers. Housing development with access from Class 4 roads, on steep slopes, or in remote areas that place a financial burden on municipalities is not endorsed by this Plan.
15. Discourage new housing developments in areas within downtown and village centers that are known to be prone to natural and man-made hazardous or disastrous events, and prohibit such developments in vulnerable areas outside of downtown and village centers.
16. Ensure that mitigation measures are in place to address the vulnerability of existing mobile home parks from hazardous events, such as flooding, fire, hazardous material spills, and other severe weather events.

Recommendations

1. TRORC will continue to assist non-profit housing organizations in the development of affordable housing projects 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 need and implementation of local housing assistance programs.
3. Community leaders within the region will work with state housing agencies, non-profit organizations, and lending institutions to ensure the availability of loan or grant funds for Vermonters to purchase, acquire, or improve their primary homes.
4. Towns within the region should actively cooperate with local and regional non-profit housing trusts to develop and preserve new and existing housing, with mechanisms to assure the perpetual affordability of that housing.

Goals, policies and recommendations continued on next page

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

Recommendations (Continued)

5. Community leaders, housing advocates and the TRORC must work to retain Vermont's innovative publicly financed home mortgage lending and housing assistance programs. The region's low and moderate income families, disabled individuals, and the elderly are enabled to secure affordable housing through these programs.
6. TRORC will assist towns in writing strong housing components in town plans that are based on current data that address proven needs as opposed to only updating highlighted topics from years past to better address highest current needs.
7. 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 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.

Housing Endnotes

1. Klyszeiko, Casey. "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*. <http://www.vhcb.org/mhip/>.
6. Collins, Maura. "Between a Rock and a Hard Place: Housing and Wages in Vermont," *Vermont Housing Finance Agency*. (April 2011).
7. Ibid.
8. Dobbs, Taylor. "Report: Homelessness On the Rise in Vermont." *Vermont Public Radio News*. (22 November 2013).
9. Black-Plumeau, Leslie and Maura Collins. "Housing Needs in East Central Vermont." *Vermont Housing Finance Agency*. (31 October 2013).
10. "Downtowns, Villages and Historic Settlements: An Idea from the Past that Strengthens our Future." *Vermont Natural Resources Council*. 2013
11. "Accessory Dwelling Units: Case Study." *Prepared for the U.S. Department of Housing and Urban Development Office of Policy Development and Research*. (June 2008).

UTILITIES, FACILITIES AND SERVICES

A. Background

Communities depend on a system of utilities, facilities and services to maintain the health and welfare of their citizens. This system includes such things as solid waste management, transportation infrastructure, water and wastewater services, emergency services and recreation. In urban areas, these systems are often intertwined between communities, requiring some level of regional oversight and maintenance. In our Region however, municipal government provides and maintains most of the systems (excluding state-owned highways and buildings) individually.

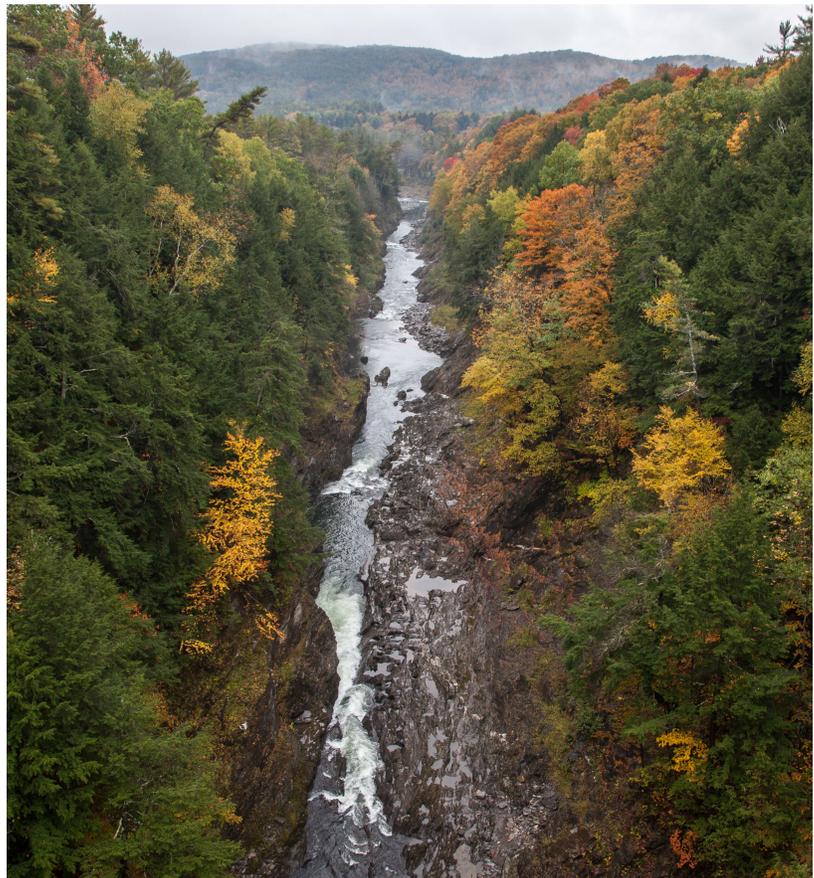
While TRORC does not have a direct role in maintaining these systems, it does have the ability to provide municipalities with guidance and technical assistance, and to take a regional approach to prioritization of future investments, particularly investments by the State. It is our role to recognize when regional land use patterns may create a need for new or improved systems, and to identify areas where future investments might have a regional benefit. At the same time, we must also recognize when expansion of infrastructure and services may lead to poor planning and unsustainable patterns of land use.

Although Vermont's population growth has flattened substantially over the past decade, it is understood that population growth can influence the need for improved utilities, facilities and services. An increased number of residents and development within a community or region can require additional roads and

additional capacity in wastewater and solid waste removal systems, etc. Where this new growth occurs also has an impact. Increased development in rural areas of a region can tax existing road and emergency management systems. To ensure that essential systems are able to sustain growth, long-range planning is needed.

Systems addressed will include:

- Water and Wastewater
- Solid Waste
- Health Care Facilities
- Broadband and Cellular Communication
- Libraries



Quechee Gorge, Quechee State Park | Source: ©imiro

For each system we will analyze their regional impact, their needs, the benefits they offer and what investments might need to be made in the future. This

chapter does not discuss transportation or emergency services as they are addressed in other parts of this Plan.

Goals, Policies and Recommendation: **Overall Utilities, Facilities and Services**

Goals

1. The expansion or construction of new facilities and utilities will be financially sustainable for governments and taxpayers.
2. Regional services and infrastructure that is secure, financially sustainable, well-maintained and energy efficient.
3. Investments in utilities, facilities and recreation enhanced 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 which support existing and future development within the regional center, town centers, village settlements, and hamlet areas, or other designated and planned regional growth areas are the policy of this Plan.
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 areas.
3. Controversial 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 public actions advance the goals and policies of this Plan and relevant local plans.
5. New land development shall be prohibited where it is found that the necessary supportive governmental facilities and public utility services are unavailable or have not been planned for as part of a capital budget program to be available concurrently with impacts, or when new development places an excessive or uneconomic demand on such services. To mitigate or prevent any such unreasonable burdens, the use of permit conditions, impact fees, exactions, and similar methods can be used.
6. The construction of primary educational facilities, health care facilities, emergency facilities, post offices, libraries, and other public facilities shall occur in or within or adjacent to existing or planned regional growth areas, so as to maximize their convenience and accessibility to people, infrastructure, 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)

7. TRORC supports the development of innovative and stable sources of public facility funding to supplement traditional funding resources.

Recommendation

1. 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.

B. Water and Wastewater Systems

The TRO region is by and large a rural region, with a majority of water supply and wastewater treatment handled through individual or small group on-site wells and septic systems. Only a fraction of towns have water or wastewater systems, and in

those municipalities, the systems serve a limited area – generally downtown or village areas. In general, these systems are considered “small” systems (i.e. serving less than 3,300 people).

For villages and downtowns, water and wastewater systems are a vital piece of infrastructure. The average area required

Table 10-1: Wastewater Treatment Facilities in TRO Region, 2014

	Design Capacity	Present Use - Annual Average Flow	% Available Capacity 2014*
	(reported in gallons per day)		
Bethel	115,000	50,000	57%
Bradford	137,000	65,000	53%
Bridgewater	43,000	9,500	78%
Chelsea	55,000	28,000	49%
Hartford-Quechee	300,000	200,923	33%
Hartford-WRJ	1,215,000	668,901	45%
Randolph	400,000	250,000	47%
Rochester (septic tank and leachfield)	30,000	12,263	60%
Royalton	70,000	21,000	70%
Woodstock	450,000	235,000	48%
Woodstock - S. Woodstock	50,000	16,000	68%
Woodstock - Taftsville	10,000	2,233	78%

*The percentage of available capacity reflects allocated and unallocated reserve capacity.

Source: TRORC

for onsite septic and water is roughly one half acre to one acre. To create and maintain the feel and viability of a village or downtown, higher density is preferred. Water and wastewater systems allow communities to encourage greater density that would be possible without them. Well-maintained public drinking water and wastewater infrastructure is critical for public health, strong businesses and a clean environment.

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 increased demand. As these facilities age, the cost of necessary upgrades increases, putting improvements out of reach of smaller communities (see Table 10-1).

With the exception of Hartford's Quechee Wastewater Treatment system (which currently has 33% remaining capacity), there are no issues regarding capacity. The majority of systems in our Region have at least 45% available capacity. Given that trends in population growth have flattened substantially, it is likely that most communities will be able to maintain their current design capacity. Hartford has a strong capital improvement plan that addresses capacity issues.

Table 10-2: Public Water Systems in the TRO Region, 2014

Town	SPA	Connections	Pop. Served	Ave. Daily Demand (gal/day)	Max. Daily Demand (gal/day)	Storage Capacity (gal)
Bethel	Yes	346	915	122,000	220,000	500,000
Bradford	Yes	551	1,512	227,000	450,000	1,200,000
Chelsea	Yes	114	140	26,254	67,500	244,000
Fairlee	Unknown	284	284	115,000	150,000	1,296,000
Hartford	Yes	2,600	2,600	727,413	1,454,826	2,500,000
Quechee Central	Yes	720	720	153,280	181,712	320,000
Hartland	Unknown	262	262	26,200	65,000	150,000
Newbury Village	Yes	180	480	44,000	60,000	350,000
Wells River	Yes	130	490	35,000	38,000	275,000
Norwich	Yes	333	333	87,837	164,800	125,000
Randolph Village	Yes	795	2,700	205,000	325,000	2,400,000
Randolph Center*	Yes	50*	1,138	60,000	100,000	250,000
Rochester	Yes	180	440	32,195	64,390	265,000
Royalton	Unknown	250	1,500	10,500	21,000	900,000
Woodstock	Yes	672	2,473	351,220	434,563	1,000,000

*Randolph Center connection data does not reflect VTC

Wastewater treatment facilities will eventually be necessary in additional communities as the need to further develop in community centers grows. At present the towns of Norwich, Hartland, Strafford and Fairlee are the most likely to need wastewater treatment facilities if the state's goal of densely populated villages and downtowns surrounded by open countryside is to continue. 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 (from an economic and health standpoint) greatly from the ability to concentrate more development within those areas.

Municipal Water Systems

There are 15 municipal water systems in 12 municipalities in the TRO Region. Like the Region's wastewater treatment infrastructure, much of this equipment is aging and in need of repairs. Some systems suffer from inadequate storage, or from poor line pressure.

Municipalities are required by law to create source protection area (SPA) plans which ensure that drinking water supplies will remain safe and untainted.

Challenges

Land Use Patterns and Geography

The need for water and wastewater treatment facilities is driven primarily by the density and intensity of land development within a given area, the number of people located within the area and geography.

Vermont's land use law seeks "to maintain the historic pattern of compact village and urban centers separated by rural countryside." This land use goal creates a dichotomy between theory and action. While most would agree that the pattern is desirable, it is challenging to implement, particularly for communities without existing infrastructure. Continued increases in density and development in our villages and downtowns will eventually be unsustainable without water and wastewater facilities. Some villages such as South Strafford, have already experienced issues of cross-contamination due to a high concentration of private systems in a small area. Fortunately, a majority of our communities with existing infrastructure have adequate reserve built into their systems to allow for steady, planned growth. However, unplanned spikes in population may tax those reserves.

Geography is also a challenge in many of our communities. Wastewater and water systems are complex, and the cost of developing them can vary dramatically due to variations in soil types, topography and other conditions. In a number of our towns, space to develop new systems is limited due to geography. Sharon's village, for example, is sandwiched between the White River on one side and I-89 and very steep slopes on the other. With maximum coverage in their village already reached, the development of a traditional water and wastewater system would be challenging.

Because population is also a factor in determining whether or not a water or wastewater treatment facility is needed, the nature of the population must be

considered. In communities such as Fairlee or Barnard, where there are a substantial number of transient residents (i.e. residents who come during the summer to enjoy the lakes), it may not be feasible to build a system large enough to handle the summer population while remaining sustainable year-round.

Aging Infrastructure/Mapping

The American Society of Civil Engineers (ASCE) issues an Infrastructure Report Card for each state every four years. This report grades the condition of the state's infrastructure, including water and wastewater facilities. ASCE's most recent report card (2013) gave Vermont a C- in drinking water facilities and a D+ in wastewater facilities. These scores are similar to other New England states which, like Vermont, has underground infrastructure which is often over 100 years old.

Our Region's water and wastewater infrastructure varies widely in age. Several communities have systems that were built in the early 1900's (Newbury and Wells River). Others were originally built in the mid-1980s. While many communities have upgraded their primary facilities, aging service lines is a serious issue. Municipalities like Hartford, who have had water and wastewater for over 100 years, have service lines that are of multiple materials (cast iron pipe from the late 1800s, for example) and multiple ages. Many of these aging facilities are past their design lives. Cast iron, for example, has an average life expectancy of 120 years. Ductile iron pipes were introduced in the 1950's and were an improvement over

their cast-iron predecessors, but they only have a life expectancy of 50 to 75 years due to corrosion. Older infrastructure is more likely to fail, creating health hazards and costing the town a substantial amount of funding to repair. In other cases, existing infrastructure is inadequate - sizing of pipes can range from a mere 4"-16" depending on the location and the town.

In many communities, the distribution systems are so old that there is not an adequate understanding of where the pipes are located, how old they are and what material they are made out of. Improved mapping of these underground systems is an essential part of creating a maintenance plan.

Infiltration and Loss

Wastewater treatment facilities suffer from leaks into sewer pipes as well as older built connections that funnel storm water from impervious surfaces such as rooftops, roadways and parking lots into combined sewer and stormwater lines. Drinking water systems often suffer from the opposite problem – loss of potable water from leaking pipes due to age, damage from frost or other causes. If systems are not properly gaged, such losses can go undetected for years. Large leaks in mains can and have caused damage to roads in our Region. During Tropical Storm Irene, several communities (including Woodstock) experienced damage to water lines that pass under the river, resulting in a loss of drinking water that was difficult to identify.

Cost of Upkeep and Investments

Water and wastewater systems are capital-intensive operations. Cost is the largest barrier to repairing, improving or expanding water and wastewater systems. During the 1970s, Federal programs existed that provided 78% of the funding needed to develop water and wastewater infrastructure. Today, federal grant programs provide less than 3%, leaving municipalities to find other sources of funding to pick up the remaining 97% or more. Commonly, these investments are funded through a mix of federal grants, bonding and pay-as-you-go funds generated through metering. The price of water supply and wastewater treatment that residents and businesses pay often do not reflect the full cost of the services. Many towns have found it challenging to get voters to buy-in to high cost investments. In the town of Bradford, for example, it took over a decade to extend their water system, despite the potential economic benefits.

Solutions

Water Efficiency Programs

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 also lead to less energy being used to treat, heat and dispose of water. Financial surpluses from

these efficiency upgrades can be set aside to build cash reserves for future system investments.

Future Infrastructure Investments

Long-range planning for infrastructure investments and maintenance is essential for water and wastewater systems. State statutes enable communities to create a Capital Budget and Program (CP&B) for the purposes of planning and investing in long-range capital planning. Although most communities have some form of capital account where they save money, many do not have a Capital Budget and Program as described in state statute (24 V.S.A §4443). A capital budget outlines the capital projects that are planned to be undertaken in the coming fiscal years over a five year period. It includes estimated

Importance to the Economy

Access to water and wastewater services is a valuable commodity for many businesses. The ability to serve multiple units in a concentrated area such as a village or downtown allows for a greater mix of commercial and residential uses. For businesses, having a larger cliental located in a central location creates a reliable base level of commerce.

Consistent service is important, as loss of either water or wastewater services for even an hour can cause problems, and in as little as a day some businesses may be forced to shut down. Smart planning and more long-term budgeting will make this possible.

costs and a proposed method of financing those costs. Also outlined in the Program is an indication of priority of need and the order in which these investments will be made. Any Capital Budget and Program must be consistent with the Town Plan. They shall include an analysis of what effect capital investments might have on the operating costs of the community. An adopted Capital Budget and Program should be drafted with assistance from the Planning Commission to ensure consistency with the Town Plan. While the Planning Commission is designated in statute as the “preparer” of the Capital Budget and Program, it is essential that members of the Selectboard and budget committee (if one exists) are part of the team that develops the CB&P. The 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 the most pressing needs. Because capacity is not a significant issue in most communities with existing infrastructure, the priority for future investments is in modernizing aging infrastructure. This will make these systems more sustainable, affordable and will protect against unwanted loss of water resources, or the potential hazards of effluent releases. In addition, any opportunities to make improvements to existing systems that increase their energy efficiency should be implemented. Expansion of infrastructure should be limited to locations that enhance the cohesive core of designated growth

areas. Any such expansions shall not encourage sprawl or strip development.

Development of new systems in communities that do not currently have water or wastewater treatment facilities should focus on areas where there is a clear village center. Fairlee, Strafford and Sharon are the most obvious candidates for the development of new systems in the TRO Region. The development of new systems must focus on the cohesive core of the village and shall not encourage sprawl or strip development.

Alternative Systems

Communities that do not have existing systems are unlikely to be able to afford to spend the millions necessary for a traditional centralized water and wastewater system. There are more affordable systems that will allow for village-scale wastewater treatment. Innovative decentralized systems include village-wide septic systems. The Village of Rochester maintains a village septic system that includes multiple leach fields. Although not inexpensive, this alternative approach has a more reasonable cost than a traditional system. Communities with unique geographical or topographical constraints may also be able to utilize alternative systems to make community wastewater and water service a reality.

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

Goal

1. Municipal water and wastewater systems that are secure, financially sustainable, well-maintained and energy efficient.

Policies

1. Municipalities should create capital budgets, enterprise funds and reserve accounts for utilities and facilities
2. Water and sewer lines should be extended only to those areas where future development of high density residential is being encouraged by regional and local plans:
3. Proposals for upgrades, improvements or expansion of water and wastewater treatment infrastructure which promote sprawl and 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 encourages the location of community water supplies and wastewater treatment facilities primarily in regional growth areas, however, systems designed specifically to supply cluster housing projects in rural areas may be consistent with this Plan.
6. Land development within existing or planned source protection areas which pose reasonable threat of contamination to public water supplies is not compatible with this Plan.
7. TRORC supports water conservation measures to reduce demand for water and to promote the life and efficiency of water and wastewater facilities.
8. TRORC encourages installation of community wastewater treatment facilities or water supply systems in areas of concentrated settlement where conventional onsite septic systems have failed or are marginally inadequate.
9. New water and wastewater systems should be designed so as to be as energy efficient and secure as possible.

Recommendations

1. Municipal plans, per Vermont statute, shall identify and prioritize future capital improvements/major repairs and estimate costs and means of financing for maintenance and future capacity.
2. TRORC shall assist communities with the identification and prioritization of future capital improvements/repairs.
3. TRORC shall 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.

Goals, policies and recommendations continued on next page

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

Recommendations (continued)

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 for calculation of infiltration and losses.

C. 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 that adheres to policy changes stemming from Act 148.

In addition to being in conformance with the State Plan, all SWIPs must be in accordance with any municipal or Regional Plan, prepared and adopted pursuant to 24 VSA Chapter 117. Towns and districts need to demonstrate that the provisions of these plans match the goals and policies of the SWIP. The elements of a SWIP must meet Agency planning requirements,

discuss waste diversion plans, household hazardous waste, biosolids, and septage management, waste facility siting criteria, and include a public participation component. All towns or districts for this Region are encouraged to contact TRORC offices regarding their current planning activities and to seek a determination that their SWIP revisions meet overall goals and policies of this Plan.

The TRO Region is served by a total of six waste management districts, as well as one inter-municipal association (see Table 10-3). The Greater Upper Valley Solid Waste Management District covers a ten town area, which constitutes 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% 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% of the regional population.

As of 2014, there are twenty-six active solid waste facilities throughout our Region

that have been certified by the state (see Table 10-4). Presently, the Region has: 7 recycling facilities, 4 composting facilities, 11 transfer stations, and 3 landfills. The table of existing facilities illustrates that a third of the Region’s towns lack any waste management facility, and are instead reliant on their neighboring waste management district partner municipalities for waste disposal. Four of our smallest towns (based on population numbers) are currently without waste management facilities. These four towns are: Granville, Hancock, Stockbridge and Pittsfield. In some instances, these towns find themselves two to three towns removed from a landfill or transfer station in other nearby towns or may otherwise be physically removed from nearby sites by mountain passes that make site access more challenging.

The only solid waste facility that currently has a permit for construction and use in the TRO Region is the proposed Upper Valley Landfill, which would be owned by the Greater Upper Valley Solid Waste Management District. The permit for the site has been in place since March 1996, and was recertified in 2014. Per the facility’s management plan, the landfill would have an allowable acceptance rate of up to 50,000 tons of solid waste per year, with a contingency plan in place to utilize a to-be constructed transfer station in the event of a temporary landfill shutdown. The location of the landfill is to be in the Town of Hartland, on a 112.5 acre parcel that is located at Mille Street, between the I-91 highway and the Connecticut River. While the Greater Upper Valley Solid

Table 10-3: Waste Management Districts in the TRO Region

Waste Management District	Towns	Population	% of Total Regional Pop.
Central Vermont SWMD	Bradford	2,797	11%
	Chelsea	1,238	
	Fairlee	977	
	Tunbridge	1,284	
Greater Upper Valley SWMD	Bridgewater	936	33%
	Hartland	3,393	
	Norwich	3,414	
	Pomfret	904	
	Sharon	1,502	
	Strafford	1,098	
	Thetford	2,588	
	Vershire	730	
	W. Fairlee	652	
	Woodstock	3,048	
Northeast Kingdom WMD	Corinth	1,367	8%
	Newbury	2,216	
	Topsham	1,173	
Southern Windsor/Windham Counties SWMD	Plymouth	619	1%
Tri-Town Agreement	Braintree	1,246	13%
	Brookfield	1,292	
	Randolph	4,778	
White River Alliance	Barnard	947	17%
	Bethel	2,030	
	Granville	298	
	Hancock	323	
	Pittsfield	546	
	Rochester	1,139	
	Royalton	2,773	
Stockbridge	736		
Hartford Community Recycling Center	Hartford	9,952	18%

Table 10-4: Waste Management Facilities in the TRO Region

	Town	Facility Name	Type of Facility
Orange County	Bradford	Bradford Recycling Depot	Recycling
	Bradford	Knoxland Farm-Highfields Institute	Composting
	Braintree	Greenwood Composting Facility	Composting
	Chelsea	Chelsea Transfer Station	Transfer Station
	Corinth	Sandberg Farm - Highfields Institute	Composting
	Corinth	Corinth Recycling Facility	Recycling
	Corinth	Corinth Transfer Station	Transfer Station
	Fairlee	Fairlee Transfer Station	Transfer Station
	Newbury	Newbury, Town of	Recycling
	Randolph	Randolph Stump Dump	Landfill
	Randolph	Randolph Transfer Station-Casella	Transfer Station
	Strafford	Strafford Recycling Depot	Recycling
	Thetford	Thetford Transfer Station & Recycling Ctr.	Transfer Station
	Tunbridge	Tunbridge Transfer Station	Transfer Station
	Vershire	Vershire Recycling Center	Recycling
Windsor County	Barnard	Barnard Transfer Station	Transfer Station
	Bridgewater	A.B.L.E. Waste Mgmt. Transfer Station	Transfer Station
	Hartford	Hartford C&D Landfill & Transfer Station	Transfer Station
	Hartford	NE Waste Services, LTD Recycling Fac.	Recycling
	Hartford	Twin State Sand & Gravel Stump Dump	Landfill
	Hartland	D & D Excavating, Inc.	Recycling
	Norwich	Norwich Transfer Station	Transfer Station
	Plymouth	A.B.L.E. Waste Mgmt. Transfer Station	Transfer Station
	Rochester	North Hollow Farm	Composting
	Royalton	Bethel/Royalton Transfer Station	Transfer Station
	Stockbridge	Harvey's Peavine Pit	Landfill

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.

Solid Waste Management Challenges

Universal Recycling Law

According to the Agency of Natural Resources (ANR), the average Vermont resident generates 5.18 pounds of waste per person per day in 2014, and, as of 2011, cumulatively dispose of over 400,000 tons of materials per year. In 2012,

Vermont adopted Act 148, commonly known as the Universal Recycling Law, to promote the universal recycling of solid wastes and to improve diversion rates (i.e., keeping less waste out of landfills through product recycling, composting, and other measures). (10 VSA § 6604). The Law works by phasing in a required separation of waste materials over a six year period, so as to afford municipalities and waste management districts time to establish necessary collection services and accompanying waste processing facilities for residents. Following on this, the Secretary of ANR promulgated rules in the form of the Vermont Materials Management Plan, which came into effect in June of 2014.

Four goals serve as the basis of the state Materials Management Plan (MMP), which serve to keep products out of the waste stream while also reducing reliance on conventional waste management needs:

1. To prevent waste from being generated;
2. To promote sustainable materials management, with a preference for highest 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.¹

How solid waste management providers will adapt to the new requirements of Act 148 are unclear, because they lack

sufficient data and understanding of the impacts of the MMP and Act 148, more broadly, on their capacity. TRORC, therefore, is not in a position to comment on or otherwise assess the capacity, fiscal, and overall management issues that the Region's waste districts will face while the Universal Recycling Law implementation rules are phased in between now and 2020. However, there are a number of potential challenges that may arise as each of the timeline milestones is reached:

- Effectively enforcing rules on what may and may not enter landfills (i.e., recyclables, yard and food compostable) may prove difficult. Determining how solid waste management entities will monitor waste is key to addressing this, and may be aided by variable rate pricing mechanisms.
- Ensuring cooperation between solid waste districts and business, particularly with respect to recycling and composting efforts, may take time.
- Many haulers, particularly those managing smaller operations, are fearful of being pushed out of the waste collection market by larger competitors, owing to a smaller capital base with which to acquire larger trucks capable of both trash, recyclable, and compostable waste products.
- Requiring towns to provide recycling receptacles in all publicly accessible spaces alongside trash receptacles is a cost that needs to be considered in municipal budgeting. While perhaps not overly onerous for many towns,

Table 10-5: Act 148 Implementation Timeline

July 1, 2014	<ul style="list-style-type: none"> • Transfer stations/drop off facilities to accept residential recyclables at no additional charge • Generators of 2+ tons of food scraps/week must divert material to any certified facility in a 20 mile radius
July 1, 2015	<ul style="list-style-type: none"> • Statewide unit based priced takes effect • Recyclables banned from landfills • Haulers to offer residential recycling collection at no additional charge • Public buildings to provide recycling containers alongside trash containers in public spaces • Generators of 1+ tons of food scraps/week must divert to any certified facility in a 20 mile radius
July 1, 2016	<ul style="list-style-type: none"> • Leaf, yard, and clean wood debris banned from landfills • Haulers to offer leaf and yard debris collection • Generators of 1/2+ tons of food scraps/week must divert material to any certified facility in a 20 mile radius
July 1, 2017	<ul style="list-style-type: none"> • Transfer stations/drop-off facilities to accept food scraps • Haulers to offer food scrap collection • Generators of 1/3+ tons of food scraps/week must divert material to any certified facility in a 20 mile radius
July 1, 2020	<ul style="list-style-type: none"> • Food scraps to be banned from landfills

this unforeseen cost has not been a formal consideration previously, and may prove burdensome for certain municipalities unless appropriately planned for prior to July 1, 2015.

The biggest task ahead of solid waste management entities is simply providing the necessary education and guidance to equip residents, businesses, and municipal governments alike with understanding their role in the roll-out of these new waste management practice requirements. Conducting the necessary outreach, to this end, is a critical task to ensuring proper compliance with the statewide MMP.

Solid Waste Management Solutions

Reduce Inputs

According to ANR, waste generation figures can be reduced substantially through improved product design, increased producer and consumer responsibility for products' lifecycles (a cradle to cradle approach to that leads to repurpose once a product's primary purpose or utility has been fulfilled), and increasing consumer and commercial awareness of reuse and reclamation opportunities for goods. In promoting a product's highest and best use, Vermont's residents and businesses are tasked with considering the environmental impacts of all stages of a product's lifecycle. One example of this approach is

viewing organic materials as the greatest contributor of GHG emissions in landfills, and considering their reuse in a hierarchy that feeds not only people but also livestock, compost and anaerobic waste digesters, and ultimately fuelling energy production. Reliance on landfills requires the waste of natural resources, and is indicative of the inefficient management of waste products. Distancing ourselves from reliance on landfills will lessen both current and future environmental degradation impacts. A zero-waste future, is one that minimizes the ecosystem burdens to our land, our soil, our air, and our water resources from emissions, leachate, and toxins.

In line with the above-state goals, the MMP sets out eight implementation goals and objectives, from which municipal Solid Waste Management Plans are to stem:

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 needing to be landfilled.
5. Reduction of toxicity in the waste stream.
6. Improved availability of statewide infrastructure and services for waste reduction and diversion (strive for convenient, consistent, and cost-effective services).
7. Improved measurement and progress of performance standards.
8. Development of sustainable financial structures to manage materials.²

Outreach and Support

The most obvious role for TRORC regarding solid waste is to provide outreach and education to our communities. As the Agency of Natural Resources begins to implement the requirements of the Vermont Materials Management Plan, 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.

Goals, Policies and Recommendations: **Solid Waste**

Goals

1. Reduced solid and hazardous waste generation in the TRO Region.
2. Increased reuse and recycling in the TRO Region.
3. Disposal of municipal solid waste in lined landfills.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations: **Solid Waste**

Policies

1. The scale, type, and design of major public utilities and facilities should 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 areas unless those facilities are of a type that is considered inappropriate for these locations due to potential health hazards.
2. The placement of businesses that produce significant amounts of hazardous waste in areas where unintended, persistent waste discharge could cause harm to both the human and natural environment is inconsistent with this Plan.

Recommendations

1. TRORC shall 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 shall support and participate in any future discussions regarding the development of regional waste management services.
3. TRORC shall further Universal Recycling Law requirements for parallel solid waste collection services through outreach and education with assistance from the Agency of Natural Resources.
4. TRORC shall support the creation of municipal composting facilities for organic wastes where appropriate.

D. 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 through the services that they offer. 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.

This chapter focuses specifically on medical facilities. It does not delve into a greater discussion about the regional health care system and the services offered through it. This is a very complex

system, and it is likely that there are gaps and needs in the availability of services, particularly for the Region's vulnerable populations (i.e. the elderly, the physically, mentally, or developmentally disabled, and the low-income). There is no statutory requirement to have a health element as part of the Regional Plan, however, TRORC recognizes that this is an important issue and in the future, a more in-depth discussion about the regional health care system should be considered as part of this plan.

Medical Facilities

Gifford Medical Center in Randolph, and the White River Junction branch of

Table 10-6: Medical Care Facilities in TRO Region, 2014

Facility	Primary Focus	Location	Affiliation
Gifford Medical Center	Primary Care	Randolph	Gifford Primary Care
Kingwood Health Center	Rehabilitation Services	Randolph	Gifford Primary Care
Rochester Health Center	Primary Care	Rochester	Gifford Primary Care
Bethel Health Center	Primary Care	Bethel	Gifford Primary Care
Chelsea Health Center	Family Medicine	Chelsea	Gifford Primary Care
Sharon Health Center	Sports Medicine	Sharon	Gifford Primary Care
Twin River Health Center	Specialized Medicine	White River Jct	Gifford Primary Care
Little Rivers Health Care - Bradford	Family Medicine	Bradford	Little Rivers Health Care
Little Rivers Health Care - Corinth	Family Medicine	Corinth	Little Rivers Health Care
Little Rivers Health Care - Wells River	Family Medicine	Wells River	Little Rivers Health Care
VA Medical Center	Acute Care	White River Jct	U.S. Veteran's Admin.
Dartmouth-Hitchcock Medical Center	Tertiary Care	Lebanon, NH	Dartmouth-Hitchcock

the Veteran's Administration 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 children's hospital. The majority of our Region's medical needs are provided 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 TRO 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 200% of the poverty level.

Based on discussions with regional health care service providers, the Region's medical facilities are at a scale that is meeting the current needs of our residents. While there is always room to improve services and to expand opportunities, additional medical facilities are not needed at this time.

Elder Care Facilities

As the elderly (citizens aged 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. The chart below indicates the number of units or beds available for each

Table 10-7: Elder Care Facilities in the TRO Region, 2014

Assisted Living Facilities	Units	Location
Valley Terrace	61	White River Junction
Woodstock Terrace	42	Woodstock
Hillside	40	Randolph Ctr
Nursing Homes	Beds	Location
Menig	30	Randolph Ctr
Brookside	67	White River Junction
Merten's House	14	Woodstock
Residential Care (Level III)	Beds	Location
Blue Spruce Home for the Retired	8	Bradford
Mountain View	8	Vershire
Oasis Home	6	Bradford
Pleasant Street Home	3	Randolph
Riverbend Residential Care Home	21	Chelsea
The Homestead	23	Woodstock
Valley View Home for the Retired	7	Fairlee
Windover House	15	Randolph
Residential Care (Level IV)	Beds	Location
Atkinson Residence	15	Newbury
Merry Meadow Farm - Bradford House	12	Bradford

level of elderly care. Data shows that there are limited options surrounding area for all levels of care, but full-time residential care is particularly scarce. Elderly residents in need of full-time care (Level IV) are often forced to move away from their community. This is a statewide problem, not just a regional issue.

Challenges

Access to Data

Medical facilities rely heavily on the transfer of data. In this age of digital data, this requires access to the internet. Because of the size and volume of these

data, substantial bandwidth is required. Those facilities that are located in areas where internet access or internet bandwidth is limited are not able to be as responsive as other facilities.

Lane Use Patterns

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, have existing services and access to business-class internet access.

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.

Aging Population

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 fifty suffer from at least one chronic condition, including high blood pressure, diabetes or mental illness. When chronic illnesses are coupled with age, some form of elderly care service becomes necessary. In 2010, the number of residents 60 years and older

in our Region was 13,665; nearly 25% of the TRO Region’s total population. There are currently only 372 total beds/units dedicated to elderly care in our Region, a fraction of what may be needed in the future.

Solutions

Encouraging Medical Facilities through Land Use Policy

Given the need for additional medical facilities, particularly those 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. Under Act 250, rules could be clarified to allow some leeway in permitting if a facility represents a clearly defined public good.

The priority for future investments in the health of our Region should focus on elderly care facilities and services. The first step in making these investments is to determine where they would be most practical. TRORC could work with communities and stakeholders to identify possible locations for elderly care facilities throughout the Region.

Beyond the clear health benefits of these facilities, the economic benefits are obvious. Medical and elderly care facilities have the potential to provide workers with a livable wage and act as stimulators of the local economy. When located in appropriate locations, such as

within or immediately adjacent to villages and downtowns, medical and elderly care facilities are consistent with this Plan.

Support Facilities and Systems

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. During the Act 250 process, TRORC should actively participate and offer support for the proposed developments when possible. Priority of support should be given to developments that will increase the availability of elder care opportunities, provided that any proposed development is consistent with the policies contained within this Plan.

Importance to the Economy

Vermont’s not-for-profit hospitals are cornerstones of our local economies, providing and supporting more than 27,000 direct and indirect jobs in Vermont – about five times the state’s largest private employer and one out of every 12 workers.

For communities like Randolph, where Gifford Primary Care (Gifford Medical Center) is located, these facilities are a direct stimulator of the economy, providing employment, paying taxes and utilizing local services.

Goals, Policies and Recommendations: **Medical and Elderly Facilities**

Goals

1. Enhanced availability of medical and elderly care services in the Region.
2. Access for residents to all levels of health care, regardless of wealth or income status.

Policies

1. Medical and elderly care facilities are encouraged when located within or immediately adjacent to designated growth areas provided that they do not have an undue adverse impact on traffic or the character of the area.
2. Support efforts at the state and local level 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 or elderly care facilities from appropriate areas and to assist with revisions as needed.
3. TRORC should work with state partners to clarify or revise Act 250 rules to allow permitting flexibility when a proposed development is consistent with this Plan and has a clearly defined public good.
4. TRORC should work with partners to further identify and document gaps or needs within the regional health care system, particularly for vulnerable populations.

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, “[t]o keep Vermont’s democracy competitive and thriving, Vermont students must be afforded substantially equal access to a quality basic education.”³

Sustained regional and economic development will be impossible in the Region unless financial and geographic access to education is affordable and geographically convenient. Without a well-educated work force, the Region, like the rest of Vermont, will be unable to compete with other states for well-paying jobs. Further, education and child care are necessary to community vitality. Education institutions make towns attractive to residents and employers alike.

