03 | Land Use

Long View of Vermont State University, Randolph Campus | *Source: ©First Light Studios*

Disclamer: This chapter has not been updated to incorporate changes enacted into law in 2024. The guidance on how to make land use changes is not yet available to TRORC. We will update this chapter when the guidance is made available, which will be ready by the 2025-2026 adoption process.

A. Background Issues

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

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

With all of this change, we still hope to meet one of the fundamental guiding goals of state land use law, which is to further the traditional pattern of development so as to maintain the historic settlement pattern of compact village and urban centers

separated by rural countryside. While this model is greatly responsible for sustaining Vermont's rural character, it has its challenges as this pattern was built when Vermont's countryside had an agrarian lifestyle where residents did not travel much and did not have cars and commute. For many, the luxury of having a home in a rural setting is why we choose to live here. But our choice to live in more rural areas means that we must use cars and trucks to get to work, access goods and services, and be part of our communities. When we plan for our future, we will need to consider where we live and how it does, or does not, support our economy, reduce energy use, encourage a sense of community, and protect our natural resources.

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

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

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

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

White River Junction | © Kevin Geiger

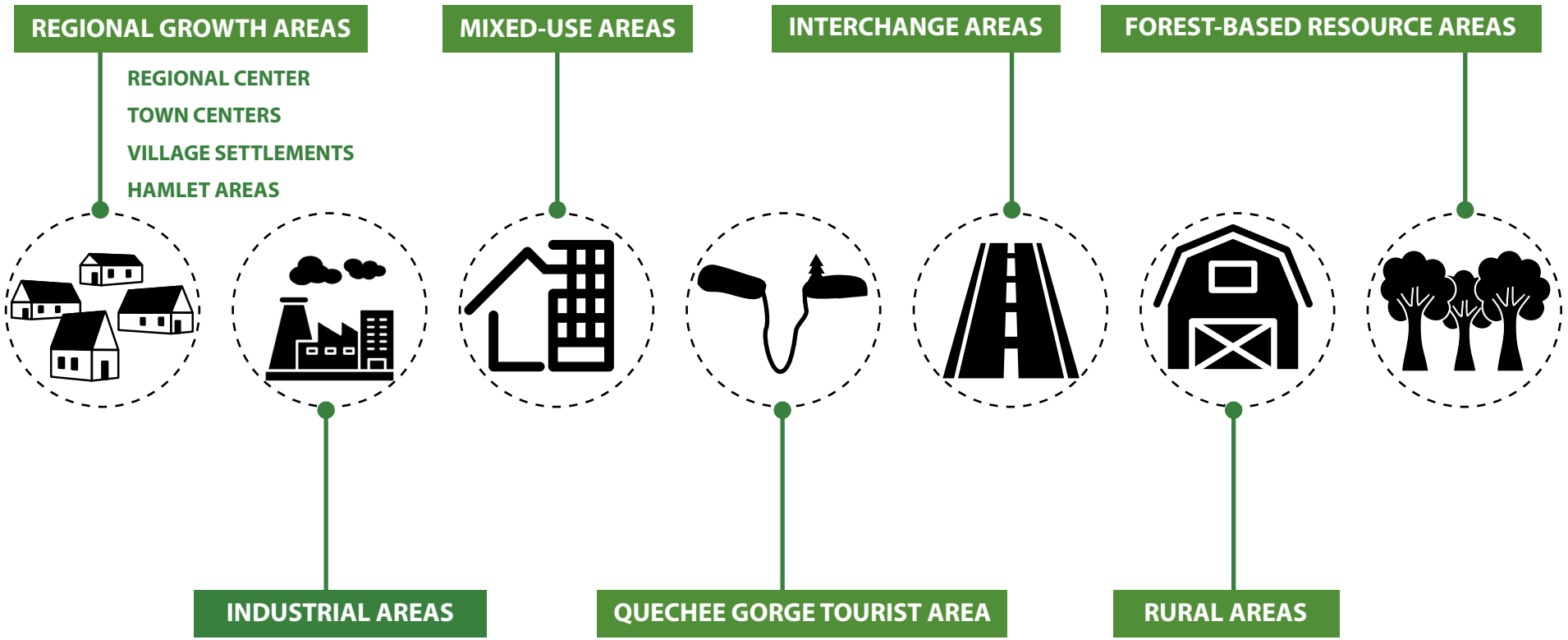
B. Future Land Use Areas

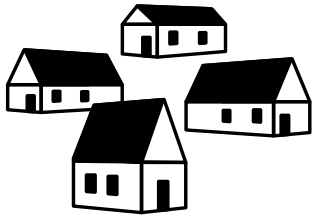
For the purposes of this Plan, seven types and four subtypes of Future Land Use Areas have been established and identified. These Areas have characteristics that identify them within the Region. They are designed to accommodate future growth based on the capacity of infrastructure and suitable land without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