Education serves as a driver of local economic development, and investments in education contribute greatly to the overall economic health of the Region.⁴ The economic downturn that began in 2008 emphasized the relationship between economic development and an educated work force. Economic restructuring following the recession resulted in a shift away from jobs in manufacturing to service sector employment. Many of these new jobs are at lower wage levels, as is true of such work in our regional growth centers. However, as workforce skillsets increase and improve through investments in regional educational opportunities, so, too, will job and wage growth in local economies.⁵

Challenges to Educational Attainment

- It is anticipated that the Region may see population growth of up to 6.2% between now and 2030, placing increased strain on some of the education facilities that currently exist.⁶ Some towns in the TRO Region may see pronounced growth, while others may experience population decline. The totality of these impacts, whether positive or negative population fluctuations, will directly influence the breadth and use of educational services throughout the Region.
- Declining enrollment numbers in certain towns and villages threaten the future of local schools, which, if closed, would increase burdens placed on schools in adjacent municipalities. Over the past decade, there have been four school closures in the Region:

Hancock, Granville, Plymouth, and Bridgewater. Many others are in active discussions about consolidation.

- The cost of publicly educating children places significant financial strain on many municipalities. These costs, coupled with potential school consolidation, may be further compounded by the need to carry out extensive renovations of remaining schools or the construction of new facilities so as to maintain a level of service for students that allows for academic achievement and growth.
- Continuing and adult education programs are few throughout the Region, and are increasingly important as the elder population grows in coming years in order to promote lifelong learning, societal engagement, mental health, and well-being.
- Lack of access to high-speed internet in portions of the Region hinders access to educational materials for many, irrespective of age or level of education.

Elementary and Secondary Schools

Sound planning for educational facilities and programs is necessary to support the social, economic, and cultural welfare of a community. There is a positive correlation between levels of higher education attainment and higher earnings; lower unemployment and poverty rates; decreased reliance on social welfare programs; and higher levels of civic engagement.⁷ Further, higher levels of education positively correlate to improved health, well-being, and lower crime rates.⁸ A quality education provides

Table 10-8: Regional School Facility Enrollment Totals, Academic Year 2013-2014

			0	K P/T	K F/T	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	AW	Total
Blue Mtn. SD	Blue Mtn. USD #21 (District)	Blue Mountain USD #21 (School)	44		29	27	44	34	36	30	29	24	22	27	29	29	26		430
Orange East SU	Bradford ID	Bradford Elementary School	32		35	36	26	32	31	34	16								242
	Bradford ID	Riverbend Career and Tech																	0
	Bradford ID	Connecticut River Academy				1	1	1	3	2	4	3		1	4	4	2		26
	Oxbow UHSD #30 (District)	Oxbow UHSD #30 (School)										49	49	74	84	68	66		390
	Newbury	Newbury Elementary School	19		18	24	17	16	17	10	22								143
	Thetford	Thetford Elementary School	8		22	28	27	26	32	33	34								210
	Thetford	Thetford Academy											31	38	66	46	52	62	295
	Thetford	Open Fields School		4	1	1	2	2	7	6									23
	Waits River Valley USD #36 (District)	Waits River Valley USD #36 (School)	26		28	32	25	14	26	20	29	20	27						
Orange Southwest SU	Braintree	Braintree School	2		23	9	9	11	11	7	15								87
	Brookfield	Brookfield School	1		8	8	8	6	7	11	9								58
	Randolph	Randolph Elementary School	5	50		47	38	56	42	38	52								328
	Randolph	Vermont Academy of Science and Technology															56		56
	Randolph UHSD #2 (District)	Randolph UHSD #2 (School)										74	68	69	98	71	65	1	446
Orange Windsor SU	Chelsea	Chelsea Elementary High School	2	23		11	13	11	11	13	10	18	10	18	27	19	8		194
	Chelsea	Brookhaven Learning Center				1	1	3	2	2	2	3	2						16
	Royalton	South Royalton Elementary/High School	15		32	18	22	21	25	24	23	22	21	38	41	28	32		362
	Sharon	Sharon Elementary School	34		15	15	14	20	22	14	13								147
	Sharon	The Sharon Academy										17	19	33	33	32	32		166
	Strafford	Newton Elementary School	4		7	11	15	7	17	13	16	13	18						121
	Tunbridge	Tunbridge Central School			14	15	14	12	13	16	10	16	11						121
	Vershire	The Mountain School															45		45

Continued next page

Table 10-8: Regional School Facility Enrollment Totals, Academic Year 2013-2014

			0	K P/T	K F/T	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	AW	Total	
Rivendell Interstate SD	Rivendell Interstate School District	Samuel Morey Elementary School	17		24	22	24	16	21	19	36								179	
		Westshire School	24		17	14	9	17	13											94
Hartford SD	Hartford	Dothan Brook School	43		43	37	37	35	37	49										281
		Hartford High School													148	138	127	145	8	566
		Hartford Memorial Middle School										114	92	115						321
		Mid Vermont Christian School		5		9	4	11	6	6	7	4	9	5	8	16	11			101
		Ottawaquechee School	28		51	38	36	33	34	30										250
		Potter's House		9												1				10
		White River School	38		36	28	33	30	35	28										228
Norwich SD	Norwich	Marion W Cross School	7		38	51	45	52	47	46	46								332	
Windsor Central SU	Barnard	Barnard Central School	10		7	8	3	8	9	14	3								62	
	Bridgewater	Bridgewater Village School	2		5	7	5	5	6	5	3								38	
	Pomfret	Pomfret School			8	4	8	9	10	13	11								63	
	Woodstock	Woodstock Elementary School	2		17	29	26	18	31	23	27								173	
	Woodstock UHSD #4	Woodstock Senior UHSD #4													95	107	81	93		376
		Woodstock Union Middle School											74	63						137
	Woodstock UHSD #4	Upper Valley Waldorf School		30		8	12	14	13	20	17	11	13						138	
Windsor Northwest SU	Bethel	Bethel Elementary School	28		33	15	26	19	24	12	21								178	
		Whitcomb Junior/ Senior High School											27	19	26	21	22	15		130
	Rochester	Rochester School	14		13	13	11	7	8	9	10	8	8	12	15	16	12		156	
	Stockbridge	Stockbridge Central School	4	8		10	5	6	8	9	4								54	
Windsor Southeast SU	Hartland	Hartland Elementary School	7		34	29	26	44	27	38	34	33	26						298	
Regional Totals			372	129	529	579	542	562	595	564	588	515	516	585	623	581	599	9	7,888	

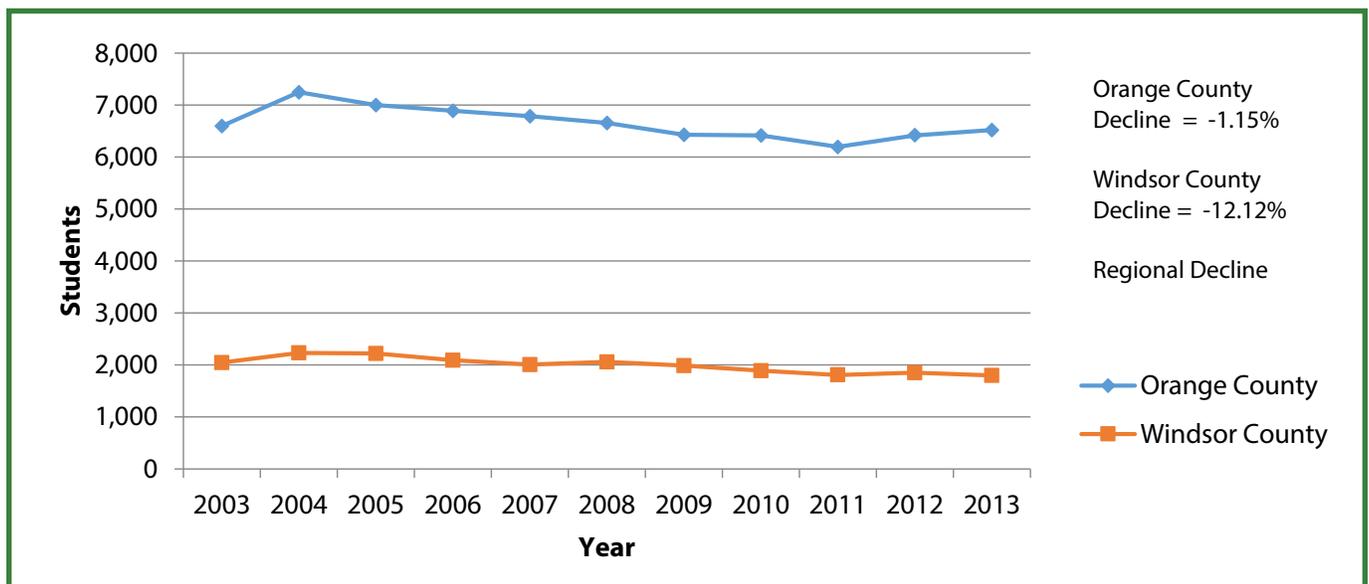
Source: Vermont Department of Education, 2013

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 2013/2014 there were a total of forty-five educational facilities within, or serving, the Region. Total enrollments amounted to approximately 7,888, covering grades K through 12 and special programs. 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 lack adequate facilities. (See Table 10-8, which lists individual school facilities and enrollment totals for the 2013/2014 academic year).

Throughout the 1980s and 1990s, school enrollments experienced slow to moderate growth, but this trend has reversed in recent decades. Declining enrollments have brought staffing, programmatic, and financial planning challenges to schools throughout the Region. It has resulted in the closure of four schools in the TRO Region in the past decade in Granville, Hancock, Plymouth, and Bridgewater. If this trend continues, additional schools and municipalities will have to make the decision whether to down-size their staffs and programs, or investigate the idea of regional schools. Regional schools will likely require one of two things: the building of entirely new facilities that are in more centralized locations for participating towns or the renovation of existing centrally-located school facilities. How towns will make this determination is yet to be determined, but both eventualities will come at a substantial cost.

Figure 10-1: School Enrollment Figures for the TRO Region, 2003-2013



Source: Vermont Department of Education, 2013

In the decade from 2003 to 2013, schools in the TRO Region saw a 3.75% decline in the number of enrolled students. Where once there were 8,650 students for academic year 2003-2004 and 47 educational facilities, there were just over 7,888 enrolled students in 2013 and a loss of 2 schools. Viewed by counties as a whole, the decline in student enrollment was most pronounced in the TRORC towns in Windsor County, which saw student numbers fall by over 12% in one decade. 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, which provides specialized and advanced courses for students from other area schools, increased by 133%. Meanwhile, enrollment at Potter’s House in Hartford declined by 53%. In Windsor County, the Bethel Elementary School’s enrollment numbers increased by over 24%, and the Rochester School’s student numbers declined by nearly 38%. 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.

Homeschooling

For the academic year running from 2013 to 2014, there were a total of 145 known home study students in the TRO Region. There are more scattered across 24 other towns and villages, but, due to there being fewer than 11 students in each of those places, the Agency of Education (AOE) has suppressed their overall student

Table 10-9: Towns/Villages with Home-schooled Students

Fewer than 11 Home-schooled Students	11 or more Home-schooled Students
Bridgewater	Randolph (27)
West Brookfield	Bradford (19)
Corinth	Randolph Center (19)
Fairlee	Bethel (17)
Hancock	Chelsea (16)
Hartford	Woodstock (13)
Newbury	Hartland (12)
West Newbury	Braintree (11)
Norwich	Brookfield (11)
Pittsfield	No Home-schooled Students
Plymouth	Fairlee
South Pomfret	Granville
East Randolph	Pomfret
Rochester	Royalton
South Royalton	
Sharon	
Stockbridge	
Strafford	
South Strafford	
Thetford	
Thetford Center	
Topsham	
Tunbridge	

figures. What this does mean is that there could be as many as an additional 240 home study students residing in our Region. Altogether, this could mean that 5% of all students in the Region are being homeschooled as opposed to mainstreamed in local schools. What may come as a surprise is that four of the towns in the Region did not have any home study students represented in Agency data, and

one of the towns lacking such students also lacks a school altogether.

Homeschooled students are reliant on parents for their curriculum, but all children enrolled in home study programs are to have access to a quality of education, in accordance with the State Board of Education, the AOE, and Vermont state law. The AOE sets guidelines for home study in Vermont, and this does include provisions allowing home study students to partake in classes and other activities at local public schools, as per Act 119 (although independent schools are not required to make such offerings).⁹ There are also community organizations, such as Artistree in Pomfret, that provide extracurricular programs to supplement in-class learning and socialize students outside of the home. All told, these homeschooled children must have a minimum of 60% of their core academic coursework conducted at home.

Determinants of Education Funding

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. Overall state aid to local and regional districts has declined, placing even greater burdens on towns to fund school costs through property taxes. Despite many attempts by the Vermont General Assembly and Executive Branch to reform property tax/school aid, Vermont has been unable to adopt a reform package that provides relief from high property taxes, as experienced in many towns.

In 1997, the Vermont Supreme Court ruled that total state funding would be provided to school districts. Prior to this judgment (the *Brigham v. State of Vermont* decision), the state would provide aid that augmented local property taxes to fund the school districts through a state-aided local tax system. The court held in *Brigham* that such a policy was unconstitutional because it unfairly allowed students in towns with higher property values to receive a higher level of education funding per pupil than less affluent areas. Following the Vermont Supreme Court ruling, the state passed Act 60, also known as the “Equal Educational Opportunity Act,” which seeks to balance educational spending across school districts, irrespective of the wealth in a particular district. Act 68 was later passed in 2003 to rectify imbalances in Act 60. Through Act 68, the state Education Fund disperses money to school districts via categorical grants and education spending toward school district budgets. Together, these funding opportunities totaled more than \$1.35 billion in 2012, and were supplemented by the homestead property tax.¹⁰ The latter tax varies proportionally with each district’s education spending per pupil, with different weighting used for different types of students.

Provision of Free Appropriate Education

Under Section 504 of the federal Rehabilitation Act of 1973, no disabled individual “shall, solely by reason of her disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal

financial assistance,” irrespective of the nature of extent of the individual’s physical or mental disability.¹¹ Generally speaking, all school-age children with disabilities are covered under Section 504, with “appropriate education” encompassing the provision of regular classes and all necessary aids and services that support a child’s learning needs, including services such as speech, occupational, physical, psychological, and/or diagnostic medical services.¹²

For all intents and purposes, the educational programs designed for disabled students must meet the needs of those designed for nondisabled students to an equal extent, be that through the creation of an individual education plan or otherwise. Students must be allowed, to the fullest extent possible, to be educated with a cohort of nondisabled students, unless it is demonstrated that their needs can be most effectively served in a different setting. Student tuition is to be free of charge to disabled students, with no additional financial burden placed on families or guardians; therefore, fees are to be borne by the school district. This federal act warrants consideration by all school districts, particularly at a time when some educational institutions specifically designed to meet the educational needs of disabled segments of the state’s population have closed or are facing closure (for example, the Austine School for the Deaf in Brattleboro).

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, 18.7% of children under 18 live in poverty, and, in Windsor County, 12.8% of children under 18 live in poverty, according to 2013 American Community Survey data. For those children who attend school, the school provides them with the supportive care they require, including providing them with important nutritional supplements through the free and reduced lunch program, access to case managers and counselors, and providing them with a safe and supportive environment. Schools also have a strong impact on children living in poverty by providing them with the opportunity to form strong, positive relationships, either formally through mentor programs or informally with teachers, coaches, and fellow students. Finally, the small class sizes in the Region allow observant teachers to act as an early warning system, and to intervene on behalf of a child whose circumstances might warrant greater attention and support. Schools can have a positive impact on students; however, the level of impact is possibly greatest with students from lower-income families. As a consequence, schools play a critical role in combating regional poverty.

Another facet of poverty with respect to education is the provision of services to homeless children. Per the federal McKinney-Vento Homeless Assistance Act, homeless children are defined as those who “lack a fixed, regular, and adequate nighttime residence.”¹³ Homeless students, under the Act, are to be afforded the same Free Appropriate Education as are other students that are mainstreamed in the local school system. They have a right to the

“same challenging State student academic achievement standards to which all students are held.”¹⁴ All homeless student data in Vermont is supplied to the Agency of Education by Local Education Agencies (LEAs – Supervisory Unions and a few school districts), and the data they receive reflects the homeless students enrolled in schools during a given academic year.

In the interest of confidentiality of minors, Vermont’s data is suppressed for school districts with fewer than 11 homeless students. Consequently, it is difficult to gauge how many students are homeless in a given academic year. Furthermore, it is likely there are duplicates in the statewide counts because some students experiencing homelessness move in and out of different LEA catchment areas during the school year (more than one LEA will count them). What is known with certainty is that the state data showed a total of 114 unsuppressed students within the TRO Region for the academic year running from 2013-2014. This figure includes 78 students from the Hartford School District, 29 students from the Orange Windsor S.U., and 17 students from the Windsor Southeast S.U. All other regional LEAs are listed as having some number of homeless students, but their data has been suppressed.

The availability of homeless student data and its limitations (such as transient student populations across LEAs) makes it difficult to draw concrete inferences about homeless youth in the Region’s school system. However, we do know that they are present, and they must be afforded equal opportunity to education as students of

differing means if the cycle of poverty they live on a daily basis is to be broken.

Vocational Training and the Region’s Youth

In recent years, promoting educational opportunities that support the acquisition of professional skillsets and allow students to develop a firmer grasp of local employment sector opportunities has become a hot button issue for both the Region and the state. 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 to include new learning initiatives, including more work-based learning and access to Career and Technical Education.¹⁵ This initiative is intended, in part, to help students align their interests and abilities with perspective professional prospects within the context of their academic curriculum. It is one means of many that students may be granted greater exposure to the Region’s industrial sectors and promote overall career development. Any such efforts to provide employment resources and exposure to the Region’s youth should be encouraged.

Perspective employers from an array of local enterprises and students alike stand to benefit substantially from the formal establishment of 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 what local jobs have to offer and the

aptitude required to complete jobs may serve as an incentive to keep many youth in our communities well beyond high school.

Higher Education

Vermont Technical College

In 1962, the Vermont School of Agriculture and the Vermont Agricultural and Technical Institute merged to form Vermont Technical College (VTC). VTC is part of the five-member Vermont State Colleges System. Located in Randolph Center, the 600 acre VTC campus consists of thirty-one buildings, which includes a farm and home and automotive learning center. The Randolph campus supports a current enrollment of roughly 1,650 students. Over the past decade alone, the student body size has increased by over 135 percent. The VTC school network also has campuses in Williston, Brattleboro, and Bennington, along with other satellite campuses elsewhere in the state.

Vermont Technical College offers both two and four year programs, certificates, associate degrees, and bachelor degree programs in a range of academic areas including: engineering technology, architectural and building technology, agribusiness, computer and information technology, sustainable agriculture, business technology and management, applied technologies, allied health and nursing, landscape design, veterinary technology, and renewable energy. Additionally, the school provides continuing education opportunities for the Region's residents of all ages, and more advanced and specialized course offerings to the Region's youth through the Vermont

Academy of Science and Technology. Most students are primarily from Vermont and other New England states. VTC retains an excellent placement record for its graduates, many of which find employment within the Region. VTC also maintains a Center for Business and Industry (CBI), which provides outreach programs and services to business and industry clients.

Vermont Law School

Founded in 1972, Vermont Law School (VLS) is a private institution offering legal education to approximately 450 students throughout the United States, internationally, and via online distance learning programs. Located in the village of South Royalton, the school offers multiple advanced degrees: Master of Environmental Law and Policy (MELP), Master of Energy Regulation and Law (MERL), Master of Food and Agriculture Law and Policy (MFALP), Master of Laws in Environmental Law (LLM), Master of Laws in Energy Law (LLM), Master of



Apple Orchard at Vermont Technical College | Source: ©First Light Studios

Laws in American Legal Studies (LLM), and Juris Doctorates (JD). VLS is home to the Environmental Law Center, which oversees the masters and LLM programs while also offering education on the issues and values underlying environmental law and policy. Additionally, the Center provides training opportunities to mid-career professionals, and serves the Region by conducting extensive programs on current environmental issues.

VLS is the home of the South Royalton Legal Clinic, where second and third year law students work under the supervision of professors and practicing attorneys, offering legal services to low-income clients. Additionally, the Environmental Law Center operates the Environmental and Natural Resources Law Clinic, where students gain experience by working on actual environmental law cases under the auspices of professors and attorneys. VLS is also home to the Institute for Energy and the Environment, which provides academic and professional research opportunities to students and staff scholars on a range of energy law and policy issues. The Center for Agriculture and Food Systems (CAFS), a more recent addition to VLS, provides advocates and entrepreneurs in the agricultural and food sectors with the legal tools that will support the sustainable food system of the future.

Center for Cartoon Studies

The Center for Cartoon Studies, located in the heart of White River Junction, is a post-graduate education institution that offers a two-year Master of Fine Arts for students looking to pursue a career in the realm of comics and graphic

novels. The school also offers one- and two-year Certificates in Cartooning and annual summer workshop opportunities. The school was founded in 2004, and is unique in being the only higher education program of its kind within the country. The curriculum spans themes of art, graphic design, and literature with respect to the creation and production of comic and graphic writing. It currently enrolls just over 100 students, and, like other higher education institutions in the Region, is a huge economic driver for the prosperity of both Hartford and the wider TRO Region.

Community College of Vermont

The Community College of Vermont is an accredited college offering a range of associate degrees in the arts and science as well as certificate programs that help further employment goals or pave the way for continued studies at the bachelor degree level. The school has no main campus. Instead, services are delivered through a network of twelve site offices around Vermont and in online classrooms. The College is part of the Vermont State College system, and it provides degree and non-degree programs to 5,918 students statewide as of the 2014/2015 academic year. The CCV has a facility in Wilder, which serves 350 part-time and full-time students; other sites close to the Region include Montpelier, Rutland, St. Johnsbury, and Springfield.

Other Institutions

Although not located within the Region, the following nearby institutions also serve the Region's residents:

- Champlain College – Burlington

- College for Lifelong Learning – Lebanon, NH
- Dartmouth College – Hanover, NH
- Green Mountain College – Poultney
- Middlebury College – Middlebury
- New Hampshire Technical College – Claremont, NH
- Norwich University – Northfield
- St. Michael’s College – Winooski
- University of Vermont – Burlington
- Vermont State Colleges – Castleton, Johnson, Lyndon
- Woodbury College – Montpelier

Continuing Education

The availability of adult education services is critical to the social and economic well-being of the Region and its residents. The Vermont AOE 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 continuing education through its Adult Education and Literacy Program. In the Region, the Agency of Education funds three adult learning centers: 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.

While both of the Community Action Agencies covering the TRO Region (Southeastern Vermont Community Action and Captstone Community Action) have adult education and job skills programs, neither of them have physical centers that offer their services within the Region. Instead, participants are required to travel outside the Region for these educational opportunities. This limits access of the Region’s lower-income residents to this specific avenue for educational services. Through accessing adult education services, lower income residents have the opportunity to improve their financial security by removing educational barriers to higher-level employment.

As Vermont’s senior population significantly increases in coming years, the State will be confronted with the need for both new educational and recreational opportunities that can help fulfill the intellectual and emotional needs of the state’s retirees and elders. There are a number of opportunities for seniors to be involved in continuing education programs throughout the Region, but 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 preclude many from enjoying the opportunities available. Currently, with respect to in-person instructional classes within the TRO Region, residents can participate in classes at Artistree in Woodstock and Vermont Technical College in Randolph. Dartmouth College also offers continuing education courses in nearby Hanover, NH through its OSHER Lifelong Learning

Institute. Riverbend Career and Tech and the Oxbow High School, both in Bradford, also offer adult programs. Additionally, there are opportunities to take classes online through public libraries (purchased from L@ad) and the University of Vermont. Some continuing education opportunities may be free for residents, while others may be fee-based.

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, but declining enrollments and an aging population are making the traditional model of one school in every town less sustainable. Surveys in many of our communities tend to 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.

Some communities have opted to close their schools or 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 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 focus of the community. In many communities, the academic institutions are the largest employer(s) and the psychological center of the community. Down-sizing or closing of schools means,

in many instances, laying off neighbors and friends. Schools provide a place where members of the community can join together to support common themes, provide opportunities for citizens to connect, and create a sense of unity. They are also a safe space for residents in the event of emergencies, often doubling as emergency shelters and response centers. Their utility to towns is unmatched.

Addressing declining enrollment numbers, deterioration of school structures and infrastructure, and increasing financing pressures in a manner that is balanced with meeting the need for well-being, safety, and academic excellence for all students of every age is no small feat. Engaging in these discussions is critical to the future health of the education system in the TRO Region. These discussions are intricately interwoven, too, with discussions around utilities and facilities, transportation, economic development, and energy concerns. For example, multi-modal access to public facilities like schools is needed for purposes of safety in as much as promoting a healthy lifestyle. Providing efficient and timely busing opportunities to schools and extracurricular activities will bolster academic and professional success. 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 at an equal footing with those from other, more developed regions of the nation. Improving energy efficiency in our schools through the installation of LED lighting, thermal efficiency improvements, solar heat pumps, and renewable energy technologies will improve schools' bottom

lines while also making schools more environmentally sustainable.

School Infrastructure

Many schools throughout the state face the constant threat of repair or renovation, with rehabilitation efforts being a harbinger of increased costs for residents. The TRO Region is not an exception to this rule, and this can be a daunting prospect for towns to consider. Inadequate insulation, accessibility issues, aging electrical wiring systems, and crumbling infrastructure plague many a school, compelling principals and superintendents to defer repair work in some instances. Providing a safe, secure, and suitable environment for the Region's children is a key concern for the Region's well-being. A healthy school environment that affords children a chance to thrive intellectually and socially attracts families to the Region, creates jobs, and helps foster vibrant communities.

The threat of repair is one element of many that has been considered

when determining whether schools ought to be consolidated. In the event that communities choose to close or merge schools, how to manage 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 incubator or office park

In addition to the existing school building, facilities that have land which had been utilized 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 throughout the Region that meet or exceed statewide standards, including life-long learning opportunities.
2. The Region's educational system provides quality services despite student-aged population fluctuations, and appropriate measures are taken to consider consolidation and/or the reuse and repurposing of facilities in the wake of closure.
3. Students have access to quality vocational and workforce training opportunities to prepare them for future career opportunities.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations: **Educational Facilities and Services**

Policies

1. The construction of primary educational facilities shall occur in or within close proximity to existing or planned regional growth areas, so as to maximize their accessibility to people and infrastructure as well as to contribute to the vitality of communities.
2. Towns in the Region should consider the need for educational facilities and services within their capital budgeting and programming that promotes flexible facility use in anticipating the need for future growth and improvements.
3. Promote the expansion of continuing education and vocational education opportunities.
4. School construction and renovation opportunities that promote the use of existing municipal infrastructure and multi-modal transportation access routes for the enhancement of designated downtown areas.
5. Adaptive reuse of vacant school facilities that occurs in a manner that enhances villages and downtowns and stimulates the local economy.
6. The sustainability of existing school systems shall be evaluated by municipalities, school boards, and other stakeholders in an equitable and transparent manner that considers the needs of students of all ages and mental and physical abilities.

Recommendations

1. Support local efforts to assess capacity issues in our Region's schools, and, conversely, that explore opportunities to consolidate where appropriate. This is of particular importance with respect to facilities that currently do—or in the future may—serve multiple jurisdictions, due to inherent land use implications of such decisions.
2. In assisting towns with capital plan and budget formulation, ensure that member towns anticipate and plan for improvements to public school facilities.
3. Coordinate with the supervisory unions and the Agency of Education to create a regional approach to planning that considers the need for new school facilities and programs.
4. Work with local communities to determine which locations are most desirable for and best suited to the growth of new or relocated educational facilities throughout the region.
5. Encourage the development of school-business partnerships that promote valuable and sustainable employment opportunities in the Region through vocational and workforce training experiential learning.
6. Facilitate coordination between town and school authorities to create and maintain safe pedestrian access and transit opportunities to educational facilities, in line with Safe Routes to School efforts.
7. Ensure towns assess and incorporate the needs of disabled children into educational facility and budgetary planning efforts to ensure the provision of free and appropriate education for all children.

F. Child Care Services

Introduction

The availability of safe 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. Equally important, child care serves as a critical component in the raising of a child or children from working families. 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. Many children also rely on child care services for meals and it is important that child care providers provide children with wholesome, nutritious food options. In addition, a supply of child care services and facilities allow parents in the regional economy to work and be productive employees. Lastly, child care enables women to pursue their career goals and participate in the workforce.

There are long term benefits of good child care as well. Research conducted by a regional economic analyst demonstrated that investment in early child development programs brings a real (adjusted for inflation) public return of 12% and a real total return, public and private, of 16%¹⁶.

Child care providers are closely tied to successful and more efficient transportation systems. For example, child care providers located near or in

connection with an employer help to reduce commuting costs and time spent in the car. In some cases, this may even reduce a family's need to own multiple vehicles. However, to help achieve reduced commute times and a reduced dependency on motor vehicles, it is important for employers to have some flexibility as to when their employees are allowed to begin and leave work each day.

Thresholds of Child Care Services

Vermont statute provides guidance on the operation of child care providers in the state. A state-issued license is required to operate a child care facility, and in order to operate a family child care home, the home must be registered with the Department of Child and Families.¹⁷ There are also exemptions to obtaining a license or registering with the state, including: a person who provides care for at most two families, not including their own family; a hospital or other establishment holding a license issued by the Department of Health; a religious organization operating to provide care and supervision to children during or in connection with religious services or church-sponsored activities; and after-school programs meeting a specific set of criteria.¹⁸ All employees of licensed child care facilities are required to receive orientation of the prevention, identification and mandatory reporting of child abuse.

Child care services that are defined by the State of Vermont include: (1) registered homes (which provide care within a home setting for up to six children under the age of six and four school-aged children);

(2) licensed early childhood programs (which are licensed for up to 12 children within a home and also include child care outside of a home (part- and full-day programs, preschools, etc.)); and (3) public pre-school programs and after-school programs.¹⁹ Child care may also be provided by family members, or a non-family member running a private, unregistered child care facility out of their home.

The State of Vermont categorizes children receiving child care into four categories. They include: infants (under 24 months); toddlers (24 months to 35 months); preschool age children (36 months to 59 months); and school age children (5 to 13 years for typical developing children, and 5 to 19 years for children with special needs).²⁰ Most child care providers are specific about the age of the child they will care for.

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%, or 9,015 individuals. In the TRO Region, there are approximately 117 licensed child care providers and homes registered with the State of Vermont.²¹ There are approximately 650 licensed child care providers in Vermont.²²

Hartford has the highest number of both licensed providers and registered homes 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 including, Bridgewater, Granville, Hancock, Pittsfield and Plymouth. It is important to note that the number of private, in-home child care providers in our Region is unknown, but is likely that this type of provider makes up a significant portion of the child care providers. Regardless, it is critical for the quantity and quality of child care providers in the TRO Region to meet the needs and expectations of parents and guardians living and/or working in the Region.

In addition to bringing children to stand-alone child care providers, some parents have the option to bring their child to work with them and leave them in the care of an on-site child care provider. 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, who pay a reduced rate, but also have slots open to the public. These employers include Kendal at Hanover, and the US Army Cold Regions Research and Engineering Laboratory under contract with Cradle & Crayon, Inc. Large employers located within the TRO Region, such as Vermont Castings, GW Plastics, King Arthur Flour, Global Resource Options, Inc., Britton Lumber Company, Inc., and North Hartland Tool Corp., do not currently provide on-site child care services.

Table 10-10 is a list of licensed child care providers and registered homes, recognized by the State of Vermont, located in the towns in our Region. The population and percentage of children aged 0-14 years in each town are also reported for reference.

Other Forms of Child Care

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 child or children is/are safe if working past school hours, or during summer vacation. There are approximately 20,000 children in after-school programs in Vermont.²³ However, the number of children attending after-school programs in the TRORC is unknown. There are a number of national, state and local organizations running after-school programs in our area including ExCel Afterschool, STYLE, CLASP, the Boys and Girls Club, One Planet and the YMCA. These after-school programs serve a number of towns in our Region including Bethel, Bradford, Hartford, Newbury, Randolph, Rochester, Royalton, Sharon, Stockbridge and Tunbridge.

There are a many varieties of summer camps that parents may choose to send their children to, from adventure camps, nature camps, summer camp at the local recreational center, art or music camp. Depending on the program, children may only attend camp during the day for a specific number of days,

Table 10-10: Numbers of Childcare Providers by Town, 2013

Town	Population (2010)	% of Children Aged 0-14 Years	Licensed Provider	Registered Home
Barnard	947	16	1	0
Bethel	2,030	17.8	2	4
Bradford	2,797	20.1	3	3
Braintree	1,246	15.3	0	2
Bridgewater	936	13.1	0	0
Brookfield	1,292	17.4	0	2
Chelsea	1,238	16.4	2	1
Corinth	1,367	16.4	1	0
Fairlee	977	14.5	2	2
Granville	298	13.4	0	0
Hancock	323	14.6	0	0
Hartford	9,952	17	15	16
Hartland	3,393	16	3	0
Newbury	2,216	16.6	4	0
Norwich	3,414	19.8	7	0
Pittsfield	546	16	0	0
Plymouth	619	12.9	0	0
Pomfret	904	16.6	0	2
Randolph	4,778	15.3	6	5
Rochester	1,139	12.9	2	0
Royalton	2,773	14	3	2
Sharon	1,502	16.4	2	0
Stockbridge	736	17.4	2	2
Strafford	1,098	18.1	2	1
Thetford	2,588	16.5	5	2
Topsham	1,173	17.7	0	1
Tunbridge	1,284	15.2	2	0
Vershire	730	17.6	0	1
W. Fairlee	652	18.3	2	1
Woodstock	3,048	13.9	4	0
Total	55,996	16.1	70	47

Source: American Fact Finder, 2010 and Vermont Department for Children and Families, Child Care Division. Bright Futures Child Care Information System. Accessed December 2013.

or they may remain at the camp for an extended period of time. Vermont Adventure Camps in Thetford, the camps of the Aloha Foundation in Fairlee and Killoleet Camp in Hancock are examples of established summer camps in the Region. In addition, the Boys and Girls Club runs a summer camp in Randolph and the Randolph recreation department holds its own summer camp. The Green Mountain Suzuki Institute, in Rochester, holds a week-long “camp” for string, flute and piano students approved by the Suzuki Association of the Americas (SAA). Hartford’s Parks and Recreation Department hosts a wide variety of spring and summer camps. Finally, Lebanon, New Hampshire’s Recreation and Parks Department hosts a number of summer camps as well.

Ranking Child Care Services

Going beyond state-recognized programs, the State of Vermont has created a ranking system, STARS (STep Ahead Recognition System), to help parents and guardians find quality child care and to improve the quality of regulated health care programs in the state. There are approximately 70 child care programs in the TRO Region that participate in/are recognized by the STARS program. Specifically, there are 35 STAR programs in towns located in Orange County, and 33 STAR programs in towns located in Windsor County. Programs receiving 4 or 5 stars are considered “high quality.” There are a number of such programs scattered across our Region, especially in the White River Junction area.

There are also other organizations which rank/grade child care providers, such as the National Association for the Education of Young Children (NAEYC). The NAEYC has accredited 62 child care programs in Vermont. Six of these programs lie within the TRO Region, most notably within the Towns of Norwich and Randolph, and in White River Junction.

Child Care Training Opportunities

There are a number of child care courses and trainings being offered around at state throughout the year. These learning opportunities are sponsored by a variety of organizations involved in child care. Most of the trainings in our Region are lead in Hartford, but other reasonably close locations include Rutland, Barre, Berlin, Middlebury and Montpelier. By sending employees to trainings, child care employers may help improve or maintain the quality of care being offered at their facility.

There are also a few vocational schools in the Region that have training programs to teach interested high school students to care for infants and preschool-aged 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 & Technology Center both have similar programs in their “Human Services/Teacher Preparation” curriculum and “Human Services” curriculum, respectively.

Barriers to Child Care Services: Cost, Affordability and Family Structure

According to the 2013 Head Start and Early Head Start Needs Assessment, some of the barriers associated with child care in Vermont include an inadequate amount of infant/toddler care available, and the inability of financial assistance for child care to support high quality services (despite the financial help from some child care providers).²⁴ In the TRO Region and broader Upper Valley area, searching for child care is often difficult for parents. 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. From 2003 to 2012 the market rates for a preschool age child in licensed child care center increased from \$140 per week to \$200 per week (43.9%).²⁵ During the same years, the market rates for a preschool age child in registered home care increased from \$106.25 to \$150 (41.2%).²⁶ This equates to approximately \$10,400 and \$7,800 per year for licensed center care and registered home care for one preschool aged child, respectively. It is more expensive to place an infant or toddler in either a licensed center or registered home than a preschool aged child. Parents or guardians wishing to place their infant in a higher quality licensed center or registered home should expect to pay \$225 to \$160 or more, respectively.²⁷

To help families pay for child care, the State of Vermont provides financial assistance, or a child care subsidy, from the

Vermont Child Care Financial Assistance program. The subsidy granted for each child is dependent on their age, the type of child care provider and the number of hours the child will attend care. Families that choose to enroll their child in a care program recognized by the Vermont's STARS program may receive additional subsidy monies, depending on the child care program's ranking. A family must first be deemed eligible to receive financial assistance, which includes meeting income guidelines. While Vermont's child care financial assistance program enables more families to take advantage of child care, some low- to moderate- income families may have difficulties paying the co-payment for their child's care.

In some cases, child care programs try to help families who are enrolled in the State's financial assistance program to afford care. Many programs that do charge or usually charge parents the co-payment offer additional financial support and work with families to determine payments that are affordable.²⁸ Some programs do not charge families a co-payment at all, which ultimately affects the bottom-line of the business. As a final point, child care workers in Vermont make an average annual income of \$23,120 (compared to the U.S. average of \$21,320), which is not necessarily a livable wage.

According to 2000 Census data, families living in poverty with children comprise 5.4% of the population in the TRO 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 child or 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 24,000 households in the TRO Region, 1,750 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 family. 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. Depending on the parent’s income, certain types of child care may be difficult or impossible to afford, even with Vermont’s Child Care Financial Assistance program. The struggle for some single parents to find and/or afford child care may be constant, leading to stress and even poor attendance and performance at work.

Parents working second or third shift may have an even more difficult time finding child care to meet their needs. This is

especially true of single parents working second or third shift. Currently, there are no “center-based programs,” that is licensed child care facilities, that offer second or third shift care in our area. However, there are a few family child care providers in the area that would consider providing second and third shift care, one in White River Junction and one in North Thetford. A number of years ago, a White River Junction-based child care center opened and intended to offer extended hours until midnight. However, they found that there was little or no interest in such care and dropped the option altogether.

As previously mentioned, most child care providers are specific about the age of the child they will care for, so, barring other obstacles, finding second or third shift care for a child of a specific age may be difficult or impossible. It is likely that most single parents working second or third in the area would leave their child or children in the care of another family member or a trusted adult.

Goals, Policy and Recommendations: **Child Care Services**

Goals

1. Ensure that an adequate supply of safe and affordable child care services and facilities are available.
2. To create a regional network of well trained, educated, child care providers and facilities that fulfill the needs of families and employers.
3. To incorporate child care issues into the planning process by:
 - a. Encouraging that any major employers (employing more than 35 employees) locating to the TRO Region provide child care services on-site.
4. Working collaboratively with child care providers and towns to help them locate into convenient areas.

Goals, policies and recommendations continued on next page

Goals, Policy and Recommendations: **Child Care Services**

Policy

1. Support initiatives to develop child care facilities where a need has been proven and the location conforms with this Regional Plan.

Recommendations

1. Work with member towns to address identified needs for child care facilities or services by:
 - a. Identifying publicly owned buildings throughout the region and;
 - b. 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” guide for providers to navigate local permitting.
4. Conduct a child care needs assessment.
5. Work with Dartmouth-Hitchcock Medical Center to build a community directory of services and options for day care, child care, after school programs, break programs, and summer programs and camps.

G. Broadband and Cellular Communications

Information Technology (wired and wireless telecommunications, Broadband Internet) has become increasingly important to the economic needs of residents and businesses in the Region. As our Region continues to become more reliant on online data and communication the need to expand these systems will grow. Because so much of our economy now relies on the availability of data and communications, in order for our Region to remain economically competitive with more urban areas of the state, continued information technology development will need to be encouraged.

In the Vermont Telecommunications Plan 2014, the Department of Public service set the lofty goals, including the following:

- 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, 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.

Availability of broadband services and mobile coverage has increased markedly since this report was released, but not all of these goals have been met. Despite this, the Regional Plan supports the goals

of increasing availability of broadband and mobile communications. In the TRO Region access to broadband is provided via a number of mediums including: cable, DSL (Digital Subscriber Line), fiber optical cable, cellular, wireless and satellite.

Use of cellular phones in day-to-day activities has skyrocketed over the past decade. The availability of broadband cellular data has increased the usefulness of cellular phones to the point that they are essential to businesses and citizens alike. In a Vermont Telecommunications survey, 57% of businesses reported that they subscribe to cell phone services for their organization. The average number of cell phones per household in Vermont is 2.39, further supporting the fact that these devices have become common.

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.

Challenges

Lack of Coverage

Although data provided by the State of Vermont reports a majority of Vermonters have broadband access, the reality is less clear. Access to broadband varies from town to town, with the highest concentration of availability generally being in villages and downtowns. This is because broadband providers tend to locate their infrastructure in areas with high population density in order to maximize the subscriber to infrastructure ratio. 2013 broadband availability data indicates that availability is highest in areas with larger villages and downtowns (such as Hartford and Randolph), or in areas where development is concentrated along service corridors where infrastructure exists (such as major roads). The farther away from a community

center, the fewer options for broadband connectivity, making the “last mile” homes and businesses, the least likely to have access.

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. Cell phones are particularly needed during severe hazard events when landline communications may be offline due to damage. The inability to communicate via phone during extreme events puts our communities at risk.

Aesthetic Concerns

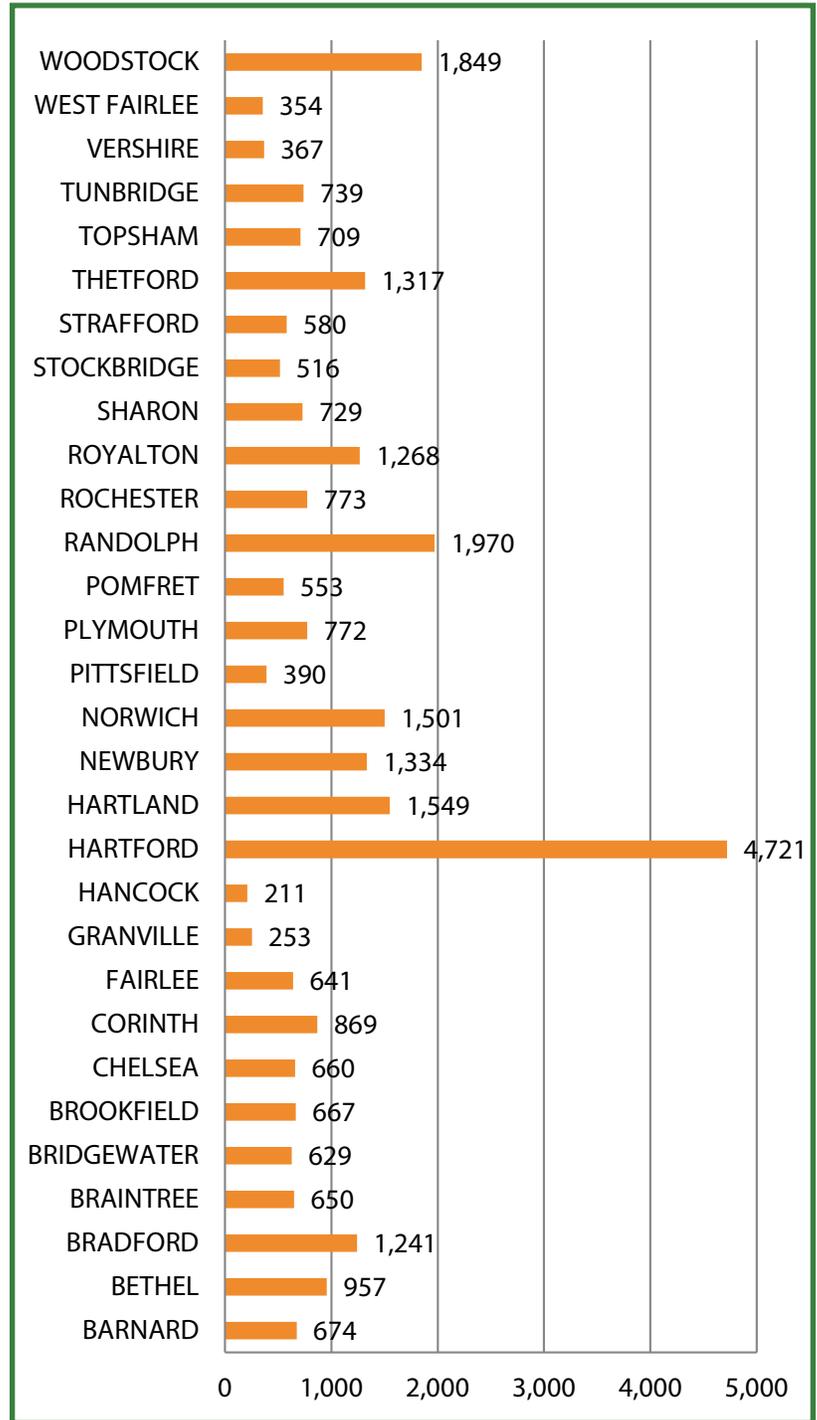
Communities are conflicted on the value of cell towers. In most cases, residents support improved cell phone access, but are less supportive of having the necessary facilities located in their communities. When residents object to proposed facilities, it is almost always due to the potential for aesthetic impacts.

Although the Section 248a process (which allows cellular network providers to apply for a Certificate of Public Good rather than going through local zoning or Act 250) does not require support at the local level, it is preferred, as legal interference can slow down the process of developing new facilities.

Access Barriers

For a portion of our population, access to the internet is a challenge for reasons that go beyond the availability of the service.

Figure 10-2: Total Served by Broadband, 2014



BroadbandVT.org, 2014

For the poor, there may be financial barriers to gaining internet access, for the elderly there may be issues of comfort with the technology. Access to broadband internet has become a necessary part of life. Underserved populations need access in order to interact with health and human service providers, many of whom utilize online forms and online data collection to assist these populations. It is important that access be made available at a cost that is sustainable.

The 2014 Vermont Telecommunications Residential Survey indicates that the average monthly cell phone bill is \$109.82. The price of cell phone packages makes them cost prohibitive for those on a limited or fixed income.

Solutions

Improve Broadband Coverage

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 recover, spur economic and job growth, and improve community resilience to disasters, the VDEP project was tasked with building digital infrastructure in communities that had been hardest hit by the storm.

In the TRO Region, the VDEP project 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 WiFi zone for residents. The benefit of village wide access is a boon to businesses who can take advantage of the additional customers who are drawn to the village to access the internet.

The East Central Vermont Fiber-Optic Network (EC Fiber) is a consortium of 24 towns (including 21 TRORC towns) that is working to expand access to high speed internet within the TRO Region. EC fiber currently provides high-speed internet access to selected communities including parts of Barnard, Pomfret, Stockbridge, Bethel, Royalton, Tunbridge, Strafford, Vershire, Corinth, Thetford and Norwich. There are additional expansions of the EC Fiber network planned in the future.

TRORC is highly supportive of efforts to expand broadband access provided that the infrastructure required does not have an undue adverse impact on the rural character of our communities.

Expand Cellular Coverage

Major cellular providers are continuously working to expand coverage, particularly along major transportation corridors such as Interstates 89 and 91. Under the Section 248a permitting process, the Public Service Board (PSB) must review the environmental, economic, and social impacts associated with a particular project, similar to Act 250. In making its determination, the PSB must give due consideration to the recommendations

of municipal and regional planning commissions and their respective plans. Accordingly, it is appropriate that this Plan address these land uses and provide guidance to town officials, regulators, and providers.

For all cellular telecommunications facilities, the following policies shall apply:

1. **Preferred Locations:** New generation and transmission facilities shall be sited in locations that reinforce the Region’s traditional patterns of growth, of compact downtown and village centers surrounded by a rural countryside, including farm and forest land.
2. **Prohibited Locations:** Because of their distinctive natural, historic or scenic value, telecommunications facility development shall be excluded from the following areas;
 - Floodways shown on FEMA Flood Insurance Rate Maps (except as required for hydro facilities)
 - Fluvial erosion hazard areas shown on Fluvial Erosion Hazard Area maps (except as required for hydro facilities)
 - Wetlands as indicated on Vermont State Wetlands Inventory maps or identified through site analysis.
 - Rare, threatened or endangered species habitat or communities.
3. **Significant Areas:** All new telecommunications facilities and related infrastructure shall 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, sites and structures listed, or eligible for listing, on state or national registers.
 - Public parks and recreation areas, including state and municipal parks, forests and trail networks.
 - 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.
 - Necessary wildlife habitat identified by the state or through analysis, including core habitat areas, migration and travel corridors.
4. **Natural Resource Protection:** New telecommunications facilities and related infrastructure must be sited to avoid the fragmentation of, and undue adverse impacts to the town’s working landscape, including large tracts of undeveloped forestland and core forest habitat areas, open farm land, and primary agricultural soils mapped by the US Natural Resource Conservation Service.

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5. **Protection of Wildlife:** Designers must gather information about natural and wildlife habitats that exist in the project area and take measures to avoid any undue adverse impact on the resource. Consideration shall be given to the effects of the project on: natural communities, wildlife residing in the area and their migratory routes; the impacts of human activities at or near habitat areas; and any loss of vegetative cover or food sources for critical habitats.
 6. **Site Selection:** Site selection should not be limited to telecommunications facilities alone; other elements of the facility need to be considered as well. These include access roads, site clearing, onsite power lines, lighting, and off-site power lines. Development of these elements shall be done in such a way as to minimize any negative impacts. Unnecessary site clearing and highly visible roadways can have greater visual impacts than the energy generation facility itself. In planning for facilities, designers should take steps to mitigate their impact on natural, scenic and historic resources and improve the harmony with their surroundings.
 7. **Aesthetics:** The developer shall make all 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.
 8. **Height of Structures:** Telecommunications facilities shall be designed to be the minimum height necessary to achieve coverage.
 9. **Colocation:** Applicants shall provide reasonable options for sharing space on existing towers or tower sites prior to proposing new towers sites and related facilities. In making such a determination on the feasibility of co-location, proposers should evaluate space available on existing towers, the tower owners ability to lease space, geographic service area requirements, mechanical or electrical incompatibilities, the comparative costs of co-location and new construction, and regulatory limitations.
 10. **Resiliency Support:** To support resiliency, applicants should make space available for municipal communication systems to enhance or expand road and emergency service communication networks.

Remove Access Barriers

While broadband and cellular service expansion is not within TRORC’s traditional purview, it can support opportunities for free access such as the village Wi-Fi zones developed through the Vermont Digital Economy Project. Our Region’s libraries and senior centers represent the best opportunity for underserved members of the community to access broadband. A library’s public

computers and high-speed access allow those in need to reach health and human service providers, as well as potential employers. Additionally, some libraries offer technology training as part of their program. These services are vital to our communities.

Goals, Policies and Recommendations: **Information Technology**

Goals

1. Universal broadband access using fiber throughout the TRO Region.
2. Universal availability of mobile service in the TRO Region.
3. Universal first responder communications.
4. Speeds and pricing for residential broadband on par with national urban areas.

Policies

1. Support public and private efforts to expand broadband access as long as the infrastructure required does not have an undue adverse impact on the rural character of our communities.
2. Encourage the expansion of the mobile telecommunications network in a manner that respects the rural character of our communities.
3. Support efforts to provide broadband access to segments of the population who cannot afford access.

Recommendations

1. Continue to participate actively in the Section 248a permitting process.
2. Seek out funding for our communities to implement new or sustain existing Wi-Fi Zones in villages and downtowns.

H. Libraries

These are times of tremendous change at all levels of society. Citizens of the Region need information to make decisions and to solve problems associated with living in a complex society. Public libraries play an important role in providing materials to inform, challenge, and inspire the Region's residents.

Public libraries and the services they provide are changing too, partly to meet

the changing needs of users and also because of developments in technology and the availability of information. Statewide use of national on-line databases and the Internet by libraries has increased dramatically 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, which is 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. This is likely to remain a priority of this decade and beyond. The Vermont Department of Libraries programs and services to local and regional libraries will be key factors in advancing coordination and services from the Region's public library system.

I. Recreational Facilities

The TRORC has many recreational opportunities available to its residents and visitors. These range from organized, structured prospects at state and

federal parks, as well as more informal opportunities in municipal parks and forests. Recreational opportunities attract tourists, second homeowners, and retirees to the Region and contribute to the quality of life. The Region's recreational resources include elements of the built environment like historic towns and buildings, museums and theatres, and the natural environment which includes scenic views, rivers, lakes, mountains, and forest lands that offer public and private access for hunting and fishing, hiking, mountain biking, skiing, snowmobiling, and use of all-terrain vehicles (ATVs). Access to private lands is also available through agreements brokered by groups such as VAST and other local groups. As pressure on private lands increase and more private land is posted, the need for publicly owned land for recreation is critical. Public recreational lands and resources should maximize their utility by providing for multiple uses.

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 Region is also fortunate to have access to the Green Mountain National Forest in the Quintown valley and along the Appalachian Trail and Long Trail corridors. Additionally, recreation opportunities are available at the U.S. Army Corps of Engineer Sites along the Ompompanoosuc River at Union Village and the Ottauquechee River at North Hartland Lake.

Importance to the Economy

Outdoor recreation plays an important role in Vermont's economy. The Outdoor Industry Foundation in 2006 estimated that the outdoor recreation economy supported 35,000 jobs across Vermont, generated \$187 million in annual state tax revenue, produced \$2.5 billion annually in retail sales and services across Vermont, and accounted for 12 percent of the gross state product.

In the TRO Region, some communities, such as Fairlee, depend heavily on the economic benefits of outdoor recreation. For others, it is one part of their overall economic profile.

Several state parks can be found in the Region including the Calvin Coolidge Historic Site in Plymouth, the Quechee Gorge State Park and Theron Boyd State Historic Site in Hartford, the Allis and Ainsworth State Parks in Brookfield, Thetford Hill State Park and the Granville Reservation State Park. The Department of Forest, 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 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. Nineteen towns in the Region have town forests: Barnard, Bethel, Bradford, Brookfield, Chelsea, Fairlee, Hancock, Hartford, Hartland, Newbury, Norwich, Plymouth, Pomfret, Randolph, Rochester, Royalton, Strafford, Thetford, and Woodstock. Currently, there are public and private statewide initiatives studying and encouraging town forest development and use; West Fairlee is in the process of developing a town forest.

Several towns also offer town recreation programs through their recreation departments. These may include ski programs in conjunction with local schools in the winter, camp and track & field programs in the summer, as well as 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 network 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.

Public Access to Aquatic Recreation

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 of tourists and recreators. There is a need for access areas to water resources in the Region. In addition, there is a need for management of public access resources in a manner that will make them safe and attractive for human use as well as of a quality that will sustain fish and wildlife. See the Surface Water, and Fisheries and Aquatic Resources sections of this Plan, for more information.

Historic and Cultural Resources

According to the Vermont Department of Tourism and Marketing, winter tourism brings in approximately thirty percent of the state's tourism activity, while antique shopping, theater and art exhibits, festivals, historic site visitations, foliage viewing and outdoor recreation make up nearly seventy percent of annual tourist activity. Cultural heritage in particular is drawing substantial attention. According to the Department, requests for information on historic sites more than doubled in

1994. Cultural heritage resources include the scenic qualities inherent in village centers and hamlets, many of which have maintained the look and feel of 19th century Vermont. Historic resources and town centers that offer museums, shopping, and eating establishments may attract bicycle and pedestrian traffic. Towns in the Region should determine to what extent they want town centers to be destinations for tourism and whether or not the facilities are available to accommodate additional traffic safely and effectively.

Private Recreational Opportunities

Only 15% of all land in Vermont is publicly owned, which means many of the outdoor recreational resources in the Region rely on the traditional willingness of landowners to allow access to private land. As the population increases in the state, so does the pressure on private land. With increased use, more landowners experience vandalism, littering, and disregard for private property. Such negative impacts result in the posting of land and closing of trails. For private lands to continue to be used, landowners must feel secure in the protection of their traditional rights and land uses, and incentives for landowners to keep their land open are needed.

Several large private landowners allow access to their land. Three notable examples include the owners of the Wilder Dam facility in Hartford and its associated Kilowatt Park, the Quechee Gorge Dam in Hartford, and the Montshire Museum lands in Norwich. Other private facilities such as local ski areas and golf courses provide recreation opportunities year round. Users to all facilities, public or private, must respect the facilities. Users should get permission when appropriate from the landowner or local access club.

Facilities in the Region include the ski centers of Bear Creek, Killington, Middlebury Bowl, Northeast Slopes, Nordic Centers, Quechee, Suicide Six; the Quechee Club; golf courses and exercise/fitness clubs.

ATVs (All-Terrain Vehicles) and Environmental Considerations

All-terrain vehicles (ATVs) provide for unique opportunities to experience nature, and at the same time, they provide opportunities to damage the critical ecostructures present in remote and sensitive areas.

Goals, Policies and Recommendations: **Recreational Facilities**

Goals

1. Access for residents and tourists to a well-managed, network of outdoor recreation throughout the region.
2. Corridors provided for wildlife habitat as well as recreational areas for hiking, biking, and cross-country skiing.
3. Promote recreation and a healthy natural environment as regional assets, and to plan development in a way that will ensure that those assets are sustainable.

Policies

1. The maintenance and development of recreation trail networks (e.g. Appalachian and Long Trails, regional and state snowmobile networks, and cross-country ski trails) are encouraged.
2. In planning for development within or immediately adjacent to recreational amenities, design plans must work toward separation of these alternative travel modes from vehicular traffic and other competing or incompatible land uses.
3. New development and land subdivisions which have an undue adverse impact on the enjoyment or continued use of recreational uses are inconsistent with this Plan.
4. Consistent with property rights, ownership and management practices which maintain or enhance public access to and uses of recreational amenities on privately held land are encouraged.
5. 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.
6. TRORC encourages planning and construction of recreational opportunities on sites of public utilities or public works facilities (e.g. incorporation of trail networks into public utility corridor planning) to achieve more efficient and productive use of these lands.
7. Roadways and village centers that are heavily used by bicycles and pedestrians must incorporate planning for sidewalks, bike lanes, or separate bike paths to promote safety and enjoyment of such activities and provide for alternative modes.
8. TRORC supports the development of multi-purpose trails using abandoned railroad beds, Class 4 roads, and other public rights-of-way.
9. TRORC encourages federal, state, and local acquisition of land and facilities well-suited for outdoor recreation, provided that adequate financial and management arrangements are made with involved local governments.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations: **Recreational Facilities**

Recommendations

1. To further support outdoor recreation, TRORC will assist communities with the establishment of Conservation Commissions and will support existing Conservation Commissions when possible.
2. TRORC will help towns develop highway policies that address recreation needs, and encourage the adoption of a walkable communities programs within the Region.

J. Opportunities for Shared Services/Infrastructure

Earlier in this chapter, it was noted that there are few regional utilities or facilities in the TRO Region. As is the case in much of Vermont, our Region is generally low-density with a limited population

as compared to more urban locations. In urban areas, opportunities for shared services and infrastructure are obvious because density and development is high enough that communities are very easily connected.

While they may not be so readily apparent, opportunities exist in our rural communities as well. 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.”²⁹ Common examples 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.

As costs of services and infrastructure investments continue to rise, communities should seek opportunities to work with neighboring towns. Engaging in well-planned and well-organized cooperative efforts can ensure that services are provided more efficiently and more effectively.

Title 24 : Municipal And County Government Chapter 121 : Intermunicipal Cooperation And Services

Subchapter 004 : Interlocal Contracts

(a) Any one or more municipalities may contract with any one or more other municipalities to perform any governmental service, activity, or undertaking which each municipality entering into the contract is authorized by law to perform, provided that the legislative body of each municipality approves the contract, and expenses for such governmental service, activity, or undertaking are included in a municipal budget approved under 17 V.S.A. § 2664 or comparable charter provision.

~24 V.S.A. § 4901

Goals, Policy and Recommendation: **Shared Services and Infrastructure**

Goal

1. Services provided efficiently and effectively.

Policy

1. TRORC encourages communities to seek opportunities for share 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 interlocal agreements, union municipal districts, and other cooperative agreements whenever possible.

Utilities, Facilities and Services Endnotes

1. Vermont Agency of Natural Resources, *Vermont Materials Management Plan*, (2014), <http://www.anr.state.vt.us/dec/wastediv/solid/pubs/MMP2014/MMPdraft_18June2014_draft.pdf>, p. 4
2. *Id.*, p. 8.
3. 16 V.S.A. § 1.
4. Berger, Noah and Peter Fisher. “A Well-Educated Workforce Is Key to State Prosperity.” *Economic Policy Institute*. August 2013. <http://www.epi.org/publication/states-education-productivity-growth-foundations/>.
5. Bartik, Timothy. “Why education is important to the economy, especially the local economy, and how business can help improve education.” June 2012. <http://investinginkids.net/2012/06/14/why-education-is-important-to-the-economy-especially-the-local-economy-and-how-business-can-help-improve-education/>.
6. Jones, Ken et al. “Vermont Population Projections – 2010 – 2030.” *Vermont Agency of Commerce and Community Development*. August 2013. <http://dail.vermont.gov/dail-publications/publications-general-reports/vt-population-projections-2010-2030>.
7. Driscoll, Elizabeth. “Higher Education: A Perspective of Administration, Access, Affordability and the Policy that Drives It.” May 2013. https://etd.ohiolink.edu/rws_etd/document/get/ksuls1366481730/inline.
8. Berger, Noah and Peter Fisher. “A Well-Educated Workforce Is Key to State Prosperity.” *Economic Policy Institute*. August 2013. <http://www.epi.org/publication/states-education-productivity-growth-foundations/>.
9. “Guidelines for Home Study in Vermont.” *Vermont Agency of Education*. April 2014. http://education.vermont.gov/documents/EDU-Homestudy_Guidelines.pdf.
10. “Vermont’s Education Funding System.” *Vermont Agency of Education*. June 2011. http://education.vermont.gov/documents/EDU-Finance_Education_Funding_System_2011.pdf.
11. 29 U.S.C. § 794.
12. U.S. Department of Education, *Free Appropriate Public Education for Students with Disabilities: Requirements Under Section 504 of The Rehabilitation Act of 1973*. (2010). <<https://www2.ed.gov/about/offices/list/ocr/docs/edlite-FAPE504.html#textnote1>>.
13. 42 U.S.C. § 11301.
14. *Id.*
15. Vermont Department of Education, <http://education.vermont.gov/flexible-pathways>. 2014
16. Rob Grunewald. Early Childhood Development: Economic Development with a High Public Return. *fedgazette*. Published March 2003 issue. <http://www.minneapolisfed.org/publications_papers/studies/earlychild/abc-part2.pdf>
17. 33 V.S.A. § 3502
18. 33 V.S.A. § 3502 (b)(1)-(5)
19. 2011 Vermont Early Childhood and Afterschool Professional Development Survey. Conducted by the Vermont Department for Children and Families, Child Development Division. Reported June 2012. Page 6. <http://dcf.vermont.gov/sites/DCF/files/pdf/cdd/CDD%202011%20Professional%20Development%20Survey_web.pdf>
20. 2012 Vermont Child Care Market Rate Survey. Vermont Department for Children and Families, Child Development Division. Page 4. <<http://dcf.vermont.gov/sites/DCF/files/pdf/cdd/care/Market%20Rate%20Survey%20Report%202012.pdf>>
21. Vermont Bright Futures Child Care Information Center, accessed 2 December 2013.
22. Vermont Child Care Regulation Review, Workgroup Data Report, July 27, 2012. <<http://dcf.vermont.gov/sites/DCF/files/pdf/cdd/proposed/RegReview/Vermont%20licensed%20program%20data%20for%20reg%20review%207%2027%202012.pdf>>
23. Afterschool Alliance. Afterschool Programs in Vermont. http://www.afterschoolalliance.org/states_docs/pdfs/2013/Vermont_Fact_Sheet.pdf
24. Vermont Head Start- State Collaboration Office. Vermont Department for Children and Families, Child Development Division. 19 September 2013. Page 101-102. <http://dcf.vermont.gov/sites/DCF/files/pdf/cdd/2012_Vermont_HS_EHS_Needs_Assessment_Report%20for%20web.pdf>

-
25. *Id.* Page 3.
 26. *Id.*
 27. *Id.*
 28. Vermont Child Care Financial Assistance Co-Payment Survey. Vermont Department for Children and Families, Child Development Division. March 201. Page 4. <<http://dcf.vermont.gov/sites/DCF/files/pdf/cdd/care/fap/Co-payment%20Survey.pdf>>
 29. 24 V.S.A. § 4861-4902



EMERGENCY MANAGEMENT

A. Background

The impact of expected, but unpredictable natural and human-caused events to the region can be reduced through proper emergency management. Emergency management is generally broken down into four areas - preparedness, response, recovery and mitigation – but also actually includes anticipation and education. These two areas create the context of what emergencies we will face and disseminate this information out so that the other phases are grounded in the rational risks of the area. The Regional Commission's strengths are in planning and administration, and therefore it is appropriate that attention is focused on understanding the emergency context and assisting towns and the state in preparing to meet these challenges. We can also best assist our towns post-disaster through mitigation efforts to lessen the risks residents face by eliminating or minimizing the effects of subsequent disaster, as well as through 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. The more prepared we all are, at all levels, for disasters, the less the loss of life and damage to property will be when a disaster occurs, and the quicker our communities will bounce back.

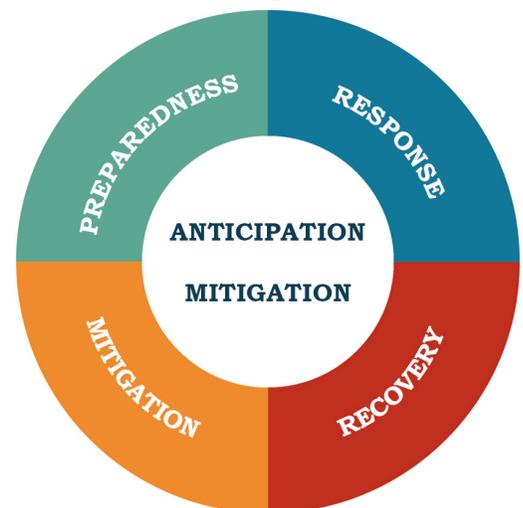
Preparedness generally focuses on emergency personnel acquiring suitable equipment, creating response plans

and conducting training and exercises.

However, preparedness is a responsibility of residents, business and government as well 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 the loss of life and damage to property will be when a disaster occurs, and the quicker our communities will bounce back. A disaster can affect not just our private lives, but can also ruin businesses and their employees' livelihood. If such a tragedy happens to many businesses or a large and critical one, it can also cripple local economies. While businesses can do their part to support their communities and employees in their own preparedness efforts, businesses can and should take actions that will help them weather the strain a disaster can deliver. The Institute for Business and Home Safety, EDA, and the Small Business Development Centers all have resources that can help businesses prepare and recover.

Response is the immediate effort by emergency response agencies and the general public during and after a disaster to save lives and property. Proper

Are
you?
ready?



equipment, training and coordination among responder agencies, and a well-educated and resilient general public, will make response activities more effective when they are needed. Besides the neighborly acts of people assisting each other in times of disaster, most response activities are carried out by our local response agencies, then state and federal resources may be called in during severe and extended disasters.

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.

Mitigation actions should be the cornerstone of emergency management.

Recovery is the more long-term process of putting 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 a few years, requires many partners, and is hindered if a disaster is severe or widespread. Recovery will be least painful where mitigation and preparedness steps have already reduced the extent of damage and fast response has limited the toll on lives and property. Recovery efforts will also be helped by having well-practiced regional coordination in place prior to the disaster so that towns can help each other and so that the local/state/federal administrative

issues are handled smoothly. Thorough and prompt documentation of losses, good media outreach communicating the assistance that is available, and the interim provision of basic services will all enable communities to recover as fast and fully as possible.

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 is now working 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.

B. Emergency Services

Police

The primary law enforcement for most of the region is the Vermont State Police. Two State Police regional barracks are located within the region. State Police from the Royalton (formerly Bethel) Barracks serve eastern central Vermont, and the force from the Bradford Barracks serves eight of the region's municipalities located in the northern part of Orange County. Pittsfield is served from the Rutland Barracks and Hancock and Granville are served from the Middlebury Barracks. State Police force 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 abilities to do law enforcement, they have minimal funding outside of town contracts. Many towns in the region contract with their Sheriffs, 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. Most towns do not have any police, but rather constables, who are elected, and 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

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.



Tunbridge Fire Department | Source: Kevin Geiger | TRORC Staff

All of the region's fire departments are members, formally or informally, of at least one Mutual Aid System, which provide back-up 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. Insurance for firefighters and maintaining equipment are large annual costs, and replacement costs for fire engines can be \$300-400,000. These sums require careful budgeting so that they do not come as a shock. However, the greatest difficulty facing departments tends to be attracting enough volunteers, 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.



Bradford FAST Squad and Fire Dept. | Source: Kevin Geiger | TRORC Staff

Ambulance and Rescue

Ambulance and FAST 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, 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 supported by town funding. Air ambulance is provided to the region through Dartmouth Hitchcock Advanced Response Team (DHART) and their two helicopters. Nearly all of the nineteen EMS services in the region are in the state EMS Districts #8 and #9. As with fire departments, lack of volunteers, particularly for daytime coverage, is a pressing problem. 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 are a critical part of the local response system, often needed so that responders can simply get to the scene in times of winter weather, downed trees or washed out roads. Town staff rely on state VTrans staff for assistance with road damage. Response operations also rely on specialized teams,

such as local Swift Water Rescue or Urban Search and Rescue teams; K-9 teams; the Vermont Hazardous Materials Response Team; 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.

The emergency field also relies on a communications system that includes E911 for mapping, dispatch centers, 911 PSAPS for call taking, 211 for more general information, RACES ham radio operators for failsafe communications, and VTAlert and the Emergency Alert System. Finally, municipal governments may communicate information using a number of avenues including the municipal website, listservs and social media during an emergency or otherwise. All of these communications systems require power and redundancy so they do not fail during disasters. Radio, cellular coverage, and even high-speed internet remains lacking in some areas, creating dangerous coverage holes in the communications system.

State and Local Emergency Management

Vermont's state emergency management duties are performed by the Division of Emergency Management and Homeland Security (DEMHS) within the Department of Public Safety. DEMHS is a small agency that largely supports state and local emergency planning and coordinates state resources during disasters. DEMHS 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. DEMHS coordinates the several state agencies under the State Emergency Operations Plan, as well as serves as the primary point of public information in a widespread event.

Local emergency management in the region 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.

Most towns had no emergency plans until the last decade, and now all towns have Local Emergency Operations Plans and have designated an Emergency Management Coordinator or Director to help get local planning done and coordinate a number of local players that may be needed in preparedness activities. Selectboards are also increasingly realizing that they have an important role in managing many types of emergencies, and are subsequently 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.

Local Emergency Planning Committees (LEPCs)

LEPC #12, www.LEPC12.org, covers all of the towns in the region except for Hartland; they are part of LEPC#3. LEPCs are organizations whose responsibilities are established by Vermont and federal law to help provide emergency planning for responding to chemical accidents, and to work with local government emergency services, DEMHS, 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. Currently, the LEPC #12 meetings provide a critical venue for cross-discipline dialog, various trainings, and a chance for different agencies to meet before having to work together in an emergency.

Planning for preparedness and mitigation efforts must be grounded in the rational evaluation of hazards to the area and the risks these hazards pose.



Meeting of LEPC #12 at White River Valley Ambulance
| Source: Kevin Geiger | TRORC Staff

C. Hazards Assessment

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?

In conducting the regional hazards assessment, potential hazards were ranked based on available information on their frequency and estimates of potential severity. The frequency at which one can expect a type of disaster to occur affects how much priority is placed on preparing for and mitigating that type of event, 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:

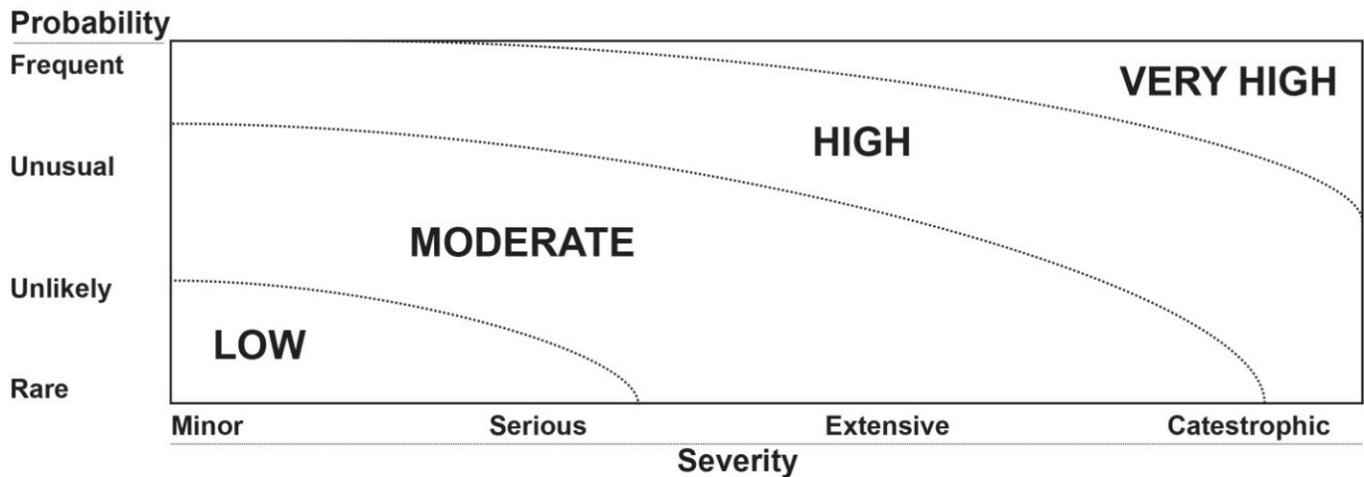
Rare: May never have occurred, annual probability of 1/100 or less.