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

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

Figure 3-1: Future Land Use Areas in the TRO Region





Regional Growth Areas

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

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

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

Regional Center

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

Town Centers

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

Village Settlements

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

Hamlet Areas

Hamlet Areas were significantly more prevalent throughout the communities in the TRO Region in the past. Presently those Hamlets that remain consist of groupings of buildings that are generally residential in nature. Hamlets are significantly smaller in scale than Village Settlements. They historically have served as the location for single-family homes, with a few stores and businesses supported primarily by local residents. Hamlets

are not regional markets or trade centers. These areas generally do not contain a community water supply or sewer system. Minor community facilities and services sometimes are located in these areas. Hamlet Areas in the Region are Bridgewater Center, Bridgewater Corners, Corinth, East Barnard, East Bethel, East Braintree, East Brookfield, East Granville, Gaysville (Stockbridge), Locust Creek, North Pomfret, North Thetford, North Tunbridge, Stockbridge Central School, Thetford Hill, Vershire, Vershire Center, Waits River (Topsham), West Braintree, West Bridgewater, West Brookfield, West Hartford, West Newbury, West Topsham, and areas immediately adjoining such areas.

Industrial Areas

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

There are Industrial Areas identified in seven communities in the TRO Region.

Mixed-Use Areas

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

Quechee Gorge Tourist Area

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

Quechee Gorge Bridge | © *John Knox*

Interchange Areas

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

Despite the benefits of interstate travel and the fact that the interchanges are important transfer points for traffic entering and exiting the Region, there are potential pitfalls to developing these areas. Increased traffic congestion and safety issues resulting from interchange developments can unacceptably decrease the level of service of roadways. One example, the Quechee interchange (I-89, Exit 1), contains acres of developable land located within a mile of the intersection of two interstate highways. This places this interchange at a high degree of vulnerability. Local development decisions made without adequate regard to preserving mobility will degrade the functionality of the public investments. An illustration of this consequence is on Interstate 89 at Exit 20, a strip of commercial development in nearby West Lebanon, NH, where access on and off the interstate for traveler services has been negatively impacted due to traffic and over development. Other typical problems associated with improper traffic management and development at interchanges include:

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

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

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

Interchange Area Policies - Specific

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

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

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

Exit 1 of Interstate 89 accesses U.S. Route 4 and connects travelers and commerce west to Woodstock, Killington, Rutland, and beyond, and east to White River Junction and Interstate 91. Route 4 is one of the few east/west highways spanning the narrower width of the State and therefore carries steady volumes of traffic. This interchange is located 1.5 miles from municipal sewer and water service; the residential wastewater system located to the west in Quechee is a shared leachfield system. The on- and off-ramps for the northbound and southbound lanes are located 0.5 miles apart. There are two different scenarios present at either end, with the northbound interchange leaving few opportunities for development due to the close proximity of 30-percent slopes and the interstate.

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

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

Randolph Interchange (I-89, Exit 4)

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

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

Since 1998 the Town of Randolph has explored opportunities for development at the Exit 4 Interchange. The Randolph Town Plan reflects many of these efforts, dividing the Interchange Area into four quadrants and incorporating design and use standards for each quadrant into its land use regulations. Key components include the following:

1. Provide space for the development of

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

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

Royalton Interchange (I-89, Exit 3)

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

Following the completion of I-89 56 years ago, several parcels of land near the interchange area have been developed. Primarily these changes in land use have been from rural residential and agricultural uses to industrial or commercial uses, but still much of the area remains undeveloped, consisting of farm and forestland. Several areas contribute to highly scenic vistas, particularly from I-89 and Route 107. Due to its prominent location, it is likely that new development at Exit 3 will continue. Solid transportation planning, coupled with sound land use planning principles, can minimize land use and traffic conflicts that have plagued many other Interchange Areas.

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

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

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

Rural Areas

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

Rural Areas has been largely constrained by on-site limitations, including soil composition, slope, and elevation; ease of access to highways; lot size minimums; and distance to community services.