Unlikely: Has occurred, has annual probability of 1/25-100.

Unusual: Has occurred in the area and has an annual probability of 1/10-25.

Frequent: Occurs often, although in varying degrees, annual probability of 1/2 or greater.

Figure 11-1: Level of Risk



Each hazard was also assigned a level of severity. These are designated as follows:

Minor: Minor injuries or illness, <10% of properties damaged, minimal disruption of quality of life, within local ability to handle.

Serious: Limited major injuries or illness 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 illness, few fatalities, 25-50% of properties damaged, critical facilities shut down for >14 days, state resources activated, federal resources needed.

Catastrophic: Multiple fatalities, widespread injuries, >50% of properties damaged, critical facilities shut down for >30 days, state and federal resources needed.

The product of the combination of hazard frequency and severity creates a risk for each type of hazard. Risk is very important, because it is the sense of risk that motivates people to take action to avoid the risk and prepare for what cannot be feasibly avoided. However, the sense of risk should be an informed one, not 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 only rated 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 less resources. Luckily, we live in state that has no very high risks.

This regional scale analysis can also be augmented at more detailed levels by considering hazards from the point of view of what they affect 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 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. Copious Internet links about each hazard can be found at trorc.org.

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. Extreme storms have been

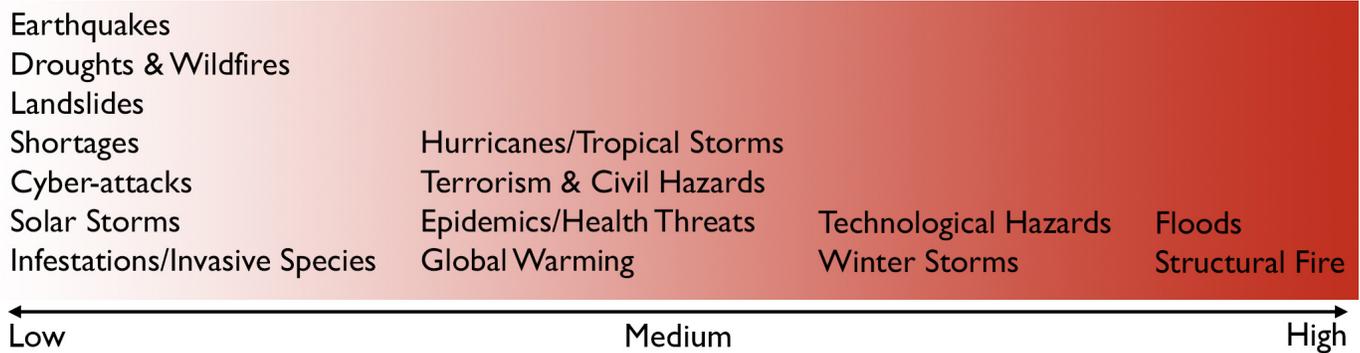
becoming more frequent and this trend is expected to continue. Flooding is of two types – rain and/or snowmelt events that are more widespread in nature and cause flooding in the major rivers’ floodplains, and localized flash flooding caused by unusually large rainstorms over a small area. Both kinds of events can be worsened by ice or debris dams and the failure of undersized infrastructure (especially culverts), private dams and beaver dams. 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 movement of rivers and streams, and this erosion has undermined homes and businesses. (Note: Additional information, policies and actions on floods can be found in the Flood Resilience section of the Regional Plan.)

The second greatest risk to the region is from structural fire. Vermont had one of the highest per capita death rates from fire in the nation, but this has dropped considerably in recent years. 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 all new residential construction. Sprinklers can prevent significant loss of life by increasing the time residents can escape blazes. Less frequent than individual fires are the major downtown fires that can destroy town



Severely Damaged Culvert, Stockbridge
| Source: Chris Sargent | TRORC Staff

Figure 11-2: Summary of Hazards and Their Risks



centers. A fire in an unprotected downtown can be devastating, and such have historically occurred in South Royalton, Bradford, and Randolph.

“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, airplane crashes, vehicle crashes, 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 are a regular occurrence in Vermont. However, severe winter storms can cause serious damage, including collapse of buildings due to overloading with snow or ice, brutal wind chills,

and power outages due to downed trees and power lines. With the exception of the January 1998 ice storm (which was thought to be a 200-500 year event), Vermont has not experienced a widespread severe winter storm recently, but severe events have and will occur. 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 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 hurricanes/tropical storms, and the more common severe thunderstorms, which can be associated with lightning, high winds, hail and tornadoes. Tropical Storm Irene severely impacted the region in 2011. Storms with such heavy rainfall have been rare, but are increasing in frequency to only unlikely, and so this hazard may become a higher hazard over time. Hailstorms generally occur about twice a year in Vermont, and a small tornado is almost an annual occurrence. Tornadoes are less common than hail storms and high winds, but they have occurred throughout Vermont.

“Technological hazards” and winter storms are moderate to high risks in the region.

Lower moderate risks that were evaluated included: terrorism and civil hazards, disease, and global warming. 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 a pandemic, are similar to terrorism and civil hazards, in that they are unlikely but could have very serious results, making them a moderate risk. While Ebola was a recent concern, it is anticipated that a more serious strain of the usual flu will occur some year and that vaccines would not be ready before it arrived in Vermont. Global warming is not a traditional disaster type, as 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, it is occurring now, and the predicted changes are disastrous. If climate change occurs as projected we will see a several fold increase in flooding, a much shorter winter, and an extremely hot summer in the decades ahead. With these changes, this driver of hazards will increase in risk. Earthquakes, extreme temperatures, landslides, solar storms, cyber-attacks, droughts, wildfire, shortages/outages and invasive species/infestations are lower risks due to estimated rarity or lack of expected severity.

Surprising as it is to some, Vermont is classified as an area with “moderate” seismic activity. In general, the eastern and western edges of the region have greater risks and would have damage in the millions if such an unlikely quake occurred.

Vermont actually has a relatively high danger due to landslides in some locations. Though this type of disaster rarely results in injury, it can destabilize roads and threaten structures. In the region, several landslides have threatened roads and buildings or caused huge sedimentation issues in rivers. Slides in Stockbridge, Plymouth, Hartford, Barnard and Bethel are impacting roads or properties.

Shortages of power, fuel, food and water are likely to be temporary and the indirect result of a localized disaster creating disruption in transportation and supply systems or of a widespread weather event. Increased sheltering capacity in the region would help address this issue, if needed.



Hurricane Katrina Response | Hartford Emergency Services, 2005
| Source: Kevin Geiger | TRORC Staff

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 levels.
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 together.
5. Efforts to educate individuals and families to prepare disaster kits and disaster plans are encouraged.
6. Conduct exercises to ensure that response plans are workable.
7. Public and private critical facilities must be built and designed to be able to function during disasters and should be coordinated to reduce unnecessary waste.
8. New or rebuilt development shall not increase disaster risk, and should take reasonable steps to reduce risk.
9. 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 sympathetic to 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.
10. Planned telecommunications towers must be built to allow collocation of emergency communications systems in order to increase radio or other coverage while lessening the need for more towers (see Chapter 10, section G).
11. 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.
12. Towns should pursue the use of capital programs and reserve accounts to properly budget so that emergency responders in the region are properly trained and equipped to respond to anticipated disasters.

Goals, policies and recommendations continued on next page

Goal, Policies and Recommendations: **Emergency Management**

Recommendations

1. State and Federal government 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. Individuals should have disaster kits ready in their homes and vehicles. They should have a plan as to what to do and where to go during foreseeable emergencies and know their local emergency shelter.
3. 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.
4. Towns should encourage sprinkling in residential structures to reduce loss from fire.
5. 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.
6. TRORC will continue to work with all communities on hazard mitigation planning efforts.
7. TRORC will continue to work cooperatively with local emergency response organizations, DEMHS, LEPC #12, social service agencies, long term recovery organizations, community resilience organizations, and others to help improve emergency planning, response, and recovery.
8. 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.
9. FEMA should modernize flood maps, especially in Orange County and unnumbered A zones, and incorporate newer flood frequency predictions into new maps.
10. TRORC should assist towns and ANR in refining river corridor maps.
11. 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.
12. Communities should work to ensure that important local facilities that provide emergency services, water, food, gas or act as an emergency shelter are able to function in power outages.
13. TRORC should work with towns and other organizations to coordinate land use, transportation and energy policies and actions to result in more resilient communities.
14. TRORC should assist towns in response and recovery stages through damage documentation assistance and navigating federal and state grants.

ENERGY

A. Introduction

The Vermont Municipal and Regional Planning and Development Act (24 VSA Chapter 117) stipulates that the Regional Plan shall have the purpose of guiding development in such a fashion that it shall:

- Reduce wastes of energy which result from either excessive congestion or excessive scattering of population;¹
- Promote efficient and economic utilization of energy;²
- Promote the conservation of the supply of energy;³
- Promote the reasonable use of energy resources.⁴

To accomplish this purpose, the Regional Plan must contain an energy element, which may include an analysis of energy resources, needs, scarcities, costs and problems within the Region across all energy sectors, including electric, thermal, and transportation, a statement of policy on the conservation of energy and the development of renewable energy resources, and a statement of policy on patterns and densities of land use and control devices likely to result in conservation of energy.

With the passage of Act 174 in 2016, the concept of “enhanced energy planning” was formally included in statute. Regional Plans that meet standards set by the Department of Public Service (DPS) for enhanced energy planning can seek a “Determination of Energy Compliance.” This determination ensures that the Regional Plan will be given substantial deference in all proceedings of the Public

Service Board under §248. Additionally, with this determination, regional planning commissions can grant determinations of energy compliance to communities who meet the standards set by DPS. TRORC has developed a standalone Energy Implementation Plan (EIP) in order to meet the standards set by DPS. The EIP has been adopted by reference as part of this Plan.

The policies and programs in this chapter (and in the EIP) are intended to direct future development and to indicate how energy development and generation shall occur in this Region. It is also intended to ensure that the TRO Region maintains a safe, efficient energy system which encourages energy conservation and the generation of renewable resources in a manner that does not negatively impact the rural nature of our communities.



Bradford Falls | Source: TRORC Staff

B. Background

Concern about the sustainability of our nation’s dependence on foreign oil has grown greatly since the oil crisis of the mid-1970s. In the mid-2000s the price of oil based fuels experienced a dramatic rise, which highlighted the tenuous position that oil dependency has put the nation in. Unpredictable fluctuations in the cost of fossil fuels can make budgeting for everyday activities such as home heating and travel by car become increasingly burdensome for our communities. While TRORC recognizes that energy supply and demand are directly influenced by economic forces at the state, federal, and international levels, the manner in which our Region plans for future growth, how it consumes energy, and where it chooses to get energy from, will have an important impact on global energy resources.

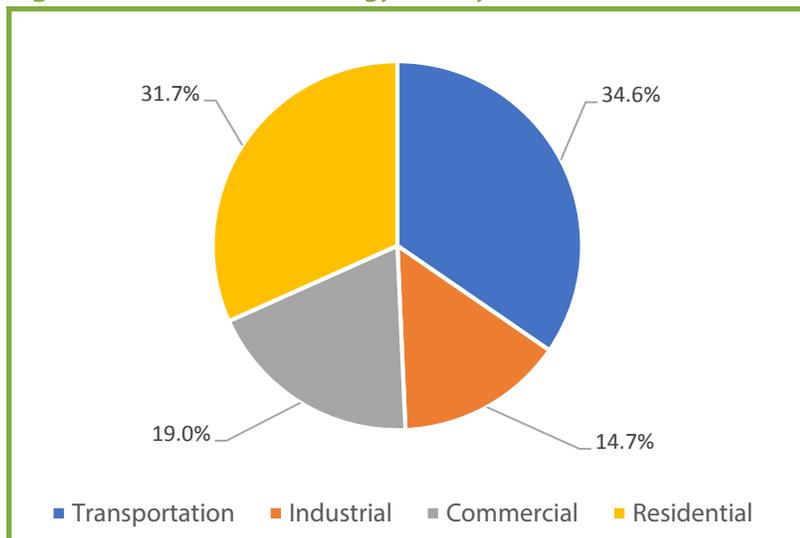
Theories such as the Hubbert Peak Theory (a.k.a. Peak Oil), suggest that at

some point—perhaps sooner than later—the worldwide consumption of oil will outpace the existing supply. Although new technologies may enable energy providers to extract oil from locations that were previously impossible to reach, there is most likely a finite amount of oil available. Many of these more extreme methods of energy extraction have the potential to create negative impacts on our environment. Given the predictions of Peak Oil, the TRO Region, like the rest of the world, should prepare for a very different future, one that focuses on sustainability. Declining oil production and increasingly worrisome signs of climate change underscore the need for good planning and active discussion about energy alternatives. It is in consideration of this, that TRORC supports the principles of energy conservation, environmental stewardship, and energy independence.

C. Statewide and Regional Energy Needs

Since 1970, total end-use energy consumption statewide has increased at an average rate of around half a percent per year. Over the same period, Vermont’s population has grown at an average rate of around 0.8% per year. This means that Vermont consumes about as much site energy per capita today as it did in 1970. In more recent years, since around 2000, Vermont’s overall demand for energy has moderated somewhat, even as the population and economy continued to grow (albeit more slowly than in the decades before 2000). Total energy end use is now 5% lower than it was 15

Figure 12-1: Vermont Energy Use by Sector, 2014



Source: U.S. Energy Information Administration

years ago, and per-capita site energy consumption now appears to be on a slight downward trend, having decreased by around a half a percent per year on average since 2000. This shift is mainly attributable to declining consumption of gasoline, electricity, and distillates, the three largest components of Vermont's total primary energy consumption.

In terms of per capita energy consumption for residential and transportation purposes, the North East is about the same as the rest of the U.S. In Vermont, almost 80% of residential energy is dedicated to space heating and domestic hot water, while nearly 35% of the state's total energy usage goes toward transportation.

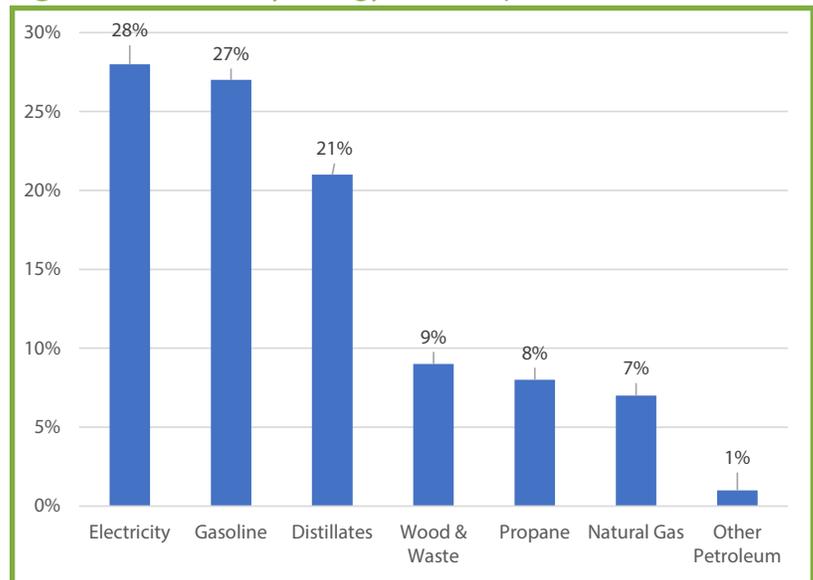
Of the energy dedicated to transportation, over 50% is used to fuel private cars for residents (as opposed to being used for public transit, road maintenance, or another public purpose). This reinforces the need for clear policy that guides land use in such a fashion that it does not continue to encourage auto-centric development.

D. Current Energy Sources

Fossil Fuels

The TRO Region, like Vermont, depends primarily on fossil fuels for energy production and transportation. As shown in the Figure 12-1, fossil fuels (most of which is used in transportation) account for more than 50% of all energy consumed in Vermont. Nearly 50% of the oil consumed in the U.S. is imported. Our economic system is so closely tied to the availability of fossil fuels that even modest

Figure 12-2: Primary Energy Consumption



Source: VT Department of Public Service

price increases can lead to inflation, a slowdown in economic growth, and monetary instability. These instabilities have a much broader impact than just our economic system. Fluctuation in the price of fossil fuels can impact our communities at the municipal and residential level as well. Increasing fuel costs make it more expensive for communities to provide services and maintain facilities. Rising costs can make it challenging for residents to heat their homes. The price and availability of food is also impacted by changes in fuel costs.

But these consequences of intensive fossil fuel use are only part of the story. The combustion of fossil fuels has been determined to be the largest contributor of atmospheric “greenhouse gases” (primarily carbon dioxide). There is consensus in the scientific community that continued accumulation of greenhouse

gases within the earth’s atmosphere has lead to a warming of the atmosphere, or “greenhouse effect.” Such warming causes severe coastal flooding and unpredictable climate shifts, threatening the viability of the earth’s most significant urban and agricultural centers. Vermont has experienced an increase in the number of severe weather events* over the past twenty years, most notably Tropical Storm Irene in 2011. If, indeed, climate instability and climate change are linked as many feel is the case, it is essential that we decrease our reliance on fossil fuels in an attempt to reverse or at least halt future damage to our atmosphere.

Vermont can successfully claim that a substantial amount of the power used statewide comes from renewable sources when compared to other states.



White River Junction Solar Farm | Source: ©Advanced Energy

Renewable Energy

Vermont can successfully claim that a substantial amount of the power used statewide comes from renewable sources when compared to other states. Although the majority of Vermont’s renewable energy is generated through Hydro-Quebec, some hydroelectric power is generated in Vermont. Additional sources of renewable energy include several utility owned commercial-scale wind, landfill methane projects, and utility-scale solar facilities. For more information on renewable energy in the TRO Region and the siting of renewable energy generation facilities, see the TRORC EIP.

E. Electrical Generation

While Vermont is fortunate to have two large electricity generators that utilize fuels that are considered less harmful in terms of greenhouse gas emissions, TRORC believes that we must continue to strive toward energy independence as a primary element of this energy plan. To do so, we must consider a wide range of potential benefits and impacts on our Region and utilize this analysis to create a plan for the future.

F. Permitting Considerations

Energy generation in Vermont is subject to a number of different permitting requirements, most of which are limited to state level permitting. On the municipal level, state statute protects residential renewable energy generation systems from regulations that will prohibit their development.

**Based on disaster declarations for the State of Vermont as reported by the Federal Emergency Management Administration.*

Section 248 for Non-Renewable Generation Facilities, Transmission and Distribution Systems

Distributed power generation facilities, such as hydropower dams, fossil fuel plants as well as wind power or solar systems owned by utilities, are subject to review and approval by the Vermont Public Service Board (30 VSA §248). Under this law, prior to the construction of a generation facility, the Board must issue a Certificate of Public Good. A Section 248 review addresses environmental, economic, and social impacts associated with a particular project, similar to Act 250. In making its determination, the Board must give substantial deference to the recommendations of municipal and regional planning commissions and their respective plans if they have received a determination of energy compliance. Accordingly, it is appropriate that this Plan address these land uses and provide guidance to town officials, regulators, and utilities.

TRORC's criteria for renewable energy generation facilities are specifically addressed in the Regional EIP (adopted by reference as part of this plan). For non-renewable energy generation facilities, as well as transmission or distribution facilities, the following policies shall apply:

- 1. Preferred Locations:** New non-renewable generation, transmission, and distribution systems shall be sited in locations that reinforce the Region's traditional patterns of growth, of compact downtown and village centers surrounded by a rural countryside, including farm and forest land.
- 2. Prohibited Locations:** Because of their distinctive natural, historic or scenic value, energy facility development shall be excluded from the following areas:
 - Floodways shown on FEMA Flood Insurance Rate Maps (except as required for hydro facilities);
 - Fluvial erosion hazard areas shown on Fluvial Erosion Hazard Area maps (except as required for hydro facilities);
 - Wetlands as indicated on Vermont State Wetlands Inventory maps or identified through site analysis;
 - Rare, threatened or endangered species habitat or communities.
- 3. Significant Areas:** All new generation, transmission, and distribution facilities shall 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, sites and structures listed, or eligible for listing, on state or national registers.
 - Public parks and recreation areas, including state and municipal parks, forests and trail networks.
 - State or federally designated scenic byways, and municipally designated scenic roads and viewsheds.

With the passage of Act 174 in 2016, the concept of “enhanced energy planning” was formally included in statute.

- 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.
 - Necessary wildlife habitat identified by the state or through analysis, including core habitat areas, migration and travel corridors.
- 4. Natural Resource Protection:** New generation and transmission facilities must be sited to avoid the fragmentation of, and undue adverse impacts to the town’s working landscape, including large tracts of undeveloped forestland and core forest habitat areas, open farm land, and primary agricultural soils mapped by the US Natural Resource Conservation Service.
- 5. Protection of Wildlife:** Designers must gather information about natural and wildlife habitats that exist in the project area and take measures to avoid any undue adverse impact on the resource. Consideration shall be given to the effects of the project on: natural communities, wildlife residing in the area and their migratory routes; the impacts of human activities at or near habitat areas; and any loss of vegetative cover or food sources for critical habitats.
- 6. Site Selection:** Site selection should not be limited to generation facilities alone; other elements of the facility need to be considered as well. These include access roads, site clearing, onsite power lines, substations, lighting, and off-site power lines. Development of these elements shall be done in such a way as to minimize any negative impacts. Unnecessary site clearing and highly visible roadways can have greater visual impacts than the energy generation facility itself. In planning for facilities, designers should take steps to mitigate their impact on natural, scenic and historic resources and improve the harmony with their surroundings.

Local Permitting

The Vermont Municipal and Regional Planning and Development Act (24 VSA Chapter 117) does not allow communities to impose land use regulation that prohibits or has the effect of prohibiting the installation of solar collectors or other renewable energy devices. It also prohibits communities from regulating the height of renewable energy systems such as windtowers provided that they are small in scale. However, statute does enable Vermont’s municipalities to adopt regulatory bylaws to implementing the energy provisions contained in their town plan. Zoning bylaws and subdivision regulations are the most commonly used bylaws. Each affords the opportunity to promote energy efficient development at the local level.

Zoning bylaws control the type and density of development. It is imperative that communities recognize the connection between land use, transportation and energy and seek to create zoning ordinances and subdivision regulations that encourage energy efficiency and conservation. Encouraging high density and diverse uses in and around existing built-up areas will lead to more compact settlement patterns, thereby minimizing travel requirements. At the same time, zoning bylaws must be flexible enough to recognize and allow for the emergence of technological advancements which encourage decreased use of fossil fuels, such as increased use of solar and wind power.

Local zoning bylaws may also permit the creation of planned unit developments (PUDs). PUDs are a grouping of mixed use or residential structures, pre-planned and developed on a single parcel of land. The setback frontage and density requirements of the zoning district may be varied, to allow creative and energy efficient design (i.e. east-west orientation of roads to encourage southern exposure of structures, solar access protection, use of land forms or vegetation for wind breaks, and attached structures), and to encourage the construction of energy efficient buildings.

Subdivision regulations are one of the most effective tools for encouraging energy efficiency and conservation. Subdivision regulations, like PUDs, involve town review (through the Planning Commission, Zoning Board of Adjustment or Development Review Board) in the design process. Because subdivision regulations

govern the creation of new building lots, as well as the provision of access and other facilities and services to those lots, a community can impose requirements that a developer site their building to maximize solar gain. Likewise, subdivision can require that landscaping be utilized to reduce thermal loss.

G. Energy Efficiency and Conservation

Energy efficiency and conservation are the highest priorities of the TRO Region. In general, these elements are the most cost effective method of reducing energy use. It is always less expensive to reduce consumption than to produce energy. But, there are barriers that prevent home owners and businesses from making energy efficiency investments and participating in existing programs. High upfront costs, split incentives, poor understanding of benefits, a lack of information about efficiency and poorly timed home improvements all present challenges to improving energy efficiency.

Energy efficiency and conservation are the highest priorities of the TRO Region.

Improving existing structures and building new structures with a vision toward increased energy efficiency is a critical way to promote energy conservation and lessen or postpone the need for costly sources of additional energy. Enhanced energy efficiency in buildings and structures can lessen the amount of income that our Region spends on energy costs, decrease per capita consumption of non-renewable sources of energy, and decrease the

emission of both acid rain precursors and greenhouse gases. Reducing the consumption of costly, imported forms of energy and increasing the use of renewable emission-free energy can reduce reliance on global markets, stimulating local economies.

Much of the Region's building stock is old, and many of these buildings are considered historic and are either listed on or eligible for listing on the State and National Registers of Historic Places. In Orange and Windsor Counties, 47% of homes were built before 1970.

In Orange and Windsor Counties, 47% of homes were built before 1970 and are in need of energy efficiency measures.

There are a wide range of programs designed to reduce costs for home energy efficiency improvements, many of which are organized by Efficiency Vermont. Efficiency Vermont is Vermont's statewide energy efficiency utility, which is funded by an energy efficiency charge on a consumer's electric bill; it is managed by the Vermont Energy Investment Corporation (VEIC), an independent non-profit energy services organization that is under contract to the Vermont Public Service Board. Efficiency Vermont helps Vermonters reduce energy costs by making their homes and businesses energy-efficient. It provides technical assistance and financial incentives to help Vermonters identify and pay for cost-effective approaches to energy-efficient building design, construction, renovation, equipment, lighting and appliances. TRORC supports statewide, regional

and local efforts to provide educational outreach to communities to better educate homeowners as to what resources are available to them for energy efficiency improvements.

New residential development in the State of Vermont is required to comply with Vermont Residential Building Energy Standards (RBES). Commercial development is subject to similar (but more effectively enforced) code regulations. Some examples of the types of development the RBES applies to include:

- Detached one- and two-family dwellings.
- Multi-family and other residential buildings three stories or fewer in height.
- Additions, alterations, renovations and repairs.
- Factory-built modular homes (not including mobile homes)

In order to comply with the RBES, a home, as built, must meet all of the Basic Requirements and the Performance Requirements for one of several possible compliance methods. If the home meets the technical requirement of the RBES, a Vermont Residential Building Energy Standards Certificate must be completed, filed with the Town Clerk of the community and posted in the home. If a home required by law to meet the Residential Building Energy Standard does not comply, a homeowner may seek damages in court. It includes heating and cooling systems as well. Unfortunately, the program lacks a mechanism that enforces the proper filing of the required certificate. Without having a way to penalize contractors who do not

file these reports, there is no way to ensure compliance with the RBES. Communities who wish to take a role in guaranteeing compliance with this program can do so by requiring proof of filing as part of a certificate of occupancy through their zoning ordinance.

H. Municipal Energy Efficiency and Conservation

Municipalities expend a substantial amount of their yearly budgets on energy related costs, primarily for heating and transportation. When the price of fuel rises, costs rise, which forces the community to either raise taxes or cut services. In the event that fuel costs were to double in the future, municipalities could be dramatically impacted. Efficiency and conservation at the municipal level can have a broad impact and will benefit the community as a whole. Some of the opportunities for energy efficiency and conservation at the municipal level include:

- Tracking energy expenses by building.
- Conducting energy audits on municipal buildings.
- Creating municipal policies that reduce energy use (such as an energy efficient purchasing policy.)

State statute enables communities to form an Energy Committee, which is a volunteer board that focuses on energy issues. An Energy Committee can assist the Planning Commission with developing good energy policy. It can also be responsible for auditing and tracking energy expenses in order to recommend energy efficiency improvements for municipal buildings.

Capital Budget and Program

Given the potential expense of energy efficiency improvements, it is essential to wisely budget town funding to cover these costs. State statute enables communities to create a Capital Budget and Program for the purposes of planning and investing in long-range capital planning. Although most communities have some form of capital account where they save money, many do not have a true Capital Budget and Program. A capital budget outlines the capital projects that are to be undertaken in the coming fiscal years over a five-year period. It includes estimated costs and a proposed method of financing those costs. Also outlined in the Program is an indication of priority of need and the order in which these investments will be made. Any Capital Budget and Program must be consistent with the Town Plan and shall include an analysis of what effect capital investments might have on the operating costs of the community.

When planning for routine major facilities investments, such as roof replacements, foundation repairs, etc., it is important to also consider making energy efficiency improvements at the same time. The cost to replace or renovate a community facility will only be slightly higher if energy efficiency improvements are done at the same time, rather than on their own.

Municipal Incentives

Communities can also consider offering incentives to residents that encourage energy efficient improvements. Vermont enacted legislation in May 2009 (Act 45) that authorizes local governments to create

Clean Energy Assessment districts. Once created, municipalities can offer financing to property owners for renewable energy and energy-efficiency projects. Eligible projects include the installation of solar water and space heating, photovoltaic panels (PV), and biomass heating, small wind, and micro-hydroelectric systems. Property-Assessed Clean Energy (PACE) financing effectively allows property

owners to borrow money to pay for energy improvements. The amount borrowed is typically repaid via a special assessment on the property over a period of up to 20 years; if the property owner wishes to sell the parcel before fully repaying the obligation, then the obligation is transferred to the new property owner at the time of sale.

Goals, Policies and Recommendations: **Energy**

Goals

1. Energy efficient homes and buildings are constructed to lessen or postpone the need for costly sources of additional energy.
2. More public transportation facilities and opportunities exist to increase ridership in areas already serviced by public transportation.
3. Educational efforts increase awareness and use of energy conservation practices.
4. Patterns of land use and development use energy most efficiently.
5. Renewable energy generation is sustainable and protects our natural and rural landscape.

Policies

1. Prior to the construction of additional or upgraded transmission or distribution lines or related facilities, utilities must demonstrate that such public investments are justified to improve efficiency and is not inconsistent with the goal to increase energy conservation for the consumer. In the consideration of the public benefit resulting from such investments, full consideration of the associated external costs must be reflected in any decision. Prior to the acceptance or acknowledgment of any new energy source or facility development affecting the region, full community and technical review is required to enable objective analysis of the positive and negative economic, social, aesthetic, and environmental impacts associated with the project.
2. Unless specifically prohibited within a land use area, New non-renewable generation facilities, and transmission and distribution systems, must be sited to avoid the fragmentation of, and undue adverse impacts to the town's working landscape, including large tracts of undeveloped forestland and core forest habitat areas, open farm land, and primary agricultural soils mapped by the US Natural Resource Conservation Service.
3. Properly planned and constructed expansions and efficiency improvements to existing hydropower generators and transmission facilities are required where such investments clearly benefit the residents of the region and are in accord with goals and policies of this Plan.
4. Where development and construction of electric power generation facilities (renewable and non-renewable) are proposed for public use, design plans must consider placement of such facilities in locations where environmental impact is minimal or reasonable measures have been employed to mitigate adverse impacts.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations: **Energy**

Policies (continued)

5. The Regional Plan requires transportation practices that promote energy efficiency. This includes the following initiatives:
 - a. Invest in bicycling and walking facilities within settlement and commercial growth centers, and invest in bicycle and walking facilities that connect settlement and commercial growth centers.
 - b. Continue investment in public transportation and rideshare programs to reduce the region's dependency on single-occupancy vehicle trips.
 - c. Construct more park-and-ride commuter parking lots at Interstate interchanges and within our settlement and commercial growth centers.
 - d. Support transportation facility design enhancements that better accommodate multi-modalism on the Region's existing roads and bridges.
 - e. Require large-scale private land use development to invest in transportation infrastructure and services that promote multi-modalism or provide the necessary right-of-way to allow public investment in those facilities.
6. Capital investments of public utilities and services are encouraged within built-up centers to support the high intensities of use.
7. Where it is demonstrated that the costs of providing energy services and facilities clearly is outweighed by a public benefit to the areas or region and the land use settlement patterns resulting from the development or subdivisions are in conformance with this Plan and relevant local plans, such services and facilities should be permitted.
8. No new dams or major improvements to existing dams are supported without full consideration of its social, economic, and environmental impacts, the appropriate local plan, and this Regional Plan. Future hydroelectric power development must occur within these guidelines:
 - a. Run-of-the river projects are preferred over projects which require impoundments with low or minimum flows;
 - b. Recreation and fisheries are top priorities for river uses and should not be significantly diminished by hydropower development. Provisions should be made for fish passage and canoe portages. Also, recreational opportunities at hydropower facilities should be explored and developed where appropriate; and
 - c. Water quality and minimum flows must be maintained.
9. New developments that are proposed under Act 250 must include measures to reduce energy consumption through site and building design, materials selection and the use of energy-efficient lighting, heating, venting and air conditioning systems.
10. TRORC supports the development and use of renewable energy resources – including but not limited to wind, solar, biomass, micro hydro and cogeneration – at a scale that is sustainable, that enhances energy system capacity and security, that promotes cleaner, more affordable energy technologies, that increases the energy options available locally, and that avoids undue adverse impacts of energy development on the local community and environment.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations: **Energy**

Recommendations

1. Actively support partnerships, strategies, and state and federal legislation that will ensure the affordable, reliable and sustainable production and delivery of electrical power to the region, in conformance with regional and municipal goals and objectives.
2. TRORC will participate in long-range utility planning and development to ensure that local energy, resource conservation and development objectives are identified and considered in future utility development.
3. Participate in the Public Service Board's review of new and expanded generation and transmission facilities to ensure that local energy, resource conservation and development objectives are identified and considered in future utility development.
4. Work in cooperation with state and local agencies, emergency service providers, regional suppliers and municipalities to develop local emergency contingency plans that ensure access to critical energy supplies and measures to reduce nonessential energy consumption in the event of an abrupt energy shortage.

Energy Endnotes

1. 24 V.S.A. § 4347(2)
2. 24 V.S.A. § 4347(3)
3. 24 V.S.A. § 4347(4)
4. 24 V.S.A. § 4347(5)

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ECONOMIC DEVELOPMENT

A. State of the Economy in the Region

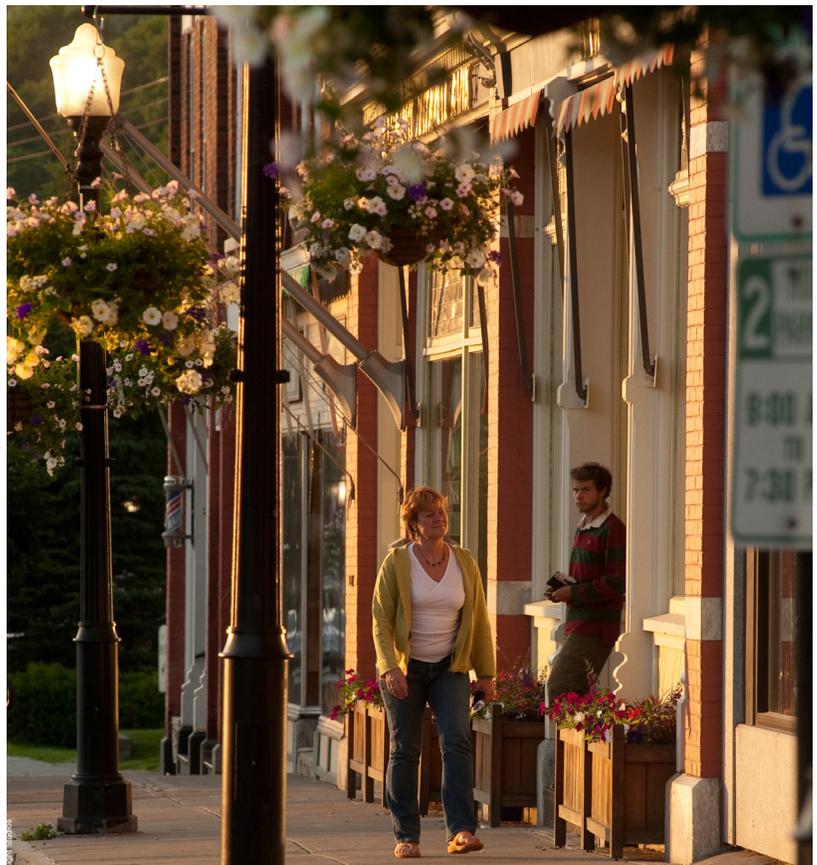
The TRO Region is largely rural and sparsely populated, as is typical of most of Vermont. Its landscape and scenery provide numerous recreational and professional opportunities, and the Region's economy is a reflection of historical patterns of development and recent economic trends, both local and statewide. Regional occupations are diversified, capturing the professional, technical, service, manufacturing, and agricultural sectors. As a consequence, 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 locate 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, and other natural resource-dependent occupations have declined in recent generations. Today's land uses show more of a trend toward subdivision of agricultural and forest land, resulting



Randolph | Source ©First Light Studios

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.

The fact that several towns, such as Barnard, Bridgewater, Granville, and Tunbridge, are able to list and individually describe most sizable commercial enterprises within their borders in two or three sentences illustrates 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. Corinth regards their very act of adopting a town plan as "a step toward protecting the town against adverse development and use." Chelsea's Plan is an exception, as it suggests actions that could be taken to focus traffic-generating industrial activity in specific locations.

Some towns have remained rural because they are remote. These are the towns which

are most distant from existing centers of development. While it's possible that outward growth pressures from economic centers could reach the farthest corners of the Region in the distant future, 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. Clearly, the economic future of these towns depends largely on forces outside of their direct control.

On the "developed" end of the spectrum, several towns define themselves as economic hubs, and are seeking suitable locations for growth by encouraging diversification (Woodstock and Bradford). 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" that provide housing opportunities for regional growth centers' workforces, such as the greater Hartford area and the Lebanon/Hanover area in New Hampshire. A listing of such "bedroom communities" within the Region would include towns like Sharon, Royalton, Pomfret, Strafford, and Bethel. The general proximity to major highways, such as 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.

A review of local plans has revealed several common themes or values related to economic growth. These are:

- A desirability for home and small-scale businesses;
- The relative importance of promoting agriculture and forestry to maintain rural character;
- The fact that property tax revenues and burden are key economic development factors; and
- The need to consider “quality of life” as having intrinsic economic value.

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 designed to diversify and strengthen regional economies by helping to guide growth throughout the forty town East Central Vermont Economic Development District that covers towns in both the TRO and Southern Windsor County Regional Planning Commission Regions. A CEDS is required by the U.S. Department of Commerce Economic Development Administration (EDA) for districts to be eligible for planning and construction funds. 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.

The 2011 CEDS process used an analysis of economic conditions completed for the area by economists Kavet, Rockler and Associates, which substantially informed the writing of the 2012 TRORC Regional Plan with respect to both data and policy formulation. The 2011 CEDS illustrated how the ECV Region was in economic distress, owing to a host of factors, including:

- Contracting population numbers in over half of the ECV towns.
- A real unemployment rate of 14.4% (as of 2011). This rate is reported by the Bureau of Labor Statistics every month, and includes all individuals who want full-time job, including those who are underemployed or discouraged individual that have given up the search for a full-time position.
- Lowered real wage rates, per worker, and lower employee wage income rates compared to the state as a whole.
- Overall negative net business creation.
- A pronounced disparity between income and housing costs and needs.
- Areas underserved by high-speed internet and cellular telecommunications.
- A lack of skilled labor opportunities to utilize conferred higher education degrees may account for a decrease in younger workers.

In 2009, the ECV CEDS Region applied to the EDA for a designation as an Economic Development District (EDD), which was officially granted in December, 2013. TRORC, in conjunction with EDD efforts throughout the Region, completed a rewrite of the 2011 CEDS in 2015.

B. Regional Challenges and Opportunity Areas for Economic Development

Telecommunications - The Region requires access to fast and efficient internet, data, and cellular technologies to promote business growth and attract prospective employees.

Housing - Providing ample workforce housing, both in the rental and home buyer markets, is key to meeting the needs of the Region's workers.

Sewer and water supply - While some areas in the Region have ample infrastructural capacity to handle any anticipated growth, only nine 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 Recession and Tropical Storm Irene. Improving 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 as much as it is owing to a lack of qualified workers.

Identification of needed businesses

- It is unclear, in many instances, what market gaps there are for new businesses, which need to be identified to boost local economies.

Existing buildings, Brownfields - A better understanding of sites that may be ripe for reuse or redevelopment as new business headquarters or for the expansion of existing businesses is needed in core town and village locations. Producing a thorough inventory of vacant lots and under-utilized parcels while also working toward reclamation of old properties, where possible, is 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 implementing 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 cost-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.

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.

C. Workforce Composition

A workforce is defined as all adults aged sixteen years and over who are either 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 do 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% 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 Two Rivers Region averaged 1.0% 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% growth over the same period. In real terms, this amounts to 2,520 workers added to the state workforce per year during the 2000s. Three hundred-eighty workers entered the Two Rivers Region during that time, which constitutes 15% of all added workers in Vermont.

Viewing data for the two decades from 1990 to 2010 with respect to individual towns, over half of the towns in the Region have experienced a 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 (such as I-89 and I-91), towns that are not in close proximity to such roadways, and towns that have municipal infrastructure or access to broadband internet. The towns with the lowest workforce participant growth rates are: Rochester (-0.1%), Bethel (0.1%), Bradford (0.1%), Braintree (0.2%), Royalton (0.2%), and Hancock (0.3%). The towns that have seen the highest growth in workforce numbers are: Strafford (1.8%), Fairlee (1.7%), Pittsfield (1.5%), Thetford (1.4%), Topsham (1.4%), Vershire (1.4%), and West Fairlee (1.4%).

Age of the Workforce

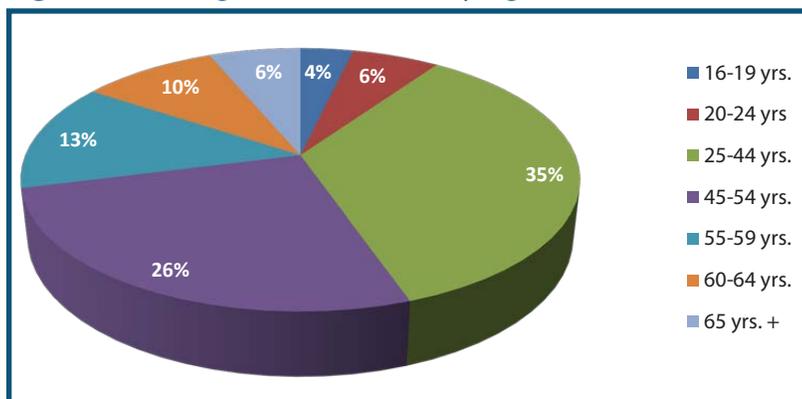
The TRO Region saw significant shifts in certain workforce age groups between

2000 and 2012, according to Census and American Community Survey (ACS) figures. The most dramatic declines were with workers under the age of 44. All told, there was a decrease of 4,086 workers, a 24% overall drop (see Figure 13-2). This follows state trends over the same time frame, albeit at a slightly higher rate (Vermont saw a 20.5% decline for the same age range). A steadily aging workforce is already upon the state, as the Baby Boomer

generation enters retirement. Having a young workforce capable of replacing the established workforce will ensure economic vitality for the Region in the long term.

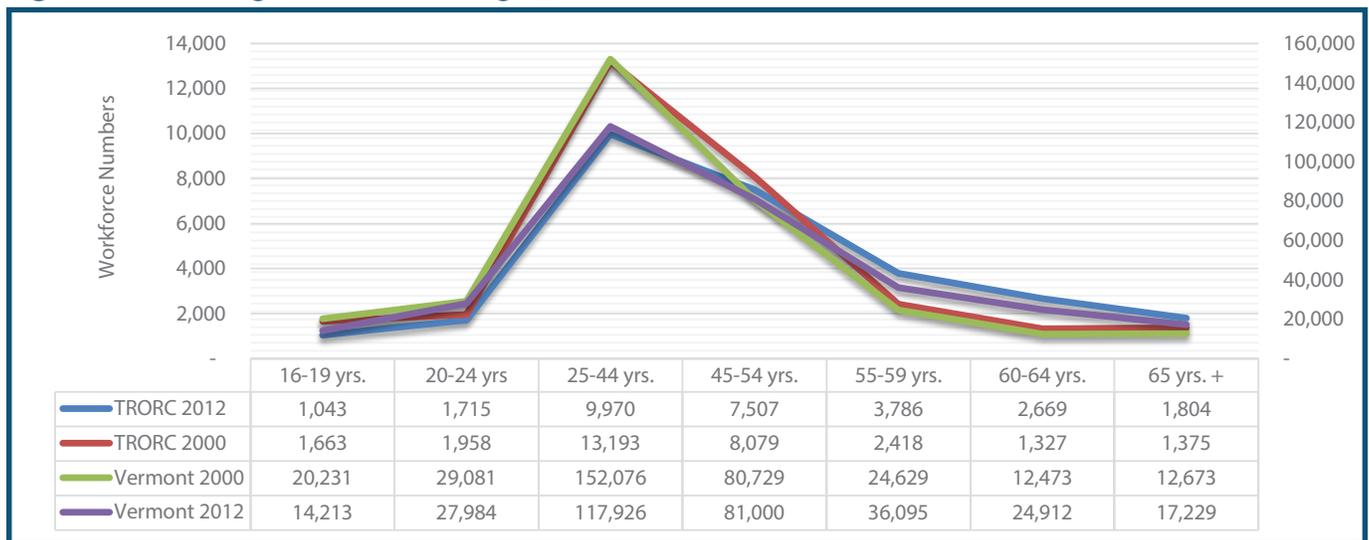
At present, the majority of workers in the Region are in the 25 to 44 year age bracket. However, this majority is slim, as approximately half (49%) of the current workforce is aged 45 or older (see Figure 13-1). In 2000, the same 45 and over age brackets only accounted for 39% of the workforce. While we lack the data to know how many respondents from the 45 to 54 year old age bracket in the 2012 ACS will reach retirement age within the next decade, trends suggest that a substantial share 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.

Figure 13-1: Regional Workforce by Age



Source: U.S. Census, 2008-2012 American Community Survey 5-Year Estimates

Figure 13-2: Changes in Workforce Ages, 2000 & 2012



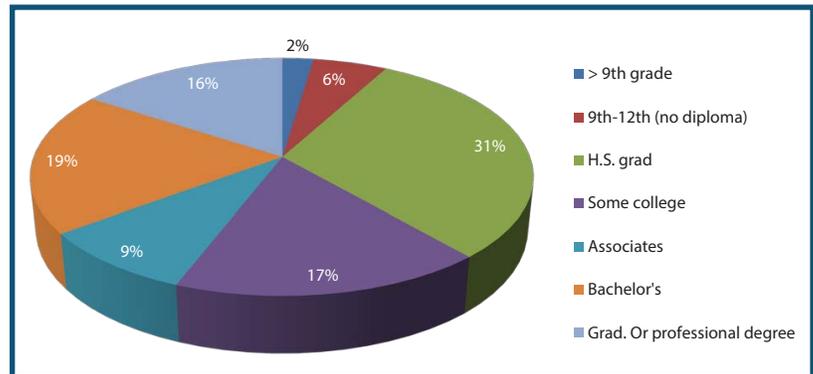
Sources: Population Group—Total, Census 2000; U.S. Census, 2008-2012 American Community Survey 5-Year Estimates

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 thirty towns. As of 2013, the majority of residents over the age of 18 had completed, was pursuing, or had pursued higher education qualifications beyond a high school diploma (nearly 61%). Of those 25 and over, 44.5% have completed an Associates, Bachelor's, graduate, or other professional degree. This is an increase of 7% 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. Compared with the rest of the country, the Region's level of educational attainment with respect to Associates, Bachelor's, graduate, and professional degrees is much higher. Only 33.6% of the nation's populace has 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 a 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

Figure 13-3: Educational Attainment Levels for Adults 25 Years and Older, 2013



Source: U.S. Census, 2009-2013 American Community Survey 5-Year Estimates

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, individuals with a background in science, technology, engineering and mathematics (STEM subjects).¹

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 out with the existing workforce pool. Finding employees from within the Region may prove difficult if recruits lack the professional experience of education necessary to fulfill job duties. Resources, such as the Pathways to Promising Careers, help individuals

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 Advance Machinists 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

identify high-paying, high-growth jobs throughout the state that match to academic experience.² With respect to recruitment from outside the Region, though, there are a number of factors contributing to difficulties in finding non-local 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.³

Retaining the Region's existing workforce pool is of the utmost importance, particularly for our younger residents fresh out of high school or recent college graduates. 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 training on-the-job 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. Training in these areas can be in the form of on-site, practical job training opportunities or course and accreditation programs outside of the workplace that supplement existing job skills.

In 2013, the State of Vermont passed Act 77, also known as the Flexible Pathways Initiative, which is a sweeping education reform measure that expands the array of learning opportunities to students. It puts an emphasis on there not being a “one size fits all” method to educating children, given the wide range of personalities, aptitudes, and knowledge possessed by youth. This initiative allows schools to provide the following educational enhancements and curriculum personalization for students:

- Expansion of the existing Statewide Dual Enrollment Program
- Expansion of the Early College Programs
- Increased access to work-based learning
- Increased virtual/blended learning opportunities
- Increased access to Career and Technical Education (CTE)
- Implementation of Personalized Learning Plans (PLPs)⁴

In essence, this Act, while not a mandate, grants schools greater latitude in personalizing students’ academic plans that cater to their learning strengths and abilities, provides exposure to the professional realm (and, specifically, local employment opportunities), and helps focus students on life in higher education beyond high school. These programs, among other things, will allow students to gain greater insight into some of the Region’s industries and employers in the hope that it will furnish students with some perspective on concrete job opportunities that they can pursue as graduates while still remaining a part of their community.

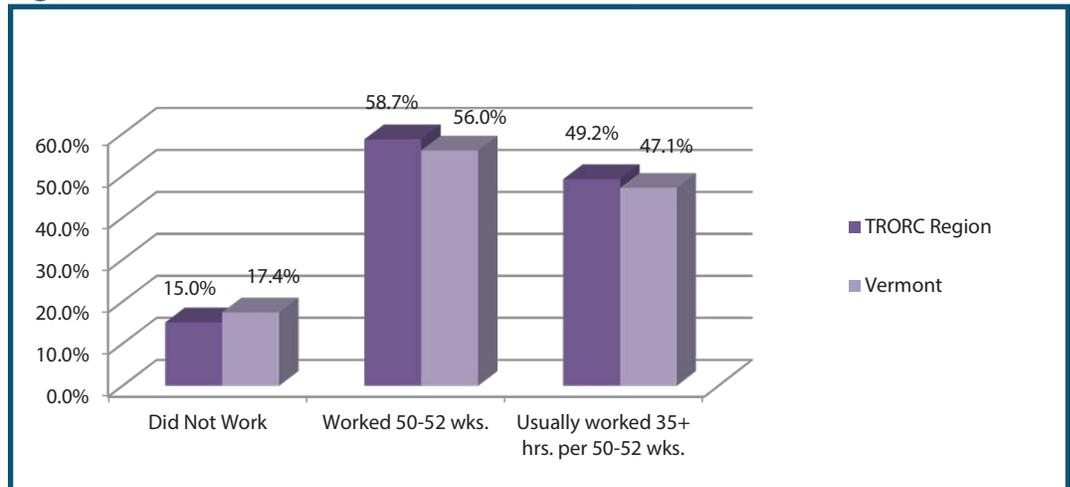
D. Employment Sector Characteristics

Employment Rates

According to U.S. Census Bureau data from 2010, of the population aged 16 to 64, 58.7% of the population worked a total of 50 to 52 weeks out of the year, while 15% were not participants in the workforce. Of those who were in this workforce age demographic, 49.2% work 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, TRORC 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

Figure 13-4: Work Status in the Past 12 Months, 2010



Source: U.S. Census Bureau, 2010 American Community Survey

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).

According to the Vermont Department of Labor, the three towns with the highest rates of unemployment in the Region as of 2014 are Pittsfield (8.3%) Granville (6.3%), and Hancock (6.3%). These towns are, coincidentally, the smallest towns in the Region, and are comparatively remote in that they are not immediately accessed by major interstates or rail links. None of these towns have public schools due to declining numbers of school aged children. All three towns have seen the loss of a major employer since 2000. Conversely, the towns with the lowest unemployment figures are Barnard, Pomfret, Thetford, and West Fairlee, all of which have a 2.5% unemployment rate. While these

four towns saw overall population declines between 2000 and 2010, two of the towns (Barnard and Thetford) have seen increases in their 16 to 64 year old population. Most of these towns are bedroom communities where people commute to nearby employment centers.

Income Levels

Income distribution levels in TRORC's member towns vary widely. Figure 13-5 illustrates the distribution of wealth within the population of each town for residents that filed nonexempt income tax returns, in descending order from the highest populated town to the least. The tax returns filed within each town are grouped into eight tax brackets, and the percentage of the returns which fall into each of the tax brackets is displayed. The chart shows a fairly equal distribution amongst the tax brackets, barring a tendency for a larger proportion of the population to fall into either the lowest two brackets or the highest bracket. The proportional

and growth centers. Three of the towns with the highest median AGIs, on the other hand, are immediately adjacent to each other, in fairly close proximity to highways, and are close to one of the Region’s main growth centers: the greater Hartford/Hanover/Lebanon area straddling the Connecticut River. These three towns are Norwich, Strafford, and Thetford, and are often sought after as bedroom communities for the retail, medical, and academic industries that dominate the business sector in nearby communities.

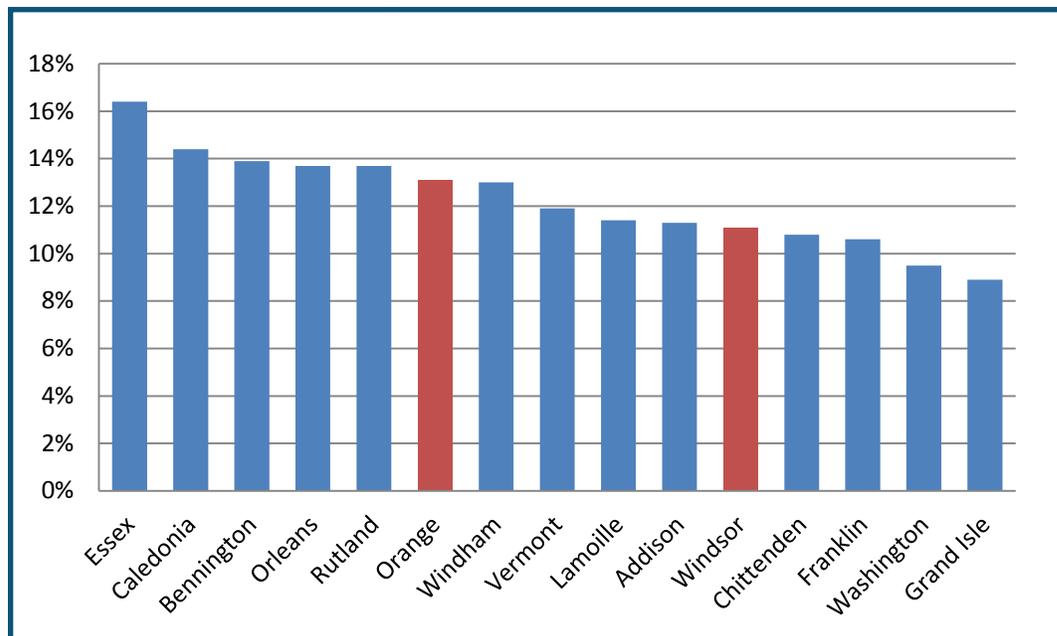
Poverty

According to 2012 ACS data, Vermont has a poverty rate that stands at 11.8%, ranking it 40th in the nation for lowest overall poverty rate. This was an increase of 0.3% from the previous year. 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 this 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”).

A more regionally specific measure of the public welfare is the Vermont Livable Wage, which is based on a more comprehensive list of basic needs, and is calculated by the Vermont Legislative Joint Fiscal Office. Vermont’s Livable Wage for 2012 set a single person’s threshold

Figure 13-6: Poverty Rates by County, 2012



Source: American Community Survey, 2012

income at \$25,964 (at a rate of \$12.48 per hour), below which a person would have to diminish spending on basic needs.⁵ This figure reflects full-time employment (with health insurance benefits) and contribution to one-half of a two-person household's expenditures, without the need to support children. This is far higher than the federal poverty line, set in 2012 at \$11,172.⁶ The implication here is that the percentage of the Region's population struggling to meet basic needs encompasses a much larger percentage than just those who fall beneath the federal poverty line. In analyzing factors beyond income level, the Rockefeller Center at Dartmouth College found that poverty across the state is largely white, rural, and prevalent amongst people who hail from well-educated households (individuals raised by parents with college degrees and higher).⁷

Compared with other counties in the state, the Two Rivers Region is not beset by the highest rates of poverty in the state with respect to persons of all ages (see Figure 13-6). However, that statement is not meant to minimize the level of poverty in our Region, particularly in Orange County where poverty rates in 2012 stood at 13.1%. 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.*⁸ 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 emigrating to more affordable areas.

With respect to the Region's working poor, 0.7% of men and 2.2% of women in the 2012 workforce were employed in the preceding 12 months but earned an income below the federal poverty level (when viewed as a percentage of all working individuals in the workforce). These numbers are slightly less stark than those for the state, for which 0.8% of its workforce consisted of men earning below the federal poverty level and 3% of women earning below the same threshold. The towns with the highest percentages of working poor in 2012 were: Topsham (10%), West Fairlee (10%), Bradford (9%), and Corinth (9%). The towns with the lowest levels of working poor were Bethel, Fairlee, Pittsfield, Sharon, and Woodstock, each with only 1% of their active workforce being classified as impoverished in 2012.

Employment by Occupation and Industrial Sector

Occupational opportunities have changed significantly in recent decades, and common occupations now include a range of office 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 13-7, nearly 45% of the Region’s jobs fall within the managerial, business, science, or art occupation sector, whereas jobs in the natural resources, construction, and maintenance occupation sector now only account for a little over 12% of all jobs in the Region. The managerial, business, science, or art occupation sector grew by 20.9% between 2000 and 2012, while all other sectors have witnessed significantly lower growth or outright declines. Indeed, production, transportation, and materials moving occupational sector jobs declined by 24.5% between 2000 and 2012.

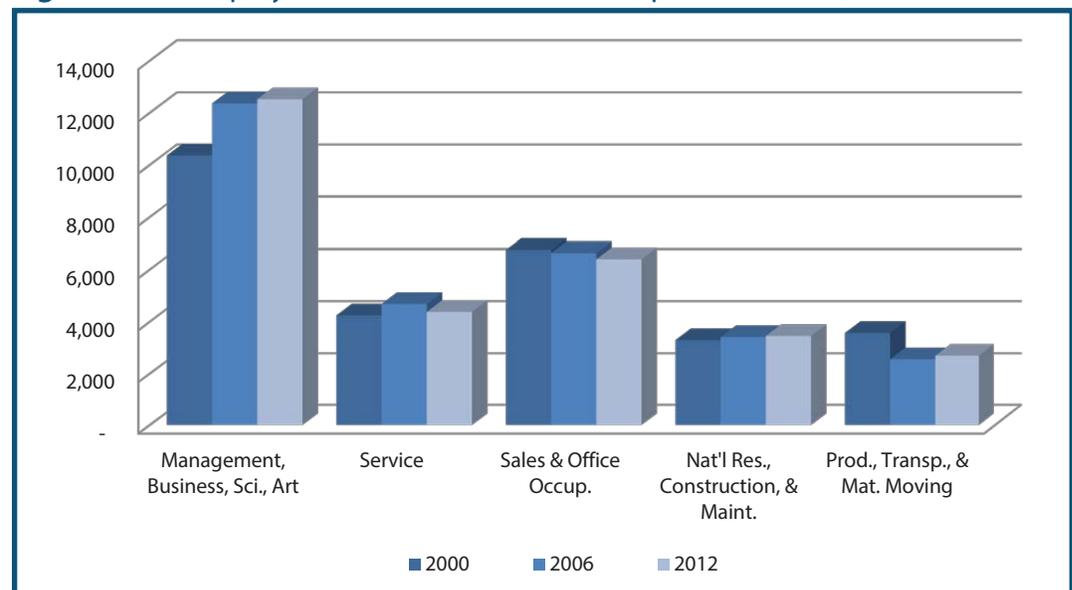
Breaking out the occupation sector further by industry sector, we see that the industry

with the highest percentage of jobs in the Region in 2012 was the educational and health services industry sector, which constituted over a quarter (28%) of all of the Region’s jobs. This statistic is largely attributable to the fact that there are numerous jobs opportunities in both of those areas, owing 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% of all of 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% of jobs in those

Figure 13-7: Employment Numbers across Occupation Sectors, 2000-2012



Sources: Selected Econ. Char., 2000 Census; Selected Econ. Data, 2006-2010 & 2008-2012 American Community Survey

industries. From 2000 to 2012, though, there was a 1.7% 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 thirty 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% in the number of farms since 2007, whereas Windsor County has seen much more modest growth at a rate of 0.13%. There is a greater disparity in the revenue seen in either county, as can be seen in Table 13-1, with Orange County farms earning over double the average earnings of farms in Windsor County.

Dairy remains a multi-million dollar industry in both Orange and Windsor Counties, accounting for 62.8% of farm revenue for Orange County and 40.6% for Windsor County. Additionally, the USDA captured how much revenue is derived from organic commodities for 2012, with 13.6% of Orange County's revenue and 6.5% of Windsor's. The majority of farms in both counties earned an amount in excess of \$50,000 in 2012 (90.7% in Orange County and 79.8% in Windsor County).

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). While the median farm size for both counties combined is 75 acres, only 27.5% of the farmland in both counties was used for crop growing. A further 20.3% 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 H), there are a number of other smaller forest-related businesses in our Region:

- Britton Lumber (Fairlee – currently closed due to a fire in March, 2015);
- Shackleton Thomas (Bridgewater);
- Lumberjack Lumber (White River Junction);
- Redstart Forestry (Corinth);
- Baker Lumber Co. (White River Junction);
- David Hurwitz Originals (Randolph); and
- 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,

Table 13-1: 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		
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		
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		
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

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% of the 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

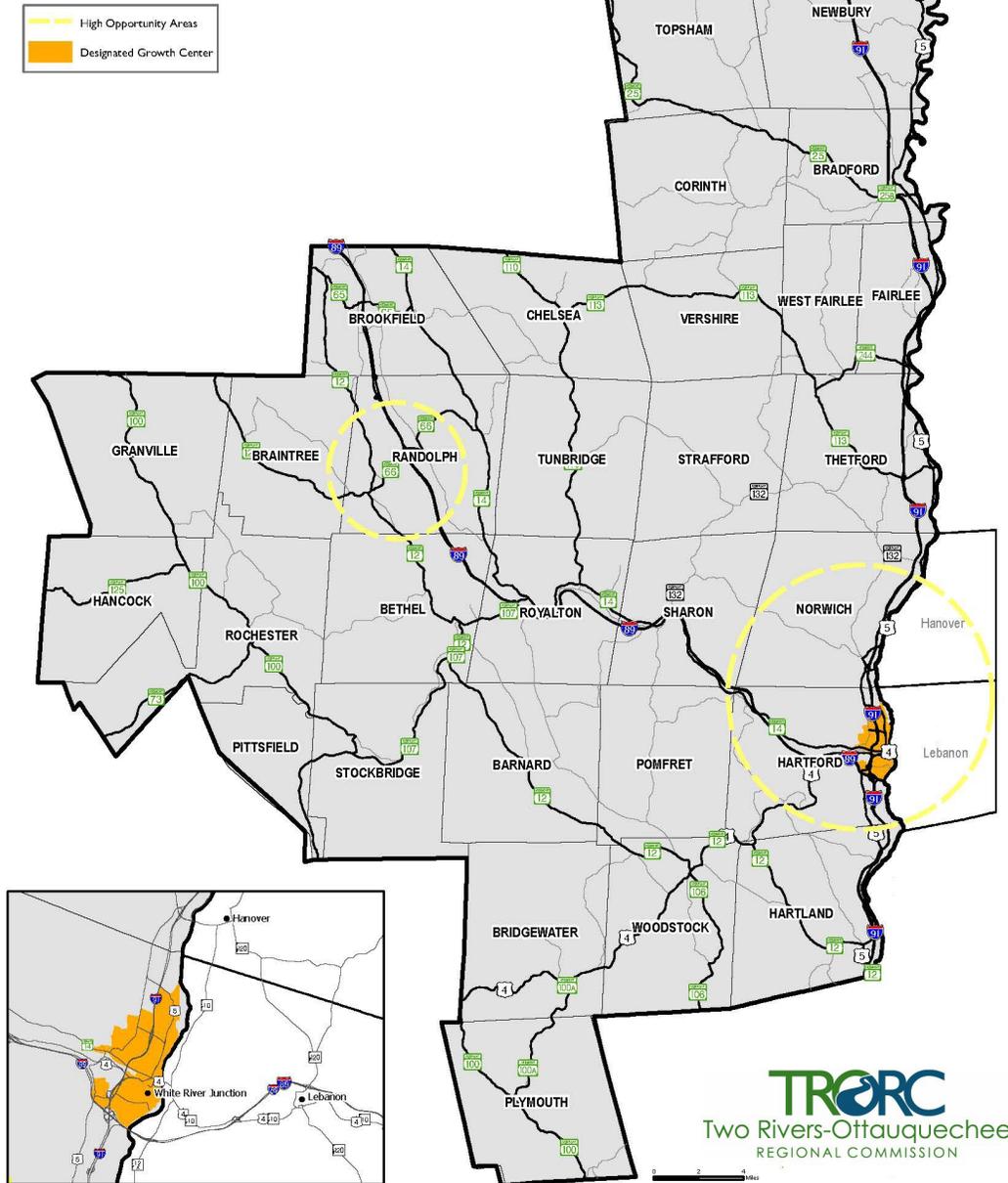
diversifying their economies to attract visitors on a season-to-season basis instead of attracting a niche tourist base at only certain times of the year. Further, ensuring that the tourism industry is equipped to face future impacts from climate change head-on is critical to ensuring business continuity 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 Randolph and the area encompassing the following four towns: the towns of Hartford and Norwich within the Two Rivers Region and the towns of Lebanon and Hanover across the Connecticut River in New Hampshire (see Figure 13-8). 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 thirty towns and those in the adjacent towns of neighboring New Hampshire.

Figure 13-8: State Designated Growth Centers and High Opportunity Areas

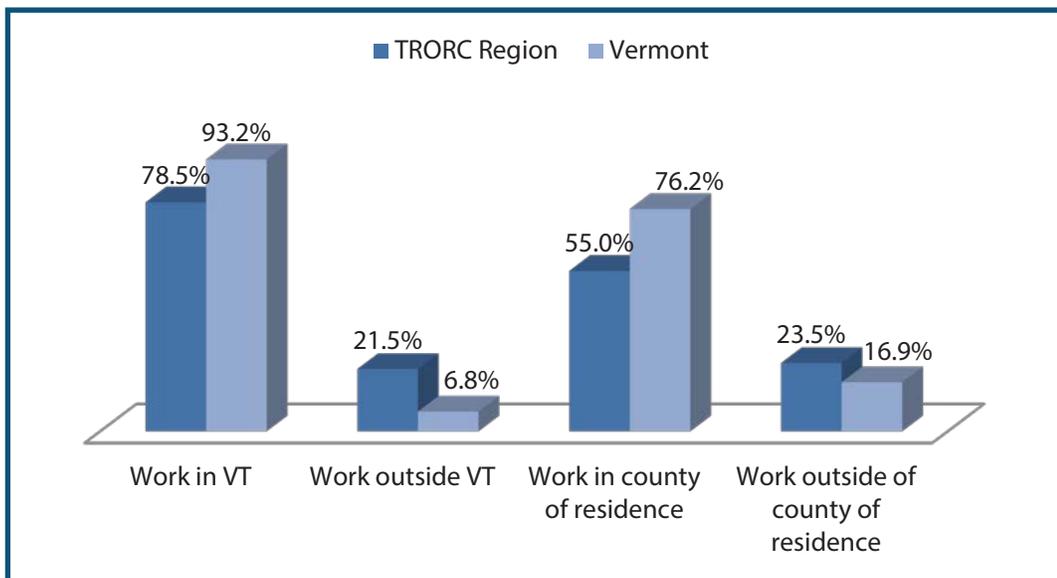
Regional Growth Centers and High Opportunity Areas



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 good, 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, and include the Randolph area and the greater Hartford/Norwich/Hanover/Lebanon Region along the Connecticut River. Indeed, with respect to jobs, 23.5% of the Region's workforce is employed outside of their respective county of residence. Of those, 21.5% work outside of Vermont altogether (see Figure 13-9). These rates far exceed those seen at the statewide level, largely due to the ease of access to these outside work markets.

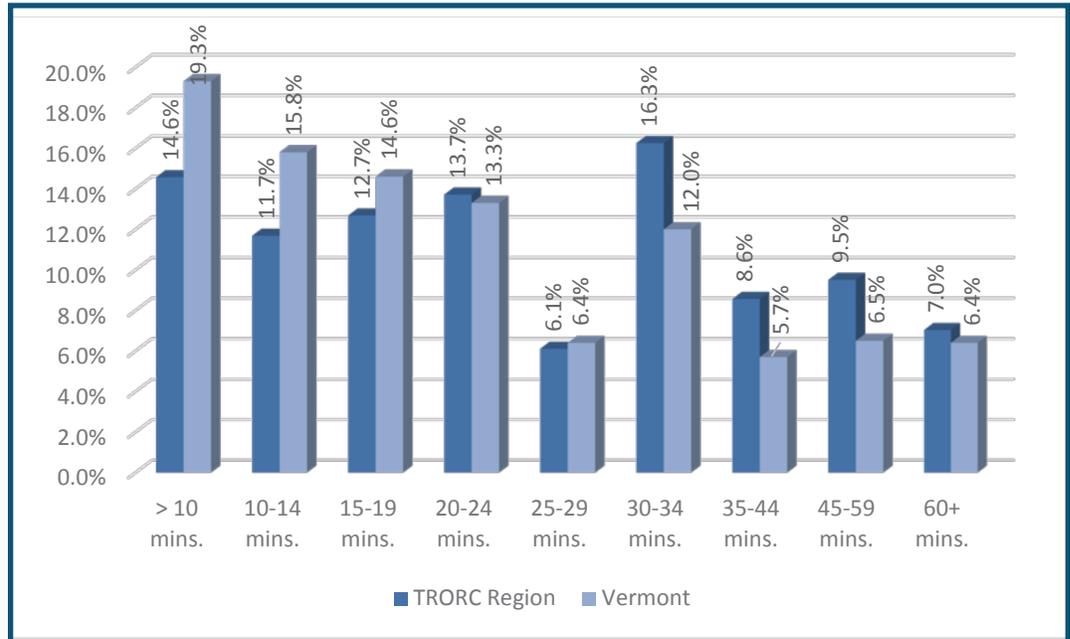
Most towns in the Region are within close distance of major interstate highways that make access to high opportunity areas much easier, allowing many to live further afield from work. This has augmented the trend of extending growth and development away from historical settlement areas throughout the 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 26.05 minutes, which is roughly equivalent to a 15-20 mile commute in most areas (see Figure 13-10). In fact, 47.5% of all commuters travel over 25 minutes to their

Figure 13-9: Place of Work



Source: *Commuting, 2008-2012 American Community Survey*

Figure 13-10: Travel Time to Work, 2012



Source: Commuting, 2008-2012 American Community Survey

workplace. This constant travel creates additional strain on built infrastructure (roadways and bridges), adds to traffic congestion in areas, and increases pollution to the air, soil, and waterways.

Being able to move to areas outside of traditional village and town centers has opened up more affordable residential opportunities for many in the Region over the past fifty years; however, significant income disparities remain in the Region. Median family incomes increased by 47% in real dollars between 1999 and 2012 for the Region, while median family income levels remain below the state level, according to 2000 Census data and 2012 ACS data. Conversely, the median nonfamily income is higher in the TRO Region than the state, but has only risen 40% in the same time period.

It is important to note that income figures from the Census and ACS do not take the actual level of inflation over time into account. Consequently, the actual purchasing power of peoples' incomes is lower despite the rise in income in real dollars. Calculating these rates, spread over the 13 year period, shows us that these income levels have hovered just above an annual 3.6% and 3% increase (for families and nonfamily households, respectively), while costs of transportation, housing, heating fuel, and other necessities have exceeded those rates in certain years. Families in more of the Region's towns earned less than the regional median family income level in 2012 than they did in 1999, with Braintree and Vershire earning the least per family in 2012 (earning over \$23,000 less than the regional average). Bradford and Bethel,

meanwhile, had median nonfamily income levels that were \$10,000 less than the regional average in 2012. These levels of disparity compound the financial troubles of many who are already cost-burdened throughout the Region.

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 healthcare. A review of employers that have staff numbers over 100 people 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, hire the most people of any two regional employers, according to Vermont Department of Labor data (see Table 13-2). The list of regional employers hiring over 100 individuals also serves to demonstrate that recreation and tourism are key contributors to the regional economy, with Lake Morey Resort, 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 business as well as municipal and social capital support.

As was highlighted in the 2011 CEDS, the towns of Pittsfield, Hancock, Granville, Randolph, and Bethel saw major employers leave key employment sites since 2000.

These closures include: Stanley Tools in Pittsfield, the Chesapeake Hardwood Products factory in Hancock, the Granville Manufacturing Company in Granville (locally known as the “bowl mill”), the Ethan Allan goods plant in Randolph, and Clifford of Vermont in Bethel. These business closures have contributed to an increase in unemployment figures in these towns, higher than that of the state. Such business closures can also have significant repercussions on neighboring towns as well, particularly when the towns in question are more remote.

E. The Future of Economic Development

A Vision for the Future

Vermont is oft touted as being a great place to both live and work. It boasts the second lowest levels of unemployment in the United States (as of 2014) and plenty of job opportunities in a range of sectors and different skill levels.⁹ The TRO Region is certainly no exception to this rule, and, as such, is well poised to attract newcomers to the Region who seek both 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

Table 13-2: Regional Employers with 100 or More Employees, 2014

	Town	Industry	Business Name	Number of Employees
Orange Co.	Fairlee	Travel Accom.	Lake Morey Resort	100-249
	Randolph	Junior Colleges	Vermont Tech. College	250-499
	Randolph	Gen. Med. & Surgical Hospitals	Gifford Medical Center	500-999
	Randolph	Other Individual & Family Services	Clara Martin Center	100-249
	Randolph	Religious Orgs.	Bethany United Church of Christ	250-499
	Randolph	Engineering Services	DuBois & King Inc.	100-249
	E. Thetford	Furniture Stores	Pompanoosuc Mills	100-249
	Bradford	Supermarkets	Hannaford Supermarket	100-249
	Randolph	Supermarkets	Shaw's Supermarket	100-249
Windsor Co.	Woodstock	Hotels	Woodstock Inn & Resort	250-499
	Quechee	Golf Courses & Country Clubs	Quechee Club	100-249
	White River Junction	Elem. & Second. Schools	Hartford High School	100-249
	S. Royalton	Junior Colleges	Vermont Law School	100-249
	White River Junction	Gen. Med. & Surgical Hospitals	VA Medical Center	500-999
	Bethel	All Other Plastics Prod. Manuf.	GW Plastics	250-499
	Quechee	Glass Prod. Manuf. Made of Purchased Glass	Simon Pearce US, Inc.	100-249
	Quechee	Business Assocs.	Quechee Lakes Landowners Asn.	100-249
	White River Junction	Specialized Freight	RSD Transportation, Inc.	250-499
	White River Junction	Postal Service	US Post Office	250-499
	Norwich	Other Grocery & Related Prods. Merchant Wholesalers	King Arthur Flour	100-249

Source: Vermont Department of Labor ELMI Employer Database, 2014: <http://www.vtlmi.info/employer.cfm>

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. As a Region, it is imperative that we 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 U.S. Department of Labor produces projections on occupations that are anticipated to see job growth across the country. Per their findings in 2012 (shown in Table 13-3), the following employment areas are projected to grow the most in Vermont by 2020, 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 for workers to affordably live in the Region. Further, as compared with other jobs listed in Table 13-3, it is evident that these are the professions that, compared to others in the listing, require less in the way of educational qualifications.