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

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

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

It is in the interest of the Region and in conformance with our towns' plans that scattered development not continue unabated so that the present land use features within Rural Areas can be maintained and remain dominant. State planning goals, to which the Regional Plan must be consistent, direct plans to "maintain the historic settlement pattern of compact village and urban centers separated by rural countryside… (and that) intensive residential development shall be encouraged primarily in areas related to community centers and that strip development along highways should be discouraged." Rural Areas in the Region can provide substantial amounts of new opportunities both to reuse existing structures and to locate new homes, home occupations, and small businesses. These lands often may be the cheapest land to put an affordable home on. But there are tradeoffs and the overall effect of unplanned growth in certain locations and at a certain scale in Rural Areas is in the process of transforming the landscape from something recognizable as "rural" in Vermont into something that is not. Rural Areas are not simply suburbs waiting to be created; they are a valued land use to Vermonters in their own right, and can remain that way for a long time if we are careful in how we develop them.

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

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

One of the main land uses in the Rural Areas is agriculture, either in cropland or in pasture. These open lands are part of the aesthetic appeal of the

Region, underlie an agrarian culture, and form the basis for a significant part of our economy. Forestry is another important use, though most larger forests are in the Forest-Based Resource Area. Agriculture and forestry and the land they depend on are addressed both in this chapter and in the Working Landscape chapter.

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

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

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

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

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

Forest-Based Resource Areas

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

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

Both fragmentation and parcelization will impact the important functions we now enjoy from the large forest blocks in these areas, but unless lands are bought outright for conservation or have easements on them, some development is likely. How this development, from simple subdivision into lots to subsequent construction of roads and

buildings, takes place is a matter of public concern, as it can negatively affect forestry and the many species that depend on such areas, as well as generate off-site impacts, such as increased flood flows. Further development in remote areas would also create increased costs for towns to maintain or upgrade minor Class 3 or 4 roads and would work against regional energy goals as such development is much more reliant on single-occupant vehicle trips.

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

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

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

It is not a regional goal, and certainly not a town goal, to have nearly entire towns developed at a very low density. Consequently, the VCD map of these areas was used as a *starting point* when developing the Forest-Based Resource Areas regional future land use area, and then it was modified based on town future land use maps, infrastructure, the amount of land that performs interior forest or habitat connector functions nearby, and adjacent conserved or public lands. This resulted in the final Forest-Based Resource Areas shown on the future land use map.

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

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

Chateauguay No Town (CNT)

A particularly large and coherent part of the Region that exemplifies the Forest-Based Resource Areas is what is known as the Chateauguay No Town (CNT) area. This is a remote upland wilderness area consisting of approximately 55,000 acres covering parts of the Towns of Barnard, Bridgewater, Stockbridge, and Killington. With limited exception, land parcels are large, ranging up to several thousand acres in size. Human settlement is sparse, year-round public access is practically non-existent for most of the area, and public services (such as electric or telephone) are very limited. Roads are relatively narrow and steep and are not designed to sustain heavy vehicles or high volumes of traffic. The few inhabitants living here mostly provide their own power and lighting and maintain and plow their own roads. Much of the CNT is