While focusing on securing jobs in growing 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.

Table 13-3: Occupations with the Highest Anticipated Growth

Occupation Name	Base Year	Base Job Openings	Projection Year	Projected Job Numbers	Change	Percent Change	Avg. Annual Openings	Median Annual Wage, 2012	Typical Education Needed for Entry
Personal Care Aides	2010	7,970	2020	11,600	3,620	45.4	430	\$19,910	Less than HS
Market Research Analysts and Marketing Specialists	2010	1,170	2020	1,550	390	33.1	70	\$60,300	Bachelor's degree
Home Health Aides	2010	930	2020	1,300	370	40.1	50	\$20,820	Less than HS
Veterinary Technologists and Technicians	2010	420	2020	580	160	37.1	20	\$30,290	Associates degree
Helpers--Carpenters	2010	250	2020	380	130	53.9	20	\$39,940	HS Diploma or Equiv.
Interpreters and Translators	2010	220	2020	280	70	31.5	10	\$45,430	Bachelor's degree
Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters	2010	100	2020	140	40	44.9	10	\$28,220	Less than HS
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	2010	90	2020	120	30	35.3	10	\$49,140	HS Diploma or Equiv.
Biochemists and Biophysicists	2010	50	2020	70	20	35.4	2	\$81,480	Doctoral or professional degree
Biomedical Engineers	2010	20	2020	30	10	50	1	\$86,960	Bachelor's degree

Source: Occupational Employment Statistics program, Bureau of Labor Statistics, U.S. Dept. of Labor, 2012.—does not include all occupations for lack of data or for confidentiality reasons.

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 draw prospective residents to the Region. Multi-modal 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 20th 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, shows 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.¹⁰ 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 to 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. The state and local regulatory systems should foster a predictable, complementary process that promotes desired development and ensures environmental protection.
2. Economic growth that supports and enhances our working landscapes and craftspeople is essential.
3. Public 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.
4. The Region’s capacity to support retention and expansion of existing businesses and the start-up and growth of entrepreneurial ventures must be expanded.
5. The establishment of diversified attractions that expand tourism and recreation opportunities while respecting the Vermont brand are encouraged.
6. Significant increases in the quality and affordability of safe housing for residents—including those with special needs— is necessary, especially within walking distance of transit lines or job/service centers.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations: **Economic Development**

Policies (continued)

7. High-speed internet, with fiber-based systems, is supported throughout the Region.
8. Cellular phone networks are supported in all areas of the TRO Region.
9. Transit systems should connect all village and town centers and serve major employment centers and business.
10. Child care facilities in our communities or in employment centers are supported by this Plan.

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, brownfield assistance, etc.) to businesses wishing to stay in or relocate to core areas.
5. TRORC will work with the 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.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations: **Economic Development**

Recommendations (continued)

11. 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, 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.
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 under-utilized sites/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 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.
16. TRORC will support efforts to recognize businesses for excellence in creating better downtowns and villages, exemplary buildings, energy efficiency, and other activities that further regional goals.
17. 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.
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 assist towns in crafting regulations to reduce fragmentation and leave land available for farming, forestry, and other land-based businesses.

Economic Development Endnotes

1. Vermont Department of Education, <http://education.vermont.gov/flexible-pathways>. 2014.
2. Vermont Legislative Joint Fiscal Office. “Basic Needs Budget and the Livable Wage.” <http://www.leg.state.vt.us/reports/2013ExternalReports/285984.pdf>. 2013.
3. *Id.*
4. Rockefeller Center at Dartmouth College. “Poverty in Vermont: What We Know and What We Don’t Know.” <http://www.leg.state.vt.us/WorkGroups/ChildPoverty/PovertyinVermont.pdf>. 2010.
5. Vermont Housing Finance Agency. “Between a Rock and a Hard Place, Housing and Wages in Vermont.” <http://www.vhcb.org/pdfs/housing-wages-2011.pdf>. 2011.
6. “Gov. Shumlin Announces ‘Great Jobs in Vermont’ Campaign.” <http://governor.vermont.gov/newsroom-great-jobs-press-release>. 2014.
7. Vermont Transportation Board. “Getting Millennials from A to B.” http://tboard.vermont.gov/sites/aot_transportation_board/files/2014%20Annual%20Report.pdf. 2014.

FLOOD RESILIENCE

What does “resilience” mean and more importantly, what is meant by “flood resilience”? Very broadly, “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. As such, “resilience” is not necessarily an action that is taken, but an overall enhanced state of being in relation to an ongoing or future specific situation or event.

When applying the term to hazards, it is important to further articulate the meaning of “resilience.” In this context, “resilience” is often discussed in terms of being resistant to the effect(s) of one or multiple hazards that could reasonably be expected to occur in a specific area. For our purposes, flood resilience will mean the ability of the region to effectively understand, plan for, resist, manage and, in a timely manner, recover from flooding.

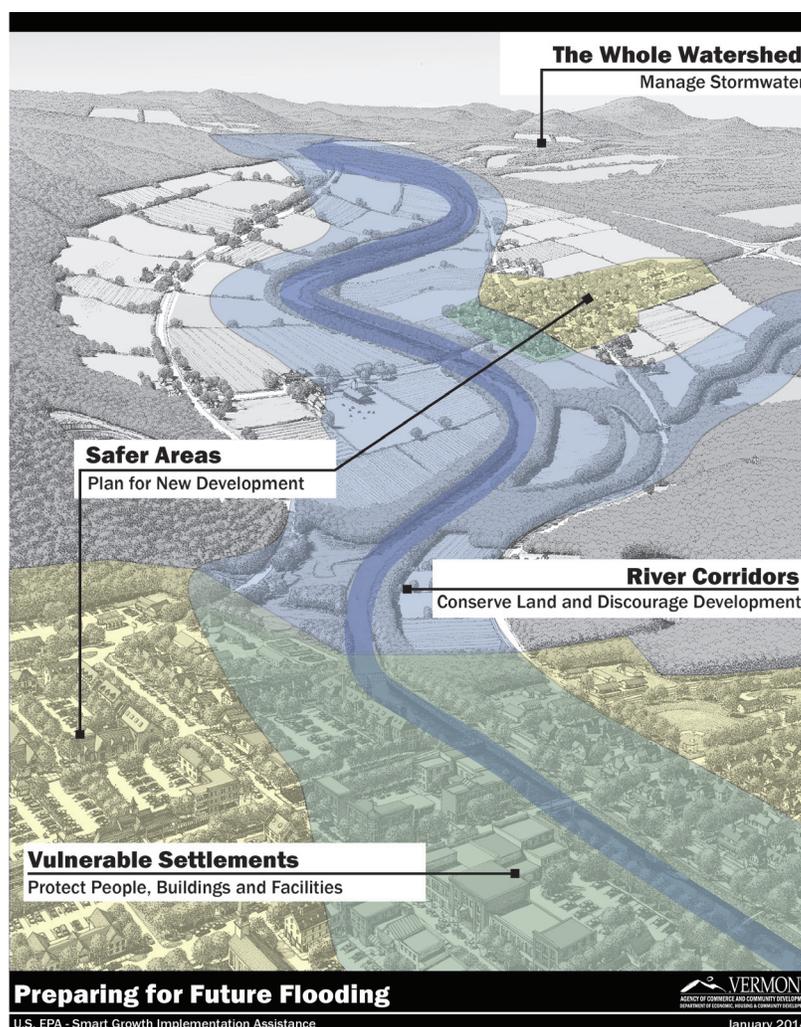
A. Background

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 occurs when rainfall over an extended period of time and over an extended area of the river’s basin leads to flooding along major rivers, inundating previously dry areas. This type of flooding occurs slowly, but flood waters can cover

a large area. Inundation flooding is slow and allows for emergency management planning if necessary. However, unlike during a flash flood, it may take days or weeks for inundation flood waters to subside from low areas, which may severely damage property.

Flash flooding occurs when heavy precipitation falls on the land over a short period of time. Precipitation falls so quickly that the soil is unable to absorb it and infiltrate it into the ground, leading to



Source: EPA

surface runoff. The quick-moving runoff collects in the lowest channel in an area—upland streams, in small tributaries, and in ditches—and the water level rises quickly and moves further downstream. 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 large boulders, trees, cars, or even houses.

“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.

The collecting of water in channels in steep areas also causes fluvial channel erosion, which can severely damage roads and public and private property. Fast moving water in the stream channel may undermine roads and structures and change the river channel itself, predisposing other roads and structures to future flooding damage. Flash floods can also mobilize large amounts of debris, plugging culverts and leading to even greater damage. In Vermont, most flood-related damage is caused by flash flooding and fluvial erosion (erosion of stream banks). Due to the topography of Vermont and of the TRORC region, most, if not all, of the towns in our region are vulnerable to flash flooding and fluvial erosion.

Causes of Flooding

Flooding in our region is caused by a small number of distinctive types of weather, and also by the cumulative impact of a weather event and the conditions on the land at the time the flooding occurs. By far the most common type of weather event to occur in our region is a severe storm. Severe storms may include thunder, lightning, hail, high winds, and precipitation with varying degrees of intensity. Severe storms with particularly heavy precipitation have the ability to create flash flood conditions. However, over an extended period of time, severe storms may cause inundation flooding due to the cumulative effects of continuous rain, saturated soils and a high water table/high aquifer levels. As with any weather system, pockets of a severe storm may be more severe than others, leading to variability of observed impacts across the region. During the spring and early summer of 2013, constant severe storms over the TRORC region caused localized flash flooding after each individual storm, but also caused inundation flooding along some of the major rivers in the region over time, including the White River.

The main hazards associated with hurricanes and tropical storms are high winds and flooding. By the time most hurricanes reach Vermont, they have been downgraded to tropical storms, but that is not to say they are less dangerous. Due to the steep slopes and narrow valleys in our region, heavy precipitation from a hurricane or tropical storm tends to cause severe flash flooding and widespread destruction. The speed that the hurricane

or tropical storm is moving across the area and pockets of varying severity have an impact on the rainfall totals observed from town to town. For example, Tropical Storm Irene dropped 6”+ over much of the White River Valley (9” in Rochester, according to local reports), causing extensive flooding damage. However, the towns in our region along the Connecticut River received 3-5” 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 fell on dry ground and was hardly remembered.

Both severe storms and hurricanes/tropical storms occur during the summer and into the fall months, but ice jams and 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 may occur during a thaw period in the winter months. Sheets of ice become hung up on a narrow portion of the stream or river, such as under a bridge, culvert or another obstruction, creating a “dam” and additional ice and water begin to back up behind the hung-up ice sheets. This creates inundation flooding immediately adjacent to the site of the “dam,” and additional inundation flooding upstream. Once the “dam” breaks free, flash flooding may occur downstream as well. Ice jams in our region typically cause minimal damage, but they can damage road infrastructure, and flood homes and businesses. The First and Third Branches of the White River (Chelsea and Randolph,

respectively), the Waits River (Bradford), and Rowell Brook (Bradford) have all experienced ice jams or are vulnerable to them. Finally, the combination of melting snow and rain, can lead to flooding in the region.

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

Implications of Climate Change and Flooding

According to a white paper produced by Vermont Agency of Natural Resources (VT ANR)’s Climate Change Team¹, 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 during the fall.² The frequency of heavy precipitation events is likely to increase in all seasons, with the heaviest precipitation events occurring during the summer months.³ 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.⁴ These increases in heavy precipitation events will be in addition to already occurring impacts of climate change that have made extreme events more frequent. This provides additional opportunities for flash flooding and inundation flooding to occur, and places the state and region at greater risk for flood-related damage. In addition, the expected increase in precipitation during

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

~VT Agency of Natural Resources

the winter months may lead to added snowmelt and flooding in the spring.

The impacts of climate change on a specific area or region (and globally) are informed by temperature and precipitation models that are used to predict future conditions. Precipitation models are important because they are used in designing and building road infrastructure, informing policy decisions, and in regulating the location where structures and facilities are built. Our understanding of the impact of global and regional climate change is constantly evolving, and precipitation models are becoming more detailed and refined as well. It is imperative to use new precipitation models when planning, designing, and constructing new infrastructure, structures and facilities to reflect the increase in frequency of heavy precipitation events. Road infrastructure, including culverts and bridges, designed and built using old precipitation models will likely be undersized in the future, or may even be undersized as-built. New structures and facilities designed and built using old precipitation models will be less likely to withstand and adapt to future precipitation events and trends (and the flooding that is likely to result).

The Regional Economic Impact of Flooding

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. For the most part, flooding may economically impact a handful of homeowners and business owners with washed out private culverts or roads, flooded basements, lost (or gained) riparian property, or it may impact municipalities with road and culvert repairs. While these initial flood-related impacts have economic ramifications, major flooding events, like Tropical Storm Irene, have the ability to have lasting economic impacts on the entire region's economy.

Economically speaking, Tropical Storm Irene struck at a very inopportune time in 2011. At the end of August 2011, the year's crops were ready for harvest or would be ready in a few weeks. Because many of the region's farms and agricultural lands are located in the floodplain, crop damage was widespread. Of 476 documented agricultural producers impacted by Irene in the state, 76 producers (and 1,659 acres of land) were located in Windsor County, and 23 (and 943 acres of land) were located in Orange County.⁵ Due to the fact that Irene was a statewide flood event and the potential for water contamination was great, flooded produce was considered "adulterated" by the U.S. Department of Agriculture and the Vermont Agency of Agriculture and, therefore, the sale of these crops was prohibited.⁶ As a result, approximately \$2 million in vegetable crops alone were destroyed or left to decompose statewide.⁷ Unofficially, the economic estimate for flood damage to farms statewide has been estimated at \$20 million (includes hay, corn, pasture,

soybeans vegetables and fruit).⁸ Finally, the loss of livestock was widespread and devastating.

Vermont is a destination for travelers coming from the Boston, New York and Montreal areas. Due to the damaged road infrastructure throughout the state, particularly in the TRORC region, 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 Routes 4, 100, 107 and 125. 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 -68.4% in September 2011 and -20.4 in October.⁹ In addition, a number of small businesses were impacted by flooding with varying degrees of damage. These businesses are the life-blood of the economy of Vermont, and unquestionably of the TRORC region. In an attempt to help businesses in our region that were impacted by flooding, or are at risk of future flood damage, TRORC completed 41 Continuity of Operations Plans (COOP) following Tropical Storm Irene.

Flooding in Our Region

Flooding is the worst current natural threat to residents and infrastructure in the TRORC region. Past instances of flooding in the region have included rain and/or snowmelt events that caused flooding in the major rivers' floodplains and intense rainstorms over a small area that caused localized flash flooding. Both events can be

worsened by the build-up of ice or debris, which can contribute to the failure of important infrastructure (such as culverts, bridges, and dams).

Significant flooding events have occurred in the TRORC region throughout recorded weather-history. Due to the topography of the region, it is likely that large scale or widespread localized flooding have been occurring for hundreds or thousands of years. Please see Appendix I for a table outlining the flooding events that have occurred in the TRORC region over the past 100 years, beginning with the worst flooding event to hit the TRORC and the Vermont, the "Great Flood of 1927." Appendix I is not intended to capture the details of every flood event in the region.



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

It is intended to provide a snapshot of the more significant flooding events, and is an attempt at beginning to build a consolidated record of these events in our region. In addition, it is an attempt to demonstrate the severe damage that can be caused by flooding in our region. These data are also presented to help towns in future flood resilience-planning endeavors. Finally, it is important to note that weather events, particularly from long ago, lack the details we have available to us today.

The initial flood-related impacts have economic ramifications, however, major flooding events, like Tropical Storm Irene, have the ability to have lasting economic impacts on the entire region.

Because flooding and flood damage are spatial in nature, we can begin to identify areas in the TRORC region that are most vulnerable to flooding through spatial analysis. By compiling flood data from multiple events over time, we can begin to see the areas that are consistently flooded with little damage to property and life, and which areas have repeatedly sustained significant flood damage. The flood hazard and fluvial erosion hazard areas that continually pose risks to life, private property and public infrastructure should be considered “high-hazard” or “hot spot” areas.

B. Flood Hazard and Fluvial Erosion Hazard Areas in the TRORC Region

Flood Hazard Areas

There are two sets of official maps which can govern development in the floodplain in Vermont. They are the Federal Emergency Management Agency’s (FEMA) Flood Insurance Rate Maps (FIRMs) and VT Agency of Natural Resource’s river corridor area maps. The FIRMs show the floodplain that FEMA has calculated which would be covered by water in a 1% chance annual inundation event, also referred to as the “100 year flood” or base flood. This area of inundation is called the Special Flood Hazard Area (SFHA). FIRMs may also show expected base flood elevations (BFEs) and floodways (smaller areas that carry more current). Every town in our region has areas of mapped flood risk by FEMA. FIRMs are only prepared for larger streams and rivers.

Recent studies have shown that the a significant portion of flood damages in Vermont occur outside of the FEMA mapped areas along 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 only concerned with inundation, and these other areas are at risk from flash flooding and erosion, these areas are often not recognized as being flood-prone. Property owners in such areas outside of SFHAs are not required to have flood insurance. Flash flooding in these reaches can be extremely erosive, causing damage to road infrastructure and

to topographic features including stream beds and the sides of hills and mountains, and also creating landslide risk. The presence of undersized or blocked culverts can lead to further erosion and stream bank/mountain-side undercutting. Change in these areas may be gradual or sudden. Furthermore, precipitation trend analyses suggest that intense, local storms are occurring more frequently.

Vermont ANR's river corridor maps will show the area needed to address these erosion hazard areas, which may be inside of FEMA-mapped areas, or extend outside of this area. In these areas, the lateral movement of the river and the associated erosion is more of the threat than inundation by floodwaters. Elevation or floodproofing alone may not be protective of structures in these areas as erosion can undermine structure. Some of the region already has river corridors mapped, but Vermont ANR is set to issue statewide river corridor maps in the later part of 2014.

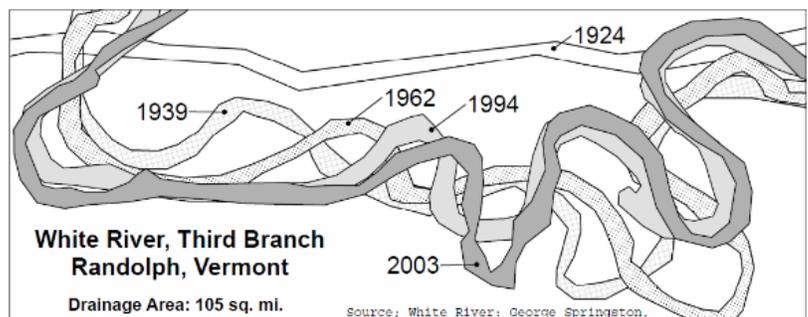
Flood Hazard Regulations

In order to enable property owners to be eligible for federal flood insurance through the National Flood Insurance Program (NFIP), municipalities must adopt and enforce a floodplain management ordinance, often called "flood hazard bylaws," "flood hazard area regulations," or "flood hazard overlay districts" in Vermont. A community's flood hazard regulations must apply to at least the Special Flood Hazard Areas (SFHA) identified by FEMA. The regulations regulate 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 regulations can *increase* flood risk, as they allow filling in flood zones.

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, such as including river corridor areas as well, and through the proper administration and enforcement of their flood hazard regulations. Lax enforcement of these laws can place lives 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. With that being said, there are some circumstances that make the administration, and to a degree, the enforcement, of flood hazard regulations problematic.

For example, the FIRMs used by the towns in the TRORC region may be old or outdated and/or do not document any changes in a stream's course. For areas impacted by Tropical Storm Irene, this updated information is particularly



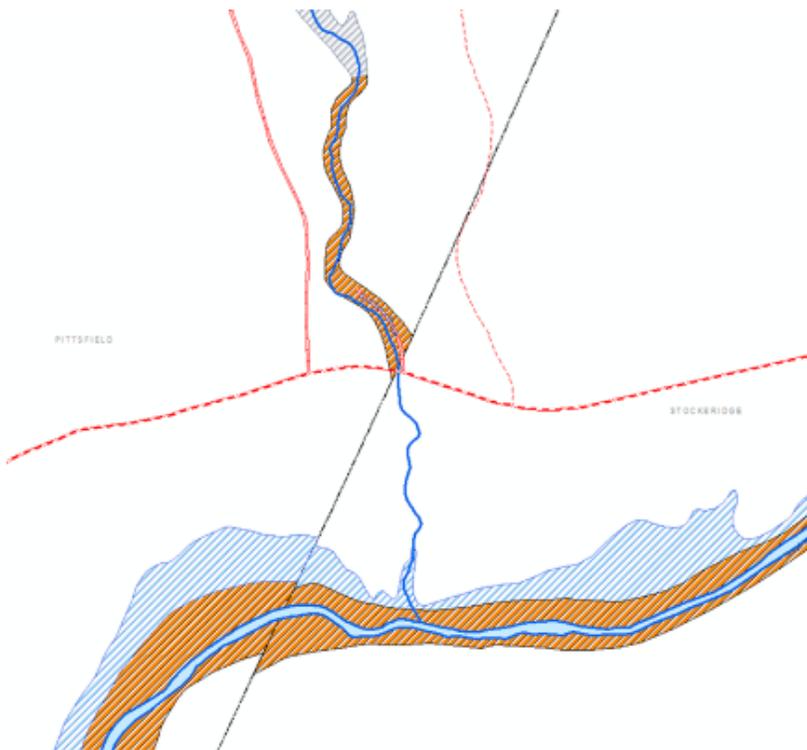
White River's path through the years. | Source: George Springston

important and useful (especially when the Irene-flooded areas are not documented on a town's FIRMs or the information between the FIRM and the real-world conditions is contradictory). Flood Insurance Rate Maps (FIRMs) for many towns within Orange County date to the early 1990's and as far back as 1978. The outdated information on these FIRMs provides challenges for administering a town's flood hazard regulations as the physical conditions on the ground may have changed since the FIRMs were issued. In any case, the town must still use the currently effective FIRMs until new FIRMs are issued by FEMA, unless a Letter of Map Amendment (LOMA) is granted for specific properties in the interim.

Unnumbered or approximate A Zones (labeled "Zone A") on a town's FIRM also present issues in the administration of a town's flood hazard regulations. In these areas, the base flood elevation, the computed elevation to which floodwater is anticipated to rise during the base flood (sometimes called the "100-year flood") has not been determined. As a result, the map does not provide or help provide the elevation to which a structure must be elevated or floodproofed. For permit applications within an unnumbered A Zone, the floodplain administrator will be required to use a few methodologies to determine the appropriate elevation to which the structure must be elevated or floodproofed. This presents the potential for inconsistency in the administration of a town's flood hazard regulations over time, and among adjacent towns sharing a body of water. Regardless, a town is responsible for ensuring that new development within unnumbered A Zones is constructed using methods that will minimize flood damage.

While towns are only responsible for administering their own flood hazard regulations, one of the ultimate goals for the NFIP is to reduce flood damage and make communities safer along the length of a body of water. Therefore, it is important for towns to properly administer and enforce their flood hazard regulations to not only protect their own community, but to help prevent damage to downstream communities. When reviewing and comparing the FIRMs' for adjacent towns, the flood zones indicated on the FIRMs are not always consistent and may produce results like the one shown below.

Figure 14-1: Inconsistency Among FIRMS



Mismatched FIRMs can make working or planning on a multiple-town or regional scale challenging.

Regional Flood Hazards

Please see the table in Appendix J for a summary of both the flood hazards and fluvial erosion hazards in the Two Rivers-Ottawaquechee region. The Vermont Department of Environmental Conservation is working to complete a statewide analysis of fluvial erosion hazards. The results of this endeavor should be completed in 2014. The fluvial erosion hazard data presented in the table is the result of work completed by Phase II Stream Geomorphic Assessments, from which fluvial erosion hazards can be derived. This information will be replaced by the VT ANR data once it is available, as it will be more up-to-date and will be available for all towns.

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). Over the course of this process, over 130 damaged or destroyed residential properties in the state of Vermont will be bought out with this grant funding. As a stipulation of the HMGP funding, FEMA requires that the structure(s) on each buyout property be demolished, and ownership of the empty parcel of land then

be transferred to the town/municipality. Future development on these sites will be restricted.

The home/property buyout process has both positive and negative impacts on a town and the community at large. The TRORC region was particularly hard hit by the flooding caused by Tropical Storm Irene, and had the greatest number of property buyout applicants in Vermont. As of early 2014, there were 60 properties in the TRORC region 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. As of early 2014, 21 residential properties spread across these towns were purchased with FEMA's HMGP funds. Because the properties eligible for a buyout were heavily damaged by flooding, the buyout process is an effective way to reduce a community's vulnerability to flooding and therefore improve the community's overall resilience to flooding. As a result, a number of communities in our region have been made safer.

However, while the buyout process of an at-risk home makes a community less vulnerable to flooding, there is an inherent conflict between home buyouts and the tax and housing base of a town. For many towns in our region, a fiscal issue may arise with the loss of a few homes or properties from their tax base. As a result, some towns may need to raise taxes for the remaining landowners in order to maintain

the town's level of service provided to the community. Higher taxes may make a specific town less attractive to some potential home buyers.

Another consequence of home buyouts is the loss of a town's housing base. Many towns in Vermont and in our region are located in valleys surrounded by steep slopes. Some homes are built on the hillsides, but due to topographic constraints, many homes are built in the valleys, near rivers and streams. This location places the structure and inhabitants at risk of flooding damage or injury caused by either inundation flooding or by fluvial erosion. Often times, affordable or low-income housing is located in these higher risk areas. So, during a major flooding event, these homes

have a higher probability of being damaged or destroyed, and therefore may be good candidates for a home buyout. However, when the structure is razed as part of the buyout process, it is removed from a town's housing base and in addition, may be removed from a town's affordable housing base. This situation may present challenges to the town in the future.

Generally speaking, the buyout of homes at high-risk of flood damage is an important step in improving the resilience of a town and community to flood damage. If a town's home buyouts have significantly impacted the housing base, it is important that the town have a thoughtful and creative approach to rebuilding its housing base that will maintain its improved flood resilience and conform to the town's future land use visions or settlement patterns.



Irene Flood Buyout Sign | Source: TRORC Staff

Lands that Help Prevent Flooding

Wetlands

Wetlands are a vital component for maintaining the ecological integrity of land and water. In addition, they provide an array of functions and values that support environmental health and provide benefits to humans. Benefits provided by wetlands include: flood and storm water control, maintenance of surface and ground water quality, open space and aesthetic appreciation, fish and wildlife habitat (including a large number of threatened and endangered species), ecological research and educational opportunities, and sources of nutrients for freshwater food chains.

Draining, filling, and development have resulted in the loss of more than

thirty-five percent (35%) of Vermont's original wetland acreage, primarily due to agricultural and large-scale development projects. At present, roughly four percent (4%) 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, which brings the actual total to about five or six percent of the state's land. The current rate of wetland loss in Vermont has been estimated at eight (8) 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 values associated with wetlands. 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 decades 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." 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 (1990) (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 TRORC 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 as 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 Water Resources Panel of the Natural Resources Board (formerly Water Resources Board) to be significant.

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." 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 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 been recognized as containing critical spring food sources for black bears

Examples of wetlands in the TRORC region that help to attenuate floodwaters and reduce flooding damage include the Class 2 wetlands through the Killington Flats area. Due to the topography, large wetlands are somewhat lacking in the TRORC region. However, there are a number of smaller wetlands in the towns of Newbury, Thetford, Corinth, West Fairlee, and Randolph. For areas with degraded wetlands, flooding events may be more damaging and cause problems for a town. For these reasons, it is important to preserve or enhance wetlands throughout the region, large or small, to provide flood mitigation, water quality benefits and wildlife habitat.

Wetlands Identification

According to the Vermont Wetlands Rules, the boundary between a wetland and an upland shall be delineated by the methodology set forth in the most recent edition of the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. This methodology employs three parameters: vegetation, soils, and hydrology. (See Section 5 of Vermont Wetland Rules for more detailed description of wetlands delineation in terms of function and vegetation.) The Rules state that the most recent edition of The Wetland Plant List of the State of Vermont published by the U.S. Fish and Wildlife Service shall be used to determine the frequency of vegetation occurrence in wetlands. Wetlands must serve at least one

of the following functions in order to be protected by the state:

1. Water storage for flood water and storm runoff.
2. Surface and ground water protection.
3. Fisheries habitat.
4. Wildlife and migratory bird habitat.
5. Hydrophilic vegetation habitat.
6. Threatened and endangered species habitat.
7. Education and research in the natural sciences.
8. Recreational value and economic benefits.
9. Open space and aesthetics.
10. Erosion control through binding and stabilizing the soil.

In order to be protected by Criterion 1(G) of Act 250, wetlands must be listed as significant by the state. Municipalities, the Regional Commission, or other interested parties may petition the state Water Resources Panel of the Natural Resources Board (formerly Water Resources Board) 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 (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), public investments and facilities (9A), and under local and Regional Plans.

The Regional Commission 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. The Regional Commission 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.

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: floodwater attenuation; providing habitat for aquatic and terrestrial organisms; providing river bank support and stabilization; helping prevent bank undercutting and bank collapse; reducing flood and ice damage to stream channel, and adjacent lands and structures; shading the river channel; intercepting, absorbing, and filtering out pollutants; and slowing surface water runoff. 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 strips of naturally growing grasses, shrubs, and trees is essential to the health of streams and lakes. Appropriately, vegetated shorelines contribute to maintenance of water quality and shoreline protection.

TRORC supports and encourages communities to identify and inventory wetlands within the region and to adopt mechanisms for their increased protection.

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 to dissipate flood water. This also slows 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 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. Unfortunately, this places crops and livestock at risk during flooding events. Of course, much of Vermont and the TRORC region is steep and mountainous and, therefore, does not have an abundance of flat lands surrounding rivers and streams. The importance of these lands was demonstrated during the flooding caused by Tropical Storm Irene. For example, floodwaters carried from Randolph to Bethel by the Third Branch of the White River were able to dissipate along a long stretch of fields between the two 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.¹⁰ In Vermont, the important upland forest tree species include: Red and Sugar Maple, Eastern Hemlock, Red Spruce, Yellow and Paper Birch, White Pine, White Ash, and Red and White Oak.¹¹ Aside from including these ecologically and economically valuable tree species, upland forests also comprise many small unnamed streams which make up the headwaters of a watershed. These headwater streams are the smallest, yet most abundant streams draining the state of Vermont and the TRORC region. Therefore, the activities occurring in the headwaters can impact an entire watershed.

Healthy and well-managed upland forests can reduce flooding by intercepting rainfall and infiltrating rainwater, thereby slowing the flow of rainwater into small, headwater streams. These streams are notoriously “flashy” and are often responsible for fluvial erosion, particularly within mountainous areas. The Vermont Department of Forests, Parks and Recreation’s Forest Watershed Program emphasizes the importance of healthy forests and sustainable forestry practices as a way to improve or maintain water quality.

The TRORC 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 Chateaugay No Town

Conservation Project, which stretches across the towns of Barnard, Bridgewater, Stockbridge, and Killington. There are also several town forests—for instance, those in Randolph, Fairlee, West Fairlee, Royalton, and Corinth, to name a few. It is our intention to continue to support forest stewardship and work with town planning commissions to help preserve and protect forested land, which not only provide ecological, scenic and economic benefits, but also help mitigate flood damage.

Stormwater and Impervious Surfaces

Impervious surfaces are areas that prevent the infiltration of water into the soil. Man-made impervious surfaces include parking lots, rooftops, roads (even gravel roads) and severely compacted soils. Man-made impervious surfaces exacerbate flooding events by increasing the amount and velocity of stormwater runoff, particularly in areas where these surfaces are prevalent. Because stormwater is not allowed to infiltrate into the ground or is held by vegetation, it flows quickly in sheets over impervious surfaces, and drains into the lowest area. This stormwater then adds to the “flashiness” of localized flooding, especially in heavy rain events.

Impervious surfaces and increased stormwater runoff also negatively impact water quality in a watershed. In fact, studies have demonstrated that a water body begins to demonstrate visible degradation when its watershed reaches 10% imperviousness.¹²

The percentage of impervious surfaces can be reduced by limiting the number

of rooftops and pavement, by using permeable surfacing materials, employing disconnection practices and by implementing Low Impact Development (LID) principles.¹³ The terms “LID” and “Green Infrastructure” are often used interchangeably. Overall, they are referencing essentially the same projects with similar goals in mind, but technically, there is a slight difference between the two terms. Low Impact Development refers to the process of designing and implementing practices that can be implemented at the site-level to control stormwater and attempts to replicate the pre-development conditions at that site. Green Infrastructure refers to a broader view at the community or watershed scale, and is focused on implementing LID practices as part of a coordinated effort to reduce impervious surfaces and stormwater runoff.

Green Infrastructure and LID principles seek to mimic conditions present before the development of an area by managing stormwater runoff the way a healthy and in-tact environment would— by slowing it, spreading it and/or sinking the runoff into the ground. Projects implemented with LID and Green Infrastructure principles include; porous pavement, bio-swales, “green” landscaping and vegetated buffers, rain gardens, and rain barrels.

Because stormwater has a profound impact on flooding and water quality, the state of Vermont has regulations in place to control stormwater on larger projects. Vermont’s Stormwater Management Rule outlines the development activities/projects which trigger a stormwater discharge permit in

both stormwater-impaired and unimpaired water bodies, as well as exemptions to the Rule. For example, both of the following scenarios trigger a stormwater discharge permit; “discharge from new development equal to or greater than one acre”, and “a discharge from the expansion of existing impervious surface, such that the total resulting impervious surface is equal to or greater than one acre.” The one acre threshold missed most development though, resulting in continual impacts.

Stormwater is a major cause of both nitrogen and phosphorus loading. Work is now being done to rewrite the Lake Champlain Total Maximum Daily Load or TMDL (a calculation of the maximum amount of a specific pollutant that an impaired water body can receive and still safely meet its water quality standards)

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

It is the policy of the State of Vermont 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.

~ 10 VSA Chapter 37

and to rework the Long Island Sound TMDL. We expect that changes to Vermont's Stormwater Management Rule will be coming in the future to further limit the pollution that enters these water bodies due to stormwater runoff.

While widespread impervious surfaces are detrimental to water quality, impervious surfaces in some areas, such as in village centers and downtowns, are the results 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 understand the ways to mitigate their effects through various approaches.

As part of Vermont's green infrastructure initiative, TRORC is working to review selected municipal bylaws and ordinances for their ability to allow green infrastructure/LID practices and will prepare preliminary recommendations to overcoming barriers to green infrastructure. TRORC will work with the selected community to draft model

green infrastructure ordinance language which will be tailored to the community. Finally, TRORC will assist the municipality to promote the integration of the model language into their local bylaws.

The Site-Specific Nature of Flooding

The risk of flooding in Vermont varies site-by-site, to the point where parcels located adjacent to one another may be impacted differently in a flooding event. The site-specific nature of flood risk can be attributed to a number of factors, such as: topography (the presence of steep slopes or valleys); location of any structures on the site; characteristics of the stream or river, including its course and ability to access its floodplain; soil composition; the presence of riparian buffers and the condition of the buffer, including the type of vegetation; the presence of wetlands nearby and their quality; the path and variability of weather systems; and the characteristics of adjacent and nearby sites; among others. All of these factors can vary widely.

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 and 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 and 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. Historically, Vermont town and village centers were established around water power, and 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 is a desire to have existing downtown/village developments, and even new development placed in these areas, but there can be 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.

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

Goals

1. The citizens, property and economy of the TRORC 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 mapped flood zones* outside of river corridors increases flood risk and is discouraged, and at a minimum must comply with the Association of State Floodplain Manager’s No Adverse Impact policy.
2. All new buildings, other than accessory structures, in mapped flood areas* must have the lowest floor 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 mapped floodways* shall be prohibited.