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

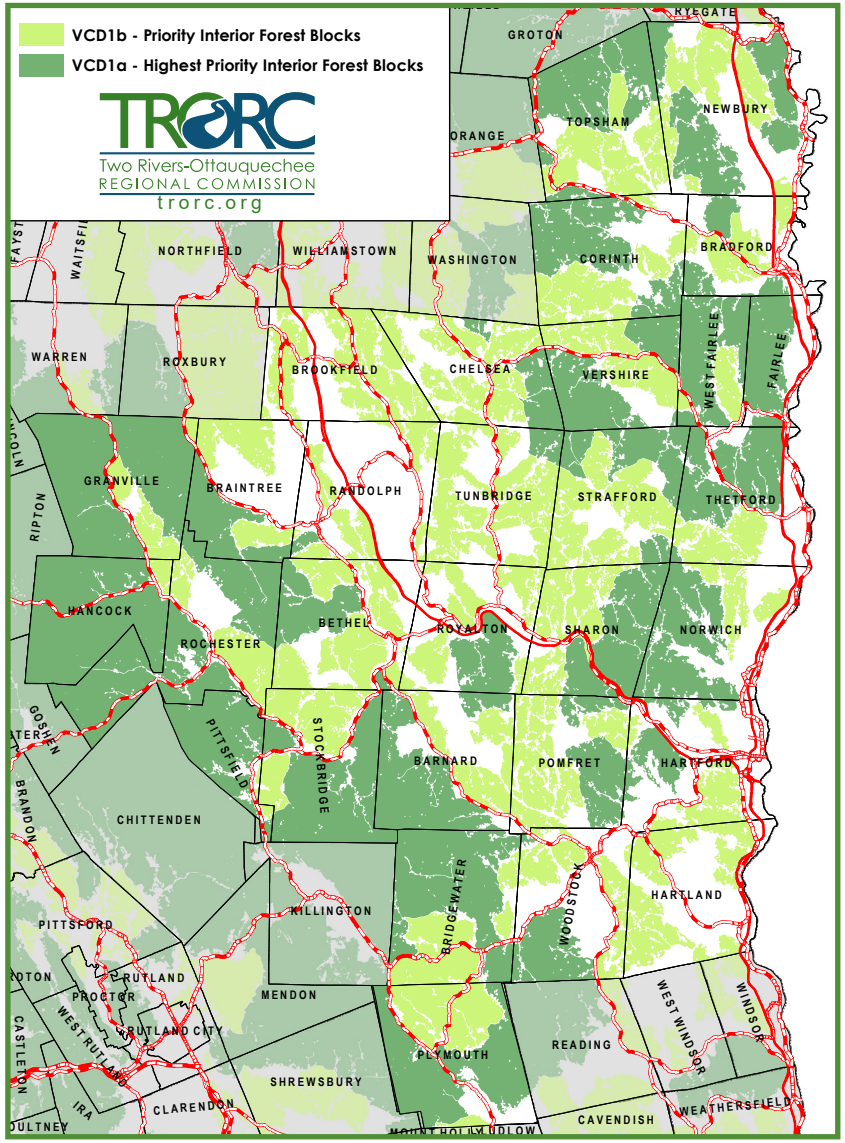


Figure 3-3: Highest Priority and Priority Connectivity Blocks in the TRO Region

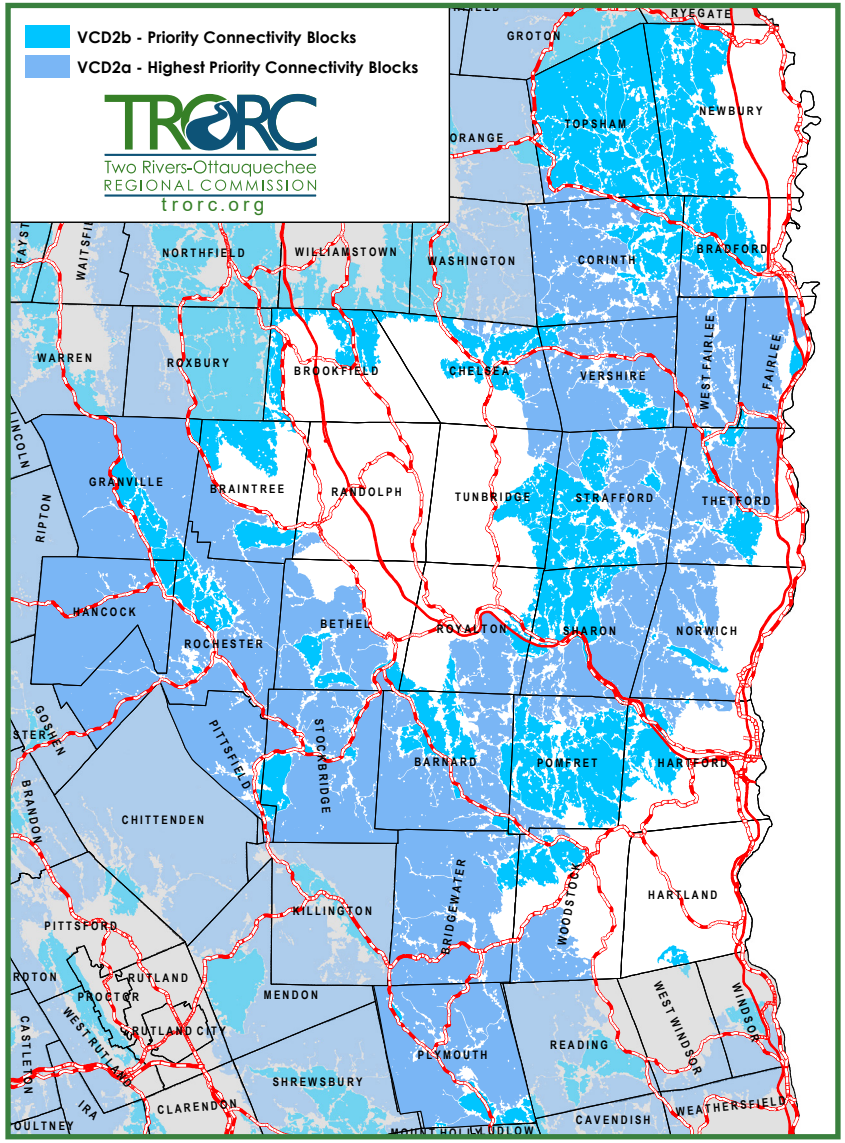