Goals, policies and recommendations continued on next page

**Mapped areas, unless corrected by FEMA.*

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

Policies (continued)

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 Stream Alteration Standards.
7. 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.
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. Vegetated buffer strips should be maintained in riparian zones surrounding streams and rivers. 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. Municipalities in the region are encouraged to enhance zoning bylaws to protect wetlands that may not be protected under state or federal law.
13. All wetlands which provide flood storage functions shall remain undeveloped or have compensatory storage constructed so as to achieve no net loss of such wetland function.
14. In the long term, restoration and enhancement of additional wetlands should be pursued in order to improve the region's flood resilience.
15. Structural development or intensive land uses shall not occur in Class I and Class II wetlands unless there is an overriding public interest.
16. Towns and the state are encouraged to adopt road and bridge standards to the 50 or 100 year storm level for identified critical transportation routes.
17. 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. The Regional Commission should 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 should 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 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 ANR River Management Section and the Regional Commission for mitigation actions such as elevation/relocation or purchase and demolition.
5. Areas not designated in either FEMA's maps or in VT ANR's maps, but which are flooded during a weather event should be added to local flood regulations.
6. Watershed-level planning should be done by towns with assistance from the Regional Commission 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 the Granville, Stockbridge, Hancock, Rochester, and the U.S. Forest Service to address flooding on a watershed basis for the Hancock Branch, Upper White, West Branch and Tweed River.
8. TRORC will work with ANR, towns and landowners to lessen flood risk by restoring natural channel functions through berm or dam removal or intentional lowering of streambanks.
9. 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.
10. TRORC encourages more consistent, accurate and thorough identification of wetlands areas through the use of best available data and the adoption of local wetlands regulations and updated maps by the municipalities in the region.

Flood Resilience Endnotes

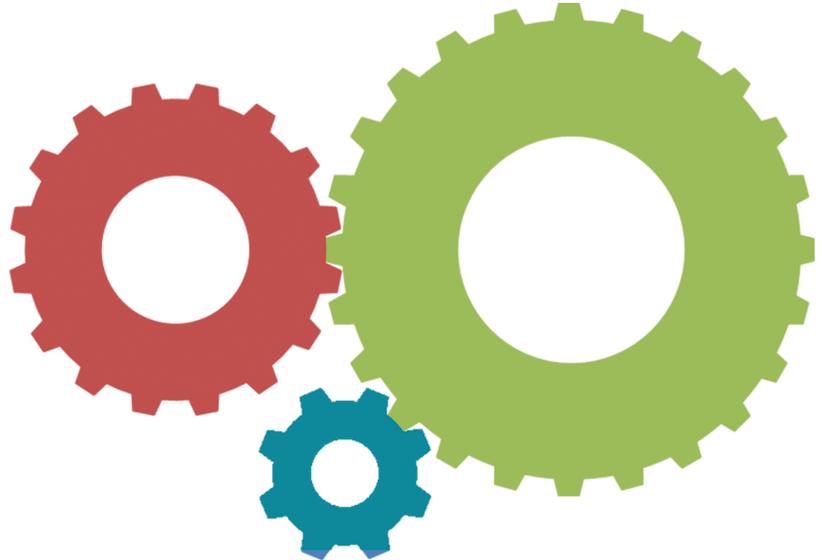
1. Alan K. Betts, "Climate Change in Vermont." June 2011 (edited 10/29/2011). <http://www.anr.state.vt.us/anr/climatechange/Pubs/VTCCAdaptClimateChangeVTBetts.pdf>
2. *Id.* at page 9
3. *Id.*
4. VT ANR Climate Change Adaptation Framework, pages ii-iv, 14-16. Presentation by Dr. Cameron Wake.
5. Economic Impact Assessment- Vermont DR-4022. Page 12. http://vtstrong.vermont.gov/Portals/0/Documents/Vermont_Econ_Impact_Final%20-%2042312.pdf
6. Impact of Irene on Vermont Agriculture. University of Vermont Extension. January 5, 2012. Page 1.
7. *Id.*
8. *Id.*
9. Economic Impact Assessment- Vermont DR-4022. Page 22.
10. Vermont Forests and Woodlands. Vermont Fish and Wildlife Service. http://www.vtfishandwildlife.com/books/Wetland,Woodland,Wildland/___76_to_386_Part_4_A_Guide_to_the_Natural_Communities_of_Vermont/_82_to_236_Upland_Natural_Communities/_84_to_186_Upland_Forests_and_Woodlands/_84_to_103_Upland_Forests_and_Woodlands.pdf
11. *Id.*
12. Vermont Green Infrastructure Initiative, Watershed Management Division of the VT Department of Environmental Conservation. Low Impact Development Fact Sheet; LID Principle #. Reduce Impervious Surfaces. http://www.anr.state.vt.us/dec/waterq/stormwater/docs/sw_gi_1.7_reduce_impervious_surfaces.pdf
13. *Id.*

PLAN IMPLEMENTATION

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 which 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 which 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 which 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 which 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 Level of Service (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 the extension, upgrading or enlargement to 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 which 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 immediate to the project site; or
 - b. increasing the cost or availability of energy for users in the Region immediate 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 which 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 which 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.

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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 non-profit facilities or utilities within one mile of a municipal boundary.
 7. A development which 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:
 - a. located within a limited geographic area;
 - b. under the control of a single applicant; and
 - c. 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 their respective parts.

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 V.S.A. § 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. The cumulative effects of development tend to be different than other forms of development. This is principally because implementation of large development plans or projects in increments precludes evaluation of the total impact of all development when completed.

Implementation of large development plans or projects in increments precludes evaluation of the total impact of all development when completed.

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 which occurs in increments may result in an inability of a municipality or region to adequately provide facilities or services when they are needed.

Large scale development which 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 which 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). It is not in the interest of the Region, therefore, to endorse or promote methods of incremental development review that inadequately evaluate the cumulative impacts of growth within an area.

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).
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, which 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 (V.S.A. 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

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;

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 which 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 zoning, site plan, subdivision regulations, unified development, official map, 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 which is consistent with its ability to provide services; and
 - a. 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 a sum of money 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 places 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 begin to exceed average levels.

Private Sector Conservation and Development

While optional, the existence of local planning bylaws enables municipalities to regulate land use within their borders. The land developer or conservationist is primary to the implementation of the Plan. The scale, size, type, and timing of growth on the landscape stands as tangible evidence of Plan implementation. 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 provides 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.

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 cooperatively organize to undertake a particular kind of project or service with other towns of similar or like needs. Given the complexity and economic costs associated with the provision of a required public service by municipalities, such as solid waste disposal and 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

If a municipality chooses to conduct a planning program, it must follow statutory requirements.

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water districts, solid waste districts, and natural resources conservation districts.

Several state and regional non-profit 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.



Bridgewater Better Back Roads Discussion | Source: TRORC Staff



Flume Model Demonstration | Source: TRORC Staff

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 needs 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 which coordinate daily with TRORC but the general public as to the Plan 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 on-going 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;

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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.

E. Implementation of the Plan

This Regional Plan contains extensive goals, policies and recommendations for action. While the goals and policies frame a state which the Plan seeks to achieve and 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.

The Implementation Matrix (see Appendix K) 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.

Tracking Progress

An implementation plan is of no use if no action is taken to move forward. Because this is the Two Rivers-Ottawaquechee Regional Plan, it falls to TRORC to monitor progress throughout the Plan's eight year life.

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DEFINITIONS

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.

ARCHAEOLOGICAL 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 and 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 elevation of 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, botanical and zoological gardens of a historic, educational or cultural interest which are not operated commercially.

DESIGNATED GROWTH CENTERS.—As defined by Act 183: *An Act Relating To Creation of Designated Growth Centers and Downtown Tax Credit Program.*

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, 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:

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- 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 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.

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.

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.

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.

MAJOR DEVELOPMENT.—Development that meets any one of the eight specific criteria that qualify a development as resulting in substantial regional impact (see Chapter 15, 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.

NEW TOWN CENTER.—As defined in 24 VSA §2791(11): the area planned for, or developing as, a community’s central business district. Composed of compact, pedestrian-friendly, multistory, and mixed use development that is characteristic of a traditional downtown and supported by planned or existing urban infrastructure, including curbed streets with sidewalks and on-street parking, stormwater treatment, sanitary sewers and public water supply.

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, 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.—A business whose primary use is the supply of merchandise or wares to the end consumer. Examples include (but are not limited to), supermarkets, hardware stores, dry-goods stores, pharmacies, big box stores, etc.

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 GROWTH AREA.—As used in this plan, regional growth areas include the Regional Center, Town Centers, Village Settlements, Hamlet Areas, Designated Growth Centers, Designated Downtowns, and Designated Village Centers.

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.

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, planform, 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.

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 shop, manufacturer’s with a small showroom, etc.

SERVICE BUSINESS.—Any establishment whose primary activity is the provision of assistance, as opposed to products, to individuals, business, industry, government, and other enterprises.

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;

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- 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 purpose 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;

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- 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 V.S.A. 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.

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.

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.

APPENDICES

Note: Appendices A, B, C, D, E, F & H can be found at www.trorc.org. (Direct links are included here.)

Appendix A: East Central Vermont Park and Ride Needs Analysis

http://www.trorc.org/wp/wp-content/uploads/2013/08/ECVT_ParkRides.pdf

Appendix B: Special Road Designations

http://www.trorc.org/wp/wp-content/uploads/2015/10/trorc_specialroads.pdf

Appendix C: Hartford US 4 Corridor Management Plan and US 4 West Corridor Management Plans

<http://www.trorc.org/wp/wp-content/uploads/2015/10/US4HartfordCorridorMgmt.pdf>

<http://www.trorc.org/wp/wp-content/uploads/2015/10/CorridorUS4West.pdf>

Appendix D: Regional Transportation Projects

http://www.trorc.org/wp/wp-content/uploads/2015/10/Regional-Transportation-Projects-Spreadsheet_4.27.2015.pdf

Appendix E: Housing Chapter Tables

http://www.trorc.org/wp/wp-content/uploads/2015/10/Appendix-A_Housing-Chapter-Appendix-of-Tables.pdf

Appendix F: Housing Needs in East Central Vermont

http://www.trorc.org/wp/wp-content/uploads/2015/10/HousingNeedsinEastCentralVermont2013_3-21-14.pdf

Appendix G: Vermont Affordable Housing Programs:

- (1) Regional:
 - a. Addison County Community Action Group:
1-802-388-3608
 - b. Addison County Community Trust:
1-802-388-9080
 - c. Capstone Community Action:
1-800-639-1053
www.capstonevt.org
 - d. Central Vermont Community Land Trust:
1-802-476-4493
www.evelt.org
 - e. Rutland County Community Land Trust:
1-802-775-3139
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- f. Southeastern Vermont Community Action:
1-800-722-4575
www.sevca.org
 - g. Twin Pines Housing Trust:
1-802-291-7000
www.twinpineshousingtrust.com
 - h. Upper Valley Habitat for Humanity:
1-802-295-1854
www.uppervalleyhabitat.org
 - i. Upper Valley Housing Coalition (advocacy):
1-802-291-9100
www.uvhc.org

(2) State:

- a. Housing Awareness Campaign (advocacy):
1-802-652-3449
www.housingawareness.org
- b. Housing Vermont
1-802-863-8424
www.hvt.org
- c. Vermont Community Loan Fund
1-802-223-1448
www.vclf.org
- d. Vermont Department of Housing and Community Development
1-800-622-4553
www.accd.vermont.gov
- e. Vermont Energy Investment Corporation
1-800-639-6069
www.veic.org
- f. Vermont Housing and Conservation Board
1-802-828-3250
www.vhcb.org
- g. Vermont Housing Finance Agency
1-800-339-5866
www.vhfa.org
- h. Vermont State Housing Authority
1-802-828-3295
www.vsha.org

(3) Federal:

- a. USDA Rural Development
1-802-828-6080
www.rurdev.usda.gov/vt

Appendix H: Regional Forest Stewardship Report 2012

<http://www.trorc.org/wp/wp-content/uploads/2015/10/TRORC-Regional-Forest-Stewardship-Report-2012-reduced.pdf>

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Appendix I: Flood Events in the Past 100 Years

Date	Location	Event Details	Extent of Damages
06/25/2013— 07/11/2013 (DR-4140 VT)	Orange, Rutland and Windsor Counties; Statewide	A series of heavy rain events caused localized flooding over a two week period.	Route 100 through the Granville Gulf sustained flood damage. \$2,818,588.95 in Public Assistance funding obligated for this disaster declaration period.
08/28/2011 (DR 4022 VT for period of 8/26/2011 – 9/2/2011) Tropical Storm Irene	Addison, Rutland, Orange and Windsor Counties; Statewide	Tropical Storm Irene moved across southeast New York and southwest New England during the morning hours of August 28th and then proceeded to track north along the Connecticut River Valley in Vermont during the afternoon and evening. The main impact from Irene was widespread, devastating flooding, especially for central and southern Vermont. Widespread rainfall amounts of 3-5" occurred across Vermont with 5 to 7+ inches across much of southern, central Vermont and elevations above 1000 feet along the spine of Vermont's Green Mountains and the Worcester range. Flooding along Wells River was extensive, isolating Wells River Village VT. Flooding along the Waits River caused widespread flooding through Corinth VT and downstream to Bradford VT. Heavy rainfall caused devastating flooding along the White and Ottauquechee River and their tributaries. Homes, businesses, and roads were flooded throughout Windsor county. The White River at West Hartford crested at 28.40 feet, about a foot below the record crest of 29.30 feet set in the great flood of 1927."	This flood event will likely rank second to the November 1927 flood in the scope of meteorological and hydrological conditions/impacts as well as loss of life (84 in 1927), but likely first in monetary damage ((approx. \$500 million statewide vs. \$350 million (1927 in 2010 dollars)). There were nearly 2400 roads, 800 homes/businesses, 300 bridges and a half dozen railroad tracks destroyed or damaged from the flooding caused by Irene. Several homes and businesses as well as farms suffered tremendous losses to crops and livestock. A number of towns isolated: Pittsfield, Rochester, Hancock, Granville, and Stockbridge. In the TRORC region, there was extensive flood damage to Routes 4, 12, 12A, 100, 107, 110, 125. County-wide damage from flooding: Addison (\$3.5 million), Orange (\$5 million), Rutland (\$12.5 million) and Windsor (\$35+ million).



FLOOD EVENTS IN THE PAST 100 YEARS *(continued)*

Date	Location	Event Details	Extent of Damages
05/26/2011 – 05/27/2011 (DR-4001 VT)	Orange County; Central and northern Vermont	A surface low as well as upper atmospheric energy traveled along a quasi-stationary boundary across northern New York and Vermont during the afternoon and evening of May 26th. The air mass ahead of this boundary was moderately to largely unstable and the combination lead to numerous reports of damaging winds and very large hail (up to 2.5 inches in diameter)25,000+ customers lost power during these storms. Straight-line winds in Orange County. 3 -5"+ of rainfall and severe flash flooding and resultant river flooding.	\$10,581,798.62 in Public Assistance funds obligated.
07/21/2008 - 08/12/2008 (DR-1790 VT)	Addison, Orange and Windsor Counties; Statewide	08/06/2008—Training showers and thunderstorms with very heavy rain across portions of the southern Green Mountains as well as northeast Vermont during the morning into early afternoon hours. 3-5" of rain causing severe localized flash flooding. Robbins and the Hancock Branch of the White River in Hancock were the source of flooding downstream. 08/07/2008—additional slow-moving storms and flooding.	8/6/2008—Numerous road and bridge washouts. The Town of Hancock was particularly hard hit—flood waters caused the failure of the Killoleet Dam and washed out the intersection of Routes 100 and 125. Flash flooding later occurred in Rochester. Portions of Route 100 were flooded in Stockbridge and the road was closed to traffic. 08/07/2008—more scattered flash flooding in Corinth, Chelsea, Sharon (floodwaters covered bridge on Faybrook Road) and in West Norwich. \$4,569,910.02 obligated for DR-1790 VT.
07/09/2007 - 07/11/2007 (DR-1715 VT)	Orange and Windsor Counties. Specific towns referenced include: Braintree, Randolph, Bethel, Stockbridge, Brookfield, Hartland, and Norwich.	A series of severe storms produced high winds, lightning hail and heavy rains. Flash flooding resulted. 5.27" reported in Bethel.	Damage to numerous roads in the region: Routes 12 and 14 washed out in Randolph; Lilliesville Road, River Road, Routes 100 and 107 in Stockbridge and Bethel. Camp structures damaged in area off of Lilliesville Road. \$4,905,985.03 Public Assistance funds obligated for disaster.



FLOOD EVENTS IN THE PAST 100 YEARS *(continued)*

Date	Location	Event Details	Extent of Damages
04/15/2007 - 04/21/2007 (DR-1698 VT)	Windsor, Rutland and Orange Counties; Statewide	Severe storms caused heavy rain, snow and high winds. Rain combined with snowmelt caused flooding in the region. Snowfall 4-7" in valleys throughout the county; 13" fell in Randolph.	Nearly \$3.6 million obligated for public infrastructure damages.
09/16/1999 - 09/21/1999 (DR-1307 VT) Remnants of "Hurricane Floyd"	Windsor Rutland and Orange Counties; Statewide	Very large storm—580 mile diameter. Made landfall in North Carolina as a Category 2 hurricane where it dumped up to 20" of rain. 4-7" of rain and strong winds across the state of Vermont. However, due to the dry conditions in Vermont at the time, much of the rain was soaked up and/or flood water dissipated quickly. At a result, flood damage was isolated. ¹	57 deaths attributed to Hurricane Floyd overall, and 1 in Vermont. At the time, the deadliest and most costly hurricane since Hurricane Agnes in 1972. Property damage set at \$1.325 billion. In Vermont, \$1,010,652.61 obligated in Public Assistance grants.
06/27/1998 (Included within DR-1228 VT for the period between 06/17/1998—07/13/1998)	Towns of Randolph and Hartford; Orange and Windsor Counties; Upper Connecticut River Valley; northern and central parts of Vermont and New Hampshire	3-6" of rain. Heaviest rain from Bristol, Vermont on western side of the Green Mountains to Bradford, Vermont to the east. Flash flooding occurred along Connecticut River basins in central Vermont on 06/27/1998. Ayers Brook in Randolph peaked at 4,200 cfs (flow greater than the 100-year flood). The White River in West Hartford was flowing at 34,500 cfs (between a 10 year and 25 year event). Wells River flowing at 989 cfs; Ottauquechee River near West Bridgewater flowing at 542 cfs. ²	Damage localized. The Town of Randolph was particularly hard hit.
08/09/1976—08/10/1976 Remnants of "Hurricane Belle"	Town of Plymouth; statewide	Struck Long Island as a Category 1 hurricane. Skirted the Vermont/New Hampshire border and was considered a minor storm upon arrival. ³ For some areas of Vermont, the precipitation was very heavy and caused extensive flooding.	Road, culvert and bridge damage in Vermont. 10 associated deaths. Caused \$100 million in damages (1976 dollars)



FLOOD EVENTS IN THE PAST 100 YEARS *(continued)*

Date	Location	Event Details	Extent of Damages
07/06/1973 (DR-397 VT)	Town of Plymouth; Windsor County; statewide	A west moving frontal system and a moist, southeasterly flow from the Atlantic Ocean joined to produce heavy precipitation in some parts of the state not seen since 1927. ⁴ 5-8" in Windsor County. Connecticut River at Wells River flowing at 57,100 cfs; Wells River flowing at 5970 cfs.	Three people killed in Vermont. Damage estimated at \$64 million— including extensive damage to crop land and \$10 million in state highway damage. ⁵ State declared disaster (DR-397 VT).
09/21/1938 "The New England Hurricane of 1938"	Vermont; New England and New York	A Category 5 hurricane, made landfall on Long Island as a Category 3. Hit Vermont as a Category 1. Peak flow on the Black River exceeded the peak flow from the 1927 flood. ⁶	Total damage: \$4.5 billion (2007 dollars). Death toll at 682, in New England—564 estimated deaths. Demolished tens of thousands of homes. 2 billion trees lost in NY and New England. ⁷ In Vermont, 5 dead and hurricane-force winds damaged trees, buildings and power lines. 2,000 miles of public road blocked.
11/03/1927— 11/04/1927 "The Great Flood of 1927"	Statewide, significant rainfall in the TRORC region.	10" of heavy rain fell on frozen ground, caused by remnants of a tropical storm. Flooding in the White River valley was particularly violent, with an estimated 120,000 to 140,000 cubic feet per second (cfs) recorded at West Hartford, Vermont, however, the hardest hit area was likely the Winooski Valley. Areas specifically impacted (with town specific data): Bethel, Chelsea, Hartford, Randolph, Sharon, Stockbridge/Gaysville, and Woodstock.	84 people killed, including the Lieutenant Governor. 1,285 bridges lost. Hundreds of miles of road and railroad track wiped out. Many homes and buildings destroyed (10,000 people left homeless). After the flooding, the U.S. Army Corps of Engineers constructed 3 flood retention reservoirs and dams in Vermont.

Appendix I Endnotes

1. [?id=IvztCLB6g_gC&pg=PA11&lpg=PA11&dq=hurricane+floyd+vermont&source=bl&ots=vbywiC_QomVsZJlZgu73QtYFjtAJudXp8&hl=en&sa=X&ei=nzXUUozlOIqwsQT4oICYDA&ved=oCHYQ6AEwDQ#v=onepage&q=hurricane%20floyd%20vermont&f=false](https://www.water.usgs.gov/whatsnew/newsreleases/floods/flood.jun27.98.html)
2. <http://nh.water.usgs.gov/WhatsNew/newsreleases/floods/flood.jun27.98.html>
3. <http://www.purocleanvt.com/hurricane-season-in-vermont-what-are-the-chances/>
4. <http://md.water.usgs.gov/publications/wsp-2375/vt/>
5. <http://md.water.usgs.gov/publications/wsp-2375/vt/>
6. <http://md.water.usgs.gov/publications/wsp-2375/vt/>
7. <http://www.islandnet.com/~see/weather/almanac/arc2008/almo8sep3.htm>

Appendix J: TRORC Region Flood Hazard and Fluvial Hazard Areas

Town	Flood Hazard Areas			Fluvial Erosion Hazard Areas
	Area	Buildings/Parcels	NFIP Regulated Streams	
Barnard	358 acres of floodplain. Just over 1% of the town is the floodplain. 1% of town (322 acres) may be in the developable portion of the floodplain (not including wetlands).	35 residences, 0 commercial/public buildings in the floodplain with 11 flood insurance policies insuring \$2m.	All of Barnard has approximate flood extents without flood elevations and these areas include Locust Creek and Pond Brook from Silver Lake as well as Broad and Barnard Brooks and Gulf Stream.	
Bethel	667 acres of FEMA NFIP mapped floodplain, 368 acres of which are floodway (the deepest, fastest flowing area in a flood). 2% of the town is the floodplain. 1% of town (299 acres) may be in the developable portion of the floodplain (no wetlands).	20 residences in the floodplain (does not include buyouts from TSI). 6 commercial buildings. 33 flood insurance policies insure \$7m. Approximately 14 parcels completely in the floodplain, most already have at least one house on them. 1 Strafford Meadows, 4 across from Trailer Park, 4 by Bethel Mills, 2 on Miller Dr, 2 in East Bethel, 1 on 107.	The White River and Third Branch include flood elevations while Lilliesville Brook has only approximate flood extents.	
Bradford	850 acres of floodplain, 81 acres of which are floodway. 4% of the town is the floodplain. Less than 1% of town (674 acres) may be in the developable portion of the floodplain (not including wetlands).	10 residences, 11 commercial/public buildings in the floodplain with 10 flood insurance policies insuring \$2.7m.	The Waits and the Connecticut Rivers and all have flood elevations.	Waits River
Braintree	372 acres of floodplain, 212 acres of which are floodway. 1.5% of the town is the floodplain. Less than 2% of town (142 acres) may be in the developable portion of the floodplain (not including wetlands).	7 residences, 4 commercial/public buildings in the floodplain with 8 flood insurance policies insuring \$1.5m.	The Third Branch of the White River has flood elevations.	Ayers Brook



TRORC REGION FLOOD HAZARD AND FLUVIAL HAZARD AREAS (CONTINUED)

Town	Flood Hazard Areas			Fluvial Erosion Hazard Areas
	Area	Buildings/Parcels	NFIP Regulated Streams	
Bridgewater	445 acres of floodplain, 164 acres of which are floodway. 1.5% of the town is the floodplain. Less than 1% of town (280 acres) may be in the developable portion of the floodplain (not including wetlands).	54 residences, 7 commercial/public buildings in the floodplain with 24 flood insurance policies insuring \$6.3m.	The Ottauquechee River and the North Branch, Broad Brook and Pinney Hollow Brook. The Upper North Branch and Upper Broad Brook and Pinney Hollow Brook do not have flood elevation but just extents.	Ottauquechee River, Broad Brook, Reservoir Brook, North Branch Brook, Bridgewater Hollow Brook, Dailey Hollow Brook
Brookfield	654 acres of floodplain, with no mapped floodway. 2% of the town is the floodplain. Less than 2% of town (463 acres) may be in the developable portion of the floodplain (not including wetlands).	17 residences, 2 commercial/public buildings in the floodplain with 3 flood insurance policies insuring \$655,000.	The Second Branch of the White River, and Ayers, Sunny, Sunset and Halfway Brooks are mapped. The Second Branch has flood elevations and 500 year areas but no mapped floodway. The southern end of Ayers Brook has mapped river corridor.	
Chelsea	265 acres of floodplain, with 36 acres of mapped floodway. 1% of the town is the floodplain. Less than 1% of town (245 acres) may be in the developable portion of the floodplain (not including wetlands).	51 residences, 20 commercial/public buildings in the floodplain with 21 flood insurance policies insuring \$2.7m.	The First Branch White River, Upper Village and Cram Brooks are mapped with the village area having flood elevations.	
Corinth	755 acres of floodplain, 68 acres of which are floodway. 2% of the town is the floodplain. 1% of town (314 acres) may be in the developable portion of the floodplain (not including wetlands).	31 residences, 3 commercial/public buildings in the floodplain with 9 flood insurance policies insuring \$1.3m.	The Waits River as well as the Tabor and South Branches and Meadow Brook and Cookeville Brook wetlands. Only the Waits River has flood elevations.	Waits River, South Branch of the Waits River, Taylor Branch of the Waits River
Fairlee	396 acres of mapped floodplain, with no mapped floodway. 3% of the town is the floodplain. 2% of town (319 acres) may be in the developable portion of the floodplain (not including wetlands).	74 residences, 2 commercial/public buildings in the floodplain with 3 flood insurance policies insuring \$627,000.	Lake Morey, Lake Fairlee, a portion of Mill Pond Brook and the Connecticut River are mapped. Only the Connecticut has flood elevations.	



TRORC REGION FLOOD HAZARD AND FLUVIAL HAZARD AREAS (CONTINUED)

Town	Flood Hazard Areas			Fluvial Erosion Hazard Areas
	Area	Buildings/Parcels	NFIP Regulated Streams	
Granville	363 acres of floodplain. Just over 1% of the town is the floodplain. Less than 1% of town (268 acres) may be in the developable portion of the floodplain (not including wetlands).	31 residences, 6 commercial/public buildings in the floodplain with 13 flood insurance policies insuring \$1.3m.	Granville has flood elevations without floodway designations on the White River and approximate flood extents on the Upper Third Branch in East Granville.	
Hancock	208 acres of floodplain. Less than 1% of the town is the floodplain. 177 acres may be in the developable portion of the floodplain (not including wetlands).	16 residences, 8 commercial/public buildings in the floodplain with 22 flood insurance policies insuring \$2.5m.	Hancock has flood elevations without floodway designations on the White River and the Hancock Branch.	
Hartford	805 acres of floodplain, 205 acres of which are floodway. Almost 3% of the town is the floodplain. 2% of town (576 acres) may be in the developable portion of the floodplain (not including wetlands).	47 residences, 22 commercial/public buildings in the floodplain with 68 flood insurance policies insuring \$14.9m.	The Ottauquechee, White and Connecticut Rivers all have mapped floodplains and flood elevations.	
Hartland	1220 acres of floodplain, 87 acres of which are floodway. 4% of the town is the floodplain. 3% of town (998 acres) may be in the developable portion of the floodplain (not including wetlands).	56 residences, 8 commercial/public buildings in the floodplain with 12 flood insurance policies insuring \$1.9m.	Lulls Brook to the Fieldsville hamlet, the Ottauquechee and the Connecticut have flood elevations. Cady, Densmore, Weed, Alder Meadow, McArthur, Fulling, Harlow and Babcock brooks have just flood extents.	
Newbury	2616 acres of mapped floodplain, with no mapped floodway. 6% of the town is the floodplain. 4.5% of town (1901 acres) may be in the developable portion of the floodplain (not including wetlands).	42 residences, 3 commercial/public buildings in the floodplain with 24 flood insurance policies insuring \$3.6m.	Connecticut and Wells Rivers as well as Scott, Peach and Halls Brooks, wetland off Fish Pond Rd and along Harriman Pond. Just the Connecticut and Wells Rivers have flood elevations.	Wells River



TRORC REGION FLOOD HAZARD AND FLUVIAL HAZARD AREAS (CONTINUED)

Town	Flood Hazard Areas			Fluvial Erosion Hazard Areas
	Area	Buildings/Parcels	NFIP Regulated Streams	
Norwich	597 acres of floodplain, 106 acres of which are floodway. 2% of the town is the floodplain. A little more than 1% of town (414 acres) may be in the developable portion of the floodplain (not including wetlands).	53 residences, 3 commercial public buildings in the floodplain with 31 flood insurance policies insuring \$5.5m.	Blood Brook and the Connecticut have flood elevations. Lower New Boston Brook just has flood extents while Upper New Boston has flood elevations.	Bragg Brook, Blood Brook
Pittsfield	300 acres of floodplain, 120 acres of which are floodway. 2% of the town is the floodplain. 1% of town (150 acres) may be in the developable floodplain (no wetlands). 60 acres of the town is in the river corridor protection area that is not in the floodplain.	14 residences, 2 commercial buildings in the floodplain, 6 residences in the river corridor area with 8 flood insurance policies insuring \$1.4m. Approximately 10 parcels completely in the floodplain, most already have at least one house on them (3 just north of Tweed River Drive, 2 on Tweed River Drive, Yoga building and 2 across street, 1 just north of Town Garage, 1 across from South Hill and 3 just north of Hadley Rd).	The Tweed River and the West Branch include flood elevations while Townsend, Guernsey, Jimmy Dean and Johnson Brooks just have approximate flood extents.	Tweed River, West Branch of the Tweed River, South Branch of the Tweed River, Gvernsey Brook
Plymouth	384 acres of floodplain. There is no mapped floodway. 1% of the town is the floodplain. Less than 1% of town (259 acres) may be in the developable portion of the floodplain (not including wetlands).	36 residences, one commercial/public building in the floodplain, 6 residences in the current river corridor area with 14 flood insurance policies insuring \$2.6m.	The Black River, Lower Pinney Hollow Brook near Bridgewater, Tinker Brook and Twenty Mile Stream. All but the Black River do not have flood elevations.	Buffalo Brook/ Reading Pond Brook, Patch Brook, Black River, Great Roaring Brook, Tinker Brook, Reservoir Brook, Pinney Hollow Brook, Broad Brook
Pomfret	521 acres of floodplain. Just over 1% of the town is the floodplain. 1% of town (454 acres) may be in the developable portion of the floodplain (not including wetlands).	38 residences, 7 commercial/public buildings in the floodplain with 10 flood insurance policies insuring \$2.3m.	All of Pomfret has approximate flood extents without flood elevations and these areas include Barnard and Pomfret Brooks as well as Cloudland Brook and Mill Brook and its tributaries.	Gulf Stream, Barnard Brook, Pomfret Brook, Cloudland Brook



TRORC REGION FLOOD HAZARD AND FLUVIAL HAZARD AREAS (CONTINUED)

Town	Flood Hazard Areas			Fluvial Erosion Hazard Areas
	Area	Buildings/Parcels	NFIP Regulated Streams	
Randolph	1105 acres of mapped floodplain, with 615 acres of mapped floodway. 3.5% of the town is the floodplain. 3% of town (889 acres) may be in the developable portion of the floodplain (not including wetlands).	26 residences, 8 commercial/public buildings in the floodplain with 21 flood insurance policies insuring \$4.2m.	Second and Third Branches of White River and Ayers Brook. All mapped areas have flood elevations.	Ayers Brook
Rochester	890 acres of floodplain, 424 acres of which are floodway. 2% of the town is the floodplain. 1% of town (466 acres) may be in the developable floodplain (no wetlands). 78 acres of the town is in the river corridor protection area that is not in the floodplain.	8 residences in the floodplain, 8 commercial buildings (5 on Peavine Drive down by the ball fields), 6 residences in the river corridor protection area, 3 commercial. (3 on Peavine, 3 off State Garage 3 on 100 just south State Garage). 14 flood insurance policies insure \$3.2m. Approximately 20 parcels completely in the floodplain, most already have at least one house on them (4 Peavine Dr, 2 across from Kennedy, 4 across from Woodlawn, 3 just south of State Garage Rd, 2 across from River Bend, 3 around Liberty Hill, 1 or 2 up Corporation).	The White River and the West Branch include flood elevations while Marsh, Brook St., Nason, Corporation, Breakneak, and Rogers Brooks just have approximate flood extents.	White River, Granville Branch of the White River, Hancock Branch of the White River
Royalton	772 acres of floodplain, 345 acres of which are floodway. 3% of the town is the floodplain. 1.5% of town (392 acres) may be in the developable portion of the floodplain (not including wetlands).	22 residences, 7 commercial public buildings in the floodplain with 14 flood insurance policies insuring \$3.8m.	The White River and First and Second Branches have mapped flood elevations while Broad Brook just has floodplain extents.	
Sharon	376 acres of floodplain. 1% of the town is the floodplain. 1% of town (339 acres) may be in the developable portion of the floodplain (not including wetlands). 247 acres of river corridor protection are outside of the floodplain.	30 residences, 6 commercial/public buildings in the floodplain with 13 flood insurance policies insuring \$2.1m.	All of Sharon has approximate flood extents without flood elevations and these areas include the White River as well as Broad, Mitchell, Fay, Whitewater and portions of Quation Brooks.	Fay Brook, Quation Brook, Elmers Brook, Broad Brook, White River



TRORC REGION FLOOD HAZARD AND FLUVIAL HAZARD AREAS (CONTINUED)

Town	Flood Hazard Areas			Fluvial Erosion Hazard Areas
	Area	Buildings/Parcels	NFIP Regulated Streams	
Stockbridge	There are approximately 630 total acres of FEMA NFIP mapped flood hazard area in Stockbridge, (about 2% of the town's acreage) of which about 270 acres are floodway. Approximately 360 acres make up the floodplain, most of which may be developable (not including wetlands).	Approximately 21 residences in the floodplain not including buyouts from Irene. Most are in Chalet Village. Three commercial buildings (2 on 107, 1 on 100). 23 policies insure \$3.5m. Approximately 32 parcels are completely in the floodplain and most already have at least one house on them—twenty parcels are in Chalet Village; two parcels are near the Rochester town line; five are near the Tweed/White River confluence; two are across from Sweet Lane on Route 107; one is at the base of Lilliesville Brook; and two are across from Arnold Mtn. Rd on Route 107.	White and Tweed Rivers include flood elevations while Stony Brook just has approximate flood extents.	
Strafford	600 acres of mapped floodplain, with no mapped floodway. 2% of the town is the floodplain. Less than 2% of town (540 acres) may be in the developable portion of the floodplain (not including wetlands).	26 residences, 3 commercial/public buildings in the floodplain with 8 flood insurance policies insuring \$1.9m.	The West Branch Ompompanoosic River and Abbott and Old City Falls Brooks as well as several tributaries off the West Branch. All mapped areas do not have flood elevations.	West Branch of the Ompompanoosic River
Thetford	1677 acres of mapped floodplain, with 58 acres of mapped floodway. 6% of the town is the floodplain. 4.5% of town (1901 acres) may be in the developable portion of the floodplain (not including wetlands).	63 residences, 16 commercial/public buildings in the floodplain with 30 flood insurance policies insuring \$5m.	Ompompanoosic River as well as the West Branch and Abbott and Lake Fairlee Brooks. Portions of the Ompompanoosic River as well as the West Branch and Abbott Brooks have flood elevations.	Ompompanoosic River, West Branch of the Ompompanoosic River
Topsham	448 acres of mapped floodplain, with 33 acres of mapped floodway. 1% of the town is the floodplain. Less than 1% of town (245 acres) may be in the developable portion of the floodplain (not including wetlands).	14 residences, 2 commercial/public buildings in the floodplain with 5 flood insurance policies insuring \$554,000.	Tabor Branch to the Ompompanoosic River as well several northern wetlands. All mapped floodplains do not have flood elevations.	



TRORC REGION FLOOD HAZARD AND FLUVIAL HAZARD AREAS (CONTINUED)

Town	Flood Hazard Areas			Fluvial Erosion Hazard Areas
	Area	Buildings/Parcels	NFIP Regulated Streams	
Tunbridge	350 acres of mapped floodplain, with no mapped floodway. 1% of the town is the floodplain. 1% of town (343 acres) may be in the developable portion of the floodplain (not including wetlands).	10 residences, 1 commercial/ public buildings in the floodplain with 8 flood insurance policies insuring \$1.7m.	First Branch White River. All mapped floodplains have flood elevations.	
Vershire	128 acres of mapped floodplain, with no mapped floodway. 1% of the town is the floodplain. 1% of town (128 acres) may be in the developable portion of the floodplain (not including wetlands).	12 residences in the floodplain with 1 flood insurance policy insuring \$35,000.	Ompompanoosuc River. All mapped floodplains do not have flood elevations.	
West Fairlee	374 acres of mapped floodplain, with no mapped floodway. 2.5% of the town is the floodplain. 1% of town (192 acres) may be in the developable portion of the floodplain (not including wetlands).	15 residences in the floodplain with 2 flood insurance policies insuring \$215,000.	Ompompanoosuc River and Blood, Middle, and Beanville Brooks. All mapped floodplains have flood elevations.	
Woodstock	800 acres of floodplain, 408 acres of which are floodway. Almost 3% of the town is the floodplain. 1% of town (377 acres) may be in the developable portion of the floodplain (not including wetlands).	107 residences, 37 commercial/ public buildings in the floodplain with 78 flood insurance policies insuring \$19.3m.	The Ottauquechee River, Barnard Brook, Gulf Stream and Kedron Brook all have flood elevations.	Barnard Brook, Gulf Stream, Ottauquechee River, Kedron Brook

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Appendix K: Implementation Matrix

FOSTERING HEALTHY COMMUNITIES: CHAPTER 3

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
The Vermont Department of health should provide community assessment, testing sites and remediation programs for housing-related illnesses (blood lead levels, respiratory health, and skin disease).	State	High	Long-Term	High	Various
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
TRORC should advocate for implementation of the state's greenhouse gas reduction plans.	TRORC	Low	Ongoing	High	Various
Municipalities should prioritize the reuse and remediation of brownfields.	Municipalities	N/A	Ongoing	High	N/A
The State and municipalities should protect water quality of rivers, streams, lakes, and wetlands.	TRORC/State	Moderate	Ongoing	High	State
TRORC should 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
The State and TRORC will provide training for neighborhood residents to participate in boards and commissions.	TRORC/State	Low	Near-Term	High	Various
Municipalities should support "aging in place" programs to ensure access to housing and services for residents of all ages and economic means.	Municipalities	N/A	Ongoing	High	N/A
Housing organizations should work with communities to coordinate healthcare and supportive services with housing.	Other	N/A	Ongoing	High	N/A
Municipalities should provide plenty of recreational and healthy opportunities for youth and overall community participation.	Municipalities	N/A	Near-Term	High	N/A
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



FOSTERING HEALTHY COMMUNITIES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC, State should create mapping resources: A) Locality of grocers, convenience stores, farmers' markets, farms, agricultural institutions, processing facilities, distributors, community gardens, food banks, and food pantries. B) Identify transportation routes/types to food retail. C) Location of low-income census tracts.	TRORC/State	High	Long-Term	Medium	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 agriculture land.	Municipalities	N/A	Ongoing	Medium	N/A
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/ Municipal Dues
TRORC should 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 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
TRORC and municipalities should continue to advocate for plentiful, high-quality drinking water.	TRORC/ Municipalities	N/A	Ongoing	Medium	N/A
The State and TRORC should educate decision makers on links between safe streets and health.	TRORC/State	N/A	Ongoing	Medium	N/A
Municipalities should promote existing trails.	Municipalities	N/A	Ongoing	Medium	N/A
Public health professionals should educate decision makers on the link between social support and health.	Other	N/A	Ongoing	Medium	N/A
The State and TRORC must continue to educate residents about Accessory Dwelling Units (ADUs).	TRORC/State	Low	Near-Term	Medium	Various



FOSTERING HEALTHY COMMUNITIES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Municipalities should allow staff to review and administer permitting for ADUs.	Municipalities	N/A	Ongoing	Medium	N/A
Municipalities should allow senior housing to be built in traditionally single-family neighborhoods.	Municipalities	N/A	Near-Term	Medium	N/A
Municipalities should create and invest in health care coordinator programs (i.e., community nurse, community healthcare coordinator).	Municipalities	Moderate	Ongoing	Medium	Various
Municipalities should develop incentives 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.	Municipalities	Low	Ongoing	Low	Various
TRORC and municipalities should participate in health impact assessments of proposed housing developments.	TRORC/ Municipalities	Low	Ongoing	Low	Various
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
The State and/or TRORC should map neighborhoods and advocate for connectivity to essential services, walkable routes, recreations opportunities, and transportation options.	TRORC/State	Moderate	Long-Term	Low	Vtrans
Municipalities should conduct walkability and bikability assessments.	TRORC	Low	Ongoing	Low	Vtrans
The State and TRORC should work with local jurisdictions to adopt bike and pedestrian master plans.	TRORC Municipalities	Moderate	Ongoing	Low	Various
Municipalities should promote joint use of park and recreation facilities between communities.	Municipalities	N/A	Ongoing	Low	N/A
The municipality should map public gathering spaces and indicate level of accessibility.	Municipalities	N/A	Ongoing	Low	N/A
The State and/or TRORC, respecting privacy, should use Geographic Information System (GIS) technology to map seniors and disabled citizens' location, housing, health facilities, and other needed and available services.	TRORC/State	Low- Moderate	Long-Term	Low	Various



FOSTERING HEALTHY COMMUNITIES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
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	Near-Term	Low	N/A

LAND USE: CHAPTER 4

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Within five years of adoption, the Regional Commission will, in consultation with member municipalities, neighboring regional commissions, the State of Vermont, public interest groups and property owners, re-evaluate the Land Use section of this Plan. The Regional Commission should give consideration to existing land use settlement patterns, municipal plan goals and policies, agency plans, and projected trends and needs for the region's citizens and businesses. Following completion of the study, the Regional Commission should offer amendments to this section for adoption.	TRORC	Medium	Mid-term	High	Various
The Regional Commission should continue its efforts to provide professional planning services to its member municipalities and advise public officials on the various options available to manage growth and development at the local level.	TRORC	Low	Ongoing	High	ACCD/ Municipal Dues
The Regional Commission will work with member towns to determine appropriate location and size for growth centers within the region.	TRORC	Low	Mid-term	High	Various
The Regional Commission should 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.	Towns	\$5,000- \$15,000 Per SPA Plan	Mid-term	Low	State/ Municipal

TRANSPORTATION: CHAPTER 5

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will assist towns to develop capital improvement plans that addresses 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.	Towns/State	Moderate-High	Ongoing	High	Local/ State
Towns should identify any local bridges that are redundant and can be abandoned, removed or need not to be rebuilt if destroyed.	Towns	N/A	Short-term	High	N/A
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
TRORC will advocate for increased funding for more robust transit services that encourage increased ridership.	TRORC/transit	N/A	Ongoing	High	N/A
TRORC will support funding increases to meet demand in Elderly and Disabled transportation services.	TRORC/transit	N/A	Ongoing	High	N/A
TRORC will advocate for increased capital investments for commuter and human service public transportation.	TRORC/transit	N/A	Ongoing	High	N/A
TRORC will continue coordination with agencies in providing transportation services for elders and persons with disabilities.	TRORC/transit	N/A	Ongoing	High	Vtrans
TRORC will support the start of the Upper Valley US Route 4 commuter bus service.	TRORC	N/A	Ongoing	High	N/A
TRORC and towns should continue to support public transportation and ride-share programs to reduce the region's dependency on single-occupancy vehicle trips.	TRORC/Towns	N/A	Ongoing	High	N/A
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/Towns	N/A	Ongoing	High	N/A



TRANSPORTATION *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will continue to support the Safe Routes to School program and encourage more schools to participate in the program – especially those schools within densely settled villages or town centers.	TRORC	N/A	Ongoing	High	N/A
Continue speed studies as requested by Towns.	TRORC	Low	Ongoing	High	Vtrans
Continue collaborating with Vermont Agency of Transportation on paving projects and district leveling prioritization.	TRORC	Low	Ongoing	High	Vtrans
TRORC will continue to work with towns to conduct road safety audit projects through Vermont Agency of Transportation.	TRORC	Low-Moderate	Ongoing	High	Vtrans
TRORC will offer town support as needed as liaisons for Vermont Agency of Transportation projects.	TRORC	Low	Ongoing	High	Vtrans
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 continue to review and participate in Act 250 permit proceedings.	TRORC	Low	Ongoing	High	ACCD
TRORC will continue to work with Towns to have town plans consistent with regional and state policy.	TRORC	Low	Ongoing	High	ACCD
TRORC will update the Transportation Land Use (Interchange Area) section of this chapter to coincide with any future changes in the Land Use chapter update.	TRORC	Low	Ongoing	High	Vtrans
TRORC will work with local highway departments as requested to minimize stormwater runoff and road/ river conflicts.	TRORC	Moderate	Ongoing	High	Various/ ANR
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 will work with others to better estimate the full cost of the transportation system.	TRORC	N/A	Ongoing	Medium	N/A



TRANSPORTATION *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
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
State investments in park and ride lot improvements shall be as identified in the East Central Vermont Park and Ride Needs Analysis (Appendix X). Specifically, the two highest priority Park and Ride sites in the region that currently do not exist but are in high demand include: • Royalton I-89 Exit 3 off VT107 (CMG PARK(27)S) • Hartford I-89/I-91 Interchange (CMG PARK(12)SC)	TRORC/State	Moderate-High	Ongoing	Medium	Vtrans
Towns should apply to the Municipal Park and Ride Program and expand the regional park and ride network.	Towns	N/A	Ongoing	Medium	Vtrans
TRORC will work with towns and Vermont Agency of Transportation to institutionalize pedestrian and bicycle accommodations in all of its planning, engineering, and construction related activities – implement “Complete Streets”. In addition to the existing local land use regulations, develop free-standing Bicycle and Pedestrian Plans for interested towns.	TRORC/State	Low-Moderate	Ongoing	Medium	Various
TRORC will advocate that commercial developments invest in transportation infrastructure and services to increase 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
Private businesses should support telecommuting options where practical for employees.	Private Sector	N/A	Ongoing	Medium	N/A
TRORC will support the implementation of the Northern New England Rail Initiative final recommendations for a Boston to Montreal high speed rail service.	TRORC	High	Ongoing	Medium	Federal/ State
TRORC will support improved rail service along I-91 corridor.	TRORC	High	Ongoing	Medium	Federal/ State



TRANSPORTATION *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Continue to conduct road safety audit projects through Vermont Agency of Transportation High Risk Rural Roads program. Focus safety audits 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/ Town	Low- Moderate	Ongoing	Medium	Vtrans
Work with towns to develop road standards that promote traffic calming in private development.	TRORC	Low	Ongoing	Medium	Vtrans/ MPG
TRORC will work with towns to promote traffic calming.	TRORC	N/A	Ongoing	Medium	N/A
TRORC will work with towns and Vermont Agency of Transportation to identify poor pavement conditions for improvement.	TRORC/Vtrans	Low- Moderate	Ongoing	Medium	Vtrans
TRORC shall assist interested communities with studies and planning designed to improve pedestrian and multi-modal networks in Regional Growth Areas.	TRORC	Low	Ongoing	Medium	Various
TRORC shall support efforts to develop municipal parking facilities in Regional Growth Areas.	TRORC	N/A	Ongoing	Medium	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 shall support development projects in hamlet areas that encourage traditional hamlet design and promote access and walkability.	TRORC	N/A	Ongoing	Medium	N/A
TRORC will encourage communities to develop land use regulations that promote reduced density in rural areas.	TRORC	N/A	Ongoing	Medium	N/A
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
TRORC will work with towns and Vermont Agency of Transportation to achieve context sensitive solutions that enhances historic, scenic, agricultural properties of roadway consistent with public safety through transparent public process and project development.	TRORC/State /Town	Low	Ongoing	Medium	Vtrans



TRANSPORTATION *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Towns should consider parking requirements and minimize the use of impervious surfaces for parking through shared parking, allow reduced parking requirements when supported by data or encourage phased parking development when demand arises.	Towns	N/A	Ongoing	Medium	N/A
Vermont Agency of Transportation, FEMA, ANR, the Vermont Department of Public Safety and others involved in flood recovery should incorporate wildlife and aquatic passage needs into rebuilt bridges and culverts when feasible.	State/ Federal	High	ASAP	Medium	Vtrans/ ANR/ FEMA
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 expectation of snow removal.	Towns	N/A	Ongoing	Low	N/A
Towns should consider shared parking lots with other properties that may become formal or informal park and ride lots.	Towns	N/A	Ongoing	Low	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 of objective measures to gauge the potential for walking and bicycling could be one element 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 should provide education and training to large employers the benefits of providing showers and bike lockers for employees that commute by biking.	TRORC	Low	Short-term	Low	Various
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/ Town	Low- Moderate	Mid-term	Low	Various
TRORC should provide education to employers on benefits of allowing some telecommuting for employees.	TRORC	N/A	Ongoing	Low	N/A



TRANSPORTATION *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC shall support efforts to promote complete streets projects in village and downtown centers that improve access and walkability and support connectivity with transit opportunities.	TRORC	N/A	Ongoing	Low	N/A
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

WORKING LANDSCAPES: CHAPTER 6

Action	Lead/Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC should work with communities to provide or facilitate education about the state's Required Agricultural Practices.	TRORC/ Towns	Low	Ongoing	High	Various
TRORC will evaluate proposed developments involving primary agricultural and forest lands, and their related industries. Where appropriate, it will provide information to federal and state agencies, town boards and commissions, and other parties regarding the probable impacts these resources have on the welfare of the region.	TRORC	Low	Ongoing	Medium	Various
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
TRORC, as part of its on-going Technical Assistance Program, will provide planning advice and support to town Planning Commissions, Conservation Commissions, non-profit conservation organizations, and other groups interested in sustaining agriculture and forestry through sound ecological practices.	TRORC	Low	Ongoing	Medium	Various
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

NATURAL RESOURCES: CHAPTER 7

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
The Legislature must keep the Petroleum Cleanup Fund at a level sufficient to meet all cleanup needs.	Legislature	2 Million	Ongoing	High	Federal/ State
The Vermont Department of Environmental Conservation's listing of threatened and impaired waters should 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.	Towns	None	ASAP	High	N/A
The Regional Commission should be involved in watershed and basin planning efforts and encourage municipal involvement.	TRORC	Low	Ongoing	High	ANR
Unless there are overriding concerns in the local and Regional Plans, the Agency of Natural Resources shall adopt the highest possible classification and type for water bodies based on their actual condition and use.	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 spoil, 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
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.	Towns	High	Ongoing	High	Private/ Federal
To protect high-quality forested riparian (river bank, stream bank or lake shore) 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.	Towns	\$5000-10,000	ASAP	High	MPG
Municipalities should 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.	Towns	None	Ongoing	Medium	N/A



NATURAL RESOURCES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Municipalities are encouraged to play an active role in the basin planning process and to prepare water resources elements in municipal plans that are in compliance with state and federal laws.	Towns	Low	Ongoing	Medium	MPG
The Regional Commission, in cooperation with the Agency of Natural Resources - Water Quality Division, Vermont Local Roads Program, and Agency of Transportation, should advise town officials on cost-effective backroad erosion and sediment control.	TRORC/ANR	Low	Ongoing	Medium	Vtrans/ ANR
The Agency of Natural Resources and local groups are encouraged to monitor water quality, and when monitoring indicates a water quality violation, to promptly locate 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 should conduct a comprehensive assessment of water quality in such basins and identify the source of any known water quality problems.	ANR	N/A	Ongoing	Medium	N/A
The State of Vermont should identify and map significant wetland areas not currently classified as Class 1 or 2 wetlands and petition the Water Resources Panel of the Natural Resources Board (formerly Water Resources Board) to have such areas reclassified at a higher level.	State	Medium	Mid-term	Medium	State
Encourage more accurate and thorough identification of wetlands areas through the use of best available data and the adoption of local wetlands regulations and updated maps by the municipalities in the region.	TRORC	\$5,000- \$15,000 per municipal inventory	Ongoing	Medium	State/ Municipal
Town plans and zoning regulations should protect significant natural features and sensitive habitat areas by using setbacks and buffers, particularly for wetlands and vernal pools, before threats to these areas develop. 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.	Towns	\$10,000- \$20,000 Per municipal inventory	Ongoing	Medium	MPG/ VTFW



NATURAL RESOURCES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Towns should adopt zoning regulations that would discourage development near wetlands and vernal pools, and prevent development within 300 feet in conservation districts, in order to protect their functions and native biological diversity and to prevent additional loss of habitat.	TRORC/Towns	\$5000-10,000	Mid-term	Medium	MPG
Protection of wetlands, riparian areas, vernal pools, the most critical deer wintering areas, and natural grasslands should be considered in revisions to local subdivision regulations.	Towns	\$5000-10,000	Ongoing	Medium	MPG
The Regional Commission should be prepared to comment upon projects outside the region which may potentially impact upon air quality within the region.	TRORC	Low	Ongoing	Medium	RPC
The Regional Commission should work with the Agency of Natural Resources, town officials, and others on educational outreach about the proper use of floor drains, local spill response capacity, and proper administration of septic regulations. The Regional Commission 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
Encourage municipalities in the region to enhance zoning bylaws to protect wetlands that may not be protected under state or federal law.	TRORC	Low	Ongoing	Low	MPG
Work with towns to establish a priority list of wetlands for protection and/or acquisition.	TRORC/Local Conservation Commissions	Low	Ongoing	Low	MPG
Encourage property tax relief to provide an incentive for the protection of designated wetlands.	Towns	N/A	Ongoing	Low	N/A
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 wetland, vernal pools, bogs and fens, mature oak trees; and critical habitats for birds, deer, bear, bobcat, heron, and threatened or endangered plant species.	Towns	\$10,000-\$20,000 Per municipal inventory	Mid-term	Low	MPG/ VTFW



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.	Towns/State	N/A	Ongoing	Low	N/A
Towns should attempt to identify critical bear habitat areas within the broader areas identified on Vermont bear habitat maps.	Towns	\$10,000-\$15,000 Per project	Mid-term	Low	MPG/VTFW
Air quality should be monitored in the region as part of broader statewide effort 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

HISTORIC, CULTURAL, ARCHEOLOGICAL & SCENIC RESOURCES: CHAPTER 8

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
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.	Towns	Low	ASAP	High	MPG
The Regional Commission should continue to support efforts to designate National Historic Register Districts and Sites. In so doing, the Regional Commission should coordinate with the State and affected municipalities. In accordance with Section 106 of the National Historic Preservation Act, the Regional Commission must review all federally funded projects in the region which affect register properties or places to assure that such publicly assisted projects are planned with due consideration to the resource.	TRORC	Low	Ongoing	Medium	RPC



HISTORIC, CULTURAL, ARCHEOLOGICAL & SCENIC RESOURCES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
The Regional Commission, 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	RPC/ Vtrans
Regional Commission staff should continue to work with the Vermont's public utilities and design professionals to evaluate lighting technologies and efficiencies.	TRORC	N/A	Ongoing	Medium	N/A
To increase public awareness of archeological resources, the Regional Commission encourages archeologists, local and regional groups, towns, and landowners to organize educational programs focused on Vermont. 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.	Towns	Low	Ongoing	Low	MPG
The Regional Commission should assist local and state policymakers in evaluating lighting options. The Regional Commission should consider sponsorship of educational workshops for planning commissions, design professionals, and others to acquaint them to 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/Towns	Low	Ongoing	Low	MPG

HOUSING RESOURCES: CHAPTER 9

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
The Regional Commission will continue to assist non-profit housing organizations in the development of affordable housing projects when such efforts are consistent with the policies of the Regional Plan.	TRORC/ Non-Profits	Low	Ongoing	High	Various
Towns within the region should actively cooperate with local and regional non-profit housing trusts to develop and preserve new and existing housing, with mechanisms to assure the perpetual affordability of that housing.	Towns/Others	N/A	Ongoing	High	N/A
Community leaders, housing advocates and the Regional Commission must work to retain Vermont's innovative publicly financed home mortgage lending and housing assistance programs. The region's low and moderate income families, disabled individuals, and the elderly are enabled to secure affordable housing through these programs.	VHCB/VHFA/ TRORC	Low	Ongoing	High	Various
The Regional Commission will assist towns in writing strong housing components in town plans that are based on current data that address proven needs as opposed to only updating highlighted topics from years past to better address highest current needs.	TRORC/Towns	Low	Short-term	High	Various
The Regional Commission will continue to provide professional assistance to member municipalities in the identification of need and implementation of local housing assistance programs.	TRORC/Towns	Low	Ongoing	Medium	Various
The Regional Commission 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
The Regional Commission 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
Community leaders within the region will work with state housing agencies, non-profit 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



HOUSING RESOURCES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
The Regional Commission 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/Towns	Low	Mid-term	Low	Various

UTILITIES, FACILITIES AND SERVICES: CHAPTER 10

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
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
Municipal plans, per Vermont statutes, shall identify and prioritize future capital improvements/repairs and estimate costs and means of financing for maintenance and future capacity.	Towns	Low	ASAP	High	MPG
TRORC shall assist communities with the identification and prioritization of future capital improvements/repairs.	TRORC	Low	Ongoing	High	Various
TRORC shall 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/Town	Low	ASAP	High	Various
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 or elderly care facilities from appropriate areas and to assist with revisions as needed.	TRORC	Low	Ongoing	High	Various
TRORC should work with partners to further identify and document gaps or needs within the regional health care system, particularly for vulnerable populations.	TRORC	Low	Mid-term	High	Various
Continue to participate actively in the Section 248a permitting process.	TRORC	Low	Ongoing	High	ACCD



UTILITIES, FACILITIES AND SERVICES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will assist communities with the development of interlocal agreements, union municipal districts and other cooperative agreements whenever possible.	TRORC	Low-Moderate	Long-term	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.	Towns	Low	Long-term	Medium	MPG
Municipalities shall conduct periodic auditing of all water and wastewater distribution systems for calculation of infiltration and losses.	Towns	Low-Moderate	Ongoing	Medium	Various
TRORC shall 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 shall support and participate in any future discussions regarding the development of regional waste management services.	TRORC	N/A	Ongoing	Medium	N/A
TRORC shall further Universal Recycling Law requirements for parallel solid waste collection services through outreach and education with assistance from the Agency of Natural Resources.	TRORC	Low	Short-term	Medium	Various
TRORC should work with state partners to clarify or revise Act 250 rules to allow permitting flexibility when a proposed development is consistent with this Plan and has a clearly defined public good.	TRORC	N/A	Short-term	Medium	N/A
Seek out funding for our communities to implement new or sustain existing Wi-Fi Zones in villages and downtowns.	TRORC	Low	Short-term	Medium	Various
To further support outdoor recreation, TRORC will assist communities with the establishment of Conservation Commissions and will support existing Conservation Commissions when possible.	TRORC	Low	Ongoing	Medium	Various
TRORC will foster a 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



UTILITIES, FACILITIES AND SERVICES *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC shall support the creation of municipal composting facilities for organic wastes where appropriate.	TRORC	N/A	Ongoing	Low	N/A
Ensure towns assess and incorporate the needs of disabled children into educational facility and budgetary planning efforts to ensure the provision of free and appropriate education for all children.	TRORC, Towns	N/A	Ongoing	High	N/A
Support local efforts to assess capacity issues in our Region's schools, and, conversely, that explore opportunities to consolidate where appropriate. This is of particular importance with respect to facilities that currently do—or in the future may—serve multiple jurisdictions, due to inherent land use implications of such decisions.	TRORC	Moderate	Ongoing	Medium	Various
In assisting towns with capital plan and budget formulation, ensure that member towns anticipate and plan for improvements to public school facilities	TRORC	Low	Ongoing	Medium	MPG
Encourage the development of school business partnerships that promote valuable and sustainable employment opportunities in the Region through vocational and workforce training experiential learning.	TRORC, Businesses, SUs	N/A	Ongoing	Medium	N/A
Facilitate coordination between town and school authorities to create and maintain safe pedestrian access and transit opportunities to educational facilities, in line with Safe Routes to School efforts	TRORC, Towns, SUs	Low	Ongoing	Medium	VTrans
Coordinate with the supervisory unions and the Agency of Education to create a regional approach to planning that considers the need for new school facilities and programs.	TRORC, State, SUs	Low	Ongoing	Low	Various
Coordinate with the supervisory unions and the Agency of Education to create a regional approach to planning that considers the need for new school facilities and programs.	TRORC, Towns	Low- Moderate	Ongoing	Low	Various

EMERGENCY MANAGEMENT: CHAPTER 11

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
State and Federal government 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 gages.	State/Federal	Moderate	Ongoing	High	State/ Federal
Individuals should have disaster kits ready in their homes and vehicles. They should have a plan as to what to do and where to go during foreseeable emergencies and know their local emergency shelter.	Individuals	Low	Ongoing	High	Private
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.	Towns/TRORC	Low	Ongoing	High	Towns
TRORC will work with all communities to annually update Local Emergency Operations Plans, ensuring that these plans take into account the Various needs of people with disabilities, pets, and those without access to transportation.	TRORC/Towns	Moderate	Ongoing	High	DHS/VT DEMAS
TRORC will continue to work with all communities on hazard mitigation planning efforts.	TRORC/Towns	Low	Ongoing	High	FEMA
TRORC Will continue to work cooperatively with local emergency response organizations, DEHMS, LEPC #12, social service agencies, long term recovery organizations, community resilience organizations, and others to help improve emergency planning response and recovery.	TRORC/ DEHMS/ Towns	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.	DEMHS/ Federal	Moderate	ASAP	High	Federal
FEMA must modernize flood maps, especially in Orange County, and incorporate newer flood frequency predictions into new maps.	FEMA	High	ASAP	High	FEMA
TRORC will assist towns and ANR in refining river corridor maps, within budgetary constraints.	TRORC/ANR	Low	Mid-term	High	Various
TRORC will 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



EMERGENCY MANAGEMENT *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will 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 will assist towns in response and recovery stages through damage documentation assistance and navigating federal and state grants.	Towns	High	Ongoing	High	FEMA
Communities should work to ensure that important local facilities that provide emergency services, water, food, gas or act as an emergency shelter are able to function in power outages.	Towns	Moderate	Ongoing	Medium	Various
Towns should encourage sprinkling in residential structures to reduce life and property loss from fire.	Towns	N/A	Ongoing	Low	N/A

ENERGY: CHAPTER 12

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
Actively support partnerships, strategies, and state and federal legislation that will ensure the affordable, reliable and sustainable production and delivery of electrical power to the region, in conformance with regional and municipal goals and objectives.	TRORC	N/A	Ongoing	High	PSB/ Various
Participate in the Public Service Board's review of new and expanded generation and transmission facilities to ensure that local energy, resource conservation and development objectives are identified and considered in future utility development.	TRORC	Low	Ongoing	High	ACCD
The Regional Commission will participate in long-range utility planning and development to ensure that local energy, resource conservation and development objectives are identified and considered in future utility development.	TRORC	Low	Ongoing	Medium	ACCD
Work in cooperation with state and local agencies, emergency service providers, regional suppliers and municipalities to develop local emergency contingency plans that ensure access to critical energy supplies and measures to reduce nonessential energy consumption in the event of an abrupt energy shortage.	TRORC	Low	Ongoing	Medium	DEMHS

ENERGY IMPLEMENTATION PLAN

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will support state efforts to provide additional funding for weatherization improvements, especially for low and moderate income populations.	TRORC	High	Ongoing	High	State
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. Provide outreach to communities with a COO to ensure that they are tracking submission of the RBES certificate.	TRORC	Moderate	Ongoing	High	DPS
TRORC will partner with Efficiency Vermont, Green Mountain Power, HVAC contractors, and others to identify and promote cold climate heat pumps.	TRORC	Low	Future	High	DPS
TRORC should provide outreach and education to communities to ensure residents are aware of existing incentives and rebates.	TRORC	Low	Ongoing	High	DPS
The State should support woodstove change out programs to lower heat cost and reduce particulate emissions.	State	Moderate	Future	High	State
TRORC will support continued expansion of high speed internet to allow for telecommuting.	TRORC	High	Ongoing	High	ACCD
TRORC will encourage employers to invest in workplace incentives for carpooling, cycling, public transportation use and telecommuting.	TRORC	Moderate	Ongoing	High	Vtrans
TRORC will support new bike/pedestrian projects in the region.	TRORC	Moderate	Ongoing	High	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).	TRORC	Low	Ongoing	High	Vtrans



ENERGY IMPLEMENTATION PLAN *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will continue to prioritize efforts 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.	TRORC	Low	Ongoing	High	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 towns	Low	Ongoing	High	Vtrans
TRORC will encourage communities and residents to identify areas with the potential for renewable energy generation.	TRORC	Moderate	Ongoing	High	DPS
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 in-state.	TRORC	Low	Future	High	DPS
TRORC will help interested towns meet the standards set forth in Act 174 for Enhanced Energy Planning.	TRORC	Moderate	Ongoing	High	DPS
DPS 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.	DPS	High	Future	High	DPS
TRORC will develop easy to understand materials about the state's energy goals and how they interact with local and regional planning.	TRORC	Low	Future	High	DPS
TRORC should work with DPS to develop a Renewable Energy Siting guide and maps and work with communities to identify areas where renewable energy generation is appropriate and preferred.	TRORC and DPS	Moderate	Future	High	DPS
TRORC should support and encourage state efforts to provide stable and predictable renewable energy policy incentives including net metering and standard offer.	TRORC	Low	Ongoing	High	DPS



ENERGY IMPLEMENTATION PLAN *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC should advocate for a stronger regional role in the PSB permitting process.	TRORC	Low	Ongoing	High	DPS
TRORC should continue to support efforts at the legislative level to strengthen the capacity of regional planning commissions and municipalities to plan for renewable energy generation and provide that information to the PSB and DPS in a manner that will be meaningful in the §248 CPG process.	TRORC	Moderate	Ongoing	High	DPS
TRORC should seek funding for an independent staff person who can work with homeowners to understand weatherization and other energy options.	TRORC	Moderate	Future	Low	DPS
DPS should work with fuel dealers to encourage them to become energy service providers.	DPS	Low	Ongoing	Low	DPS
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	Future	Low	DPS
Local Energy Committees and Planning Commission's 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.	Local Energy Committees and Planning Commissions	Low	Ongoing	Low	N/A
TRORC will work with VTrans to investigate the feasibility of commuter rail along the I-91 corridor.	TRORC and Vtrans	High	Future	Low	Vtrans
TRORC should support and promote the Vermont Bioenergy Initiative in cooperation with the VT Sustainable Job Fund's Bioenergy Initiative to address on-farm biofuel production under Act 250.	TRORC	Low	Ongoing	Low	DPS
TRORC should identify locations for alternative fuel stations in the Region and modify the Regional Plan to include them as allowed uses in appropriate locations.	TRORC	Low	Future	Low	DPS
TRORC should support efforts to switch municipal medium and heavy duty vehicles to biodiesel blends.	TRORC	High	Future	Low	DPS
TRORC should encourage state policy to adopt energy storage mandates and incentive programs.	TRORC	Low	Future	Low	DPS



ENERGY IMPLEMENTATION PLAN *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
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	Med	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	Med	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	Med	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	Med	State
Local Energy Committees should work with owners of rental housing to educate them of the financial benefits of weatherization investments and connect owners with contractors to complete weatherization projects	Local Energy Committees	Low	Future	Med	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 Vermont Energy Education Program (http://veep.org/ .)	DPS	Moderate	Ongoing	Med	DPS
Local Energy committee's should work with Neighborworks Heat Squad, COVER and community action agencies to promote their weatherization services.	Local Energy Committees	Low	Ongoing	Med	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	Med	DPS
TRORC and towns should support programs and initiatives that encourage the development of small homes (less than 1000 sq feet) as a way to reduce energy use.	TRORC	Low	Future	Med	ACCD



ENERGY IMPLEMENTATION PLAN *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will support net zero building programs by providing outreach and education to local planning commissions and energy committees and their communities	TRORC	Low	Ongoing	Med	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	Future	Med	DPS
Local Energy Committees provide information to builders and developers regarding the benefits of geothermal systems (including heat pumps).	Local Energy Committees	Low	Future	Med	N/A
TRORC and relevant non profits should conduct outreach and education by coordinating with advanced wood heat system vendors and contractors to hold informational public forums.	TRORC	Low	Future	Med	DPS
TRORC will encourage increased state incentives and rebates for efficient wood heat equipment, through communication with the Legislature.	TRORC	Moderate	Future	Med	DPS
DPS should provide guidance to communities seeking to develop district heating systems.	DPS	Low	Future	Med	DPS
DPS should conduct outreach efforts to public and non-profit entities and housing organizations to provide information on biomass heating options.	DPS	Low	Future	Med	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	Future	Med	N/A
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.	TRORC	Low	Ongoing	Med	ACCD
TRORC will encourage communities to develop bylaws that allow for the development of “makerspaces” as a way to reduce VMT. Revise the TRORC Regional Plan to include support for makerspaces in villages and downtowns.	TRORC	Low	Ongoing	Med	ACCD



ENERGY IMPLEMENTATION PLAN *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC should modify the Regional Plan to include specific language that requires developments that have a Substantial Regional Impact (as defined in the Plan) under Act 250 to demonstrate that they have consulted with transit providers about reasonably accommodating transit.	TRORC	Low	Future	Med	ACCD
TRORC should modify the Regional Plan to require all residential and large commercial land developments subject to Act 250 to evaluate the appropriateness of installing or reserving space for a transit stop.	TRORC	Low	Future	Med	ACCD
TRORC should 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	Med	Vtrans
TRORC will support community car sharing by promoting programs such as Go Vermont and CarShare Vermont.	TRORC	Low	Ongoing	Med	Vtrans
TRORC will support the development of intermodal transit facilities within the region to allow underserved areas access to multiple forms of transportation.	TRORC	High	Future	Med	Vtrans
TRORC should modify the Regional Plan to require that developments subject to Act 250 demonstrate they have or will take steps to incorporate parking spots with EV charging stations in order to meet regional goals.	TRORC	Low	Future	Med	ACCD
TRORC should encourage state policy changes to offer state buyer incentives for EVs.	TRORC	High	Ongoing	Med	DPS
TRORC should promote and share information provided by Drive Electric Vermont including their video highlighting the costs and benefits of EVs.	TRORC	Low	Ongoing	Med	DPS
TRORC will support the implementation of smart rates.	TRORC	Low	Ongoing	Med	DPS
TRORC should promote 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, 3 or advanced appliances.	TRORC	Low	Ongoing	Med	DPS



ENERGY IMPLEMENTATION PLAN *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
DPS 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.	DPS	Low	Ongoing	Med	State
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	Future	Med	DPS
DPS 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	Moderate	Ongoing	Med	DPS
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 through work with local energy committees and education and outreach.	DPS	Low	Future	Med	DPS

ECONOMIC DEVELOPMENT: CHAPTER 13

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 assist towns with village and downtown designation to provide incentives in these areas.	TRORC	Low	Ongoing	High	Various
TRORC will work with the 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, Towns, 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



ECONOMIC DEVELOPMENT *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
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
State, regional, and local economic development agencies should develop stronger financing/ funding mechanisms for business expansion and entrepreneurship.	State, Non-profits	N/A	Mid-term	High	N/A
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, ensuring that all areas have particularly good service that supports both current and future businesses and residents.	TRORC, State, Towns, Utilities	Low-Moderate	Short-term	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 work in concert with towns and development organizations to provide technical support (such as support with permitting, funding, brownfield assistance, etc.) to businesses wishing to stay in or relocate to core areas.	TRORC, Non-profits	Low	Ongoing	Medium	Various
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, Towns, School Boards, Businesses	N/A	Short-term	Medium	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.	Non-profits, Businesses	N/A	Mid-term	Medium	N/A



ECONOMIC DEVELOPMENT *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC will work with towns and development organizations in the Region to identify and inventory vacant and under-utilized sites/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, Towns, Non-profits	Low-Moderate	Short-term	Medium	Various
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 assist towns in crafting regulations to reduce fragmentation and leave land available for farming, forestry, and other land-based businesses.	TRORC, Non-profits	Low-Moderate	Short-term	Medium	Various
TRORC will support efforts to recognize businesses for excellence in creating better downtowns and villages, exemplary buildings, energy efficiency, and other activities that further regional goals.	TRORC, Businesses	N/A	Mid-term	Low	N/A
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 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, Towns, Businesses	Low-Moderate	Short-term	Low	Various

FLOOD RESILIENCE: CHAPTER 14

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
The Regional Commission should 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
TRORC should 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/Towns	Low	Ongoing	High	DEMHS
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
Existing homes and businesses at serious risk of flood damage should be identified and prioritized by towns in concert with the ANR River Management Section and the Regional Commission for mitigation actions such as elevation/relocation or purchase and demolition.	TRORC/Towns /ANR	High	ASAP	Medium	HMGP
Watershed-level planning should be done by towns with assistance from the Regional Commission to evaluate natural and constructed flood storage options upstream of existing areas of concentrated development that are at risk of flooding.	TRORC/Towns	Moderate	Mid-term	Medium	ANR
TRORC will work with the Granville, Stockbridge, Hancock, Rochester, and the U.S. Forest Service to address flooding on a watershed basis for the Hancock Branch, Upper White, West Branch and Tweed River.	TRORC/USFS	Moderate	Mid-term	Medium	ANR
TRORC will work with ANR, towns and landowners to lessen flood risk by restoring natural channel functions through berm or dam removal or intentional lowering of streambanks.	TRORC	High	Ongoing	Medium	ANR/ Various



FLOOD RESILIENCE *(continued)*

Action	Lead/ Partner	Estimated Cost	Timeline	Priority	Potential Financing
TRORC encourages more consistent, accurate and thorough identification of wetlands areas through the use of best available data and the adoption of local wetlands regulations and updated maps by the municipalities in the region.	TRORC	N/A	Ongoing	Medium	N/A
Areas not designated in either FEMA's maps or in VT ANR's maps, but which are flooded during a weather event should be added to local flood regulations.	Towns/FEMA	High	Mid-term	Low	FEMA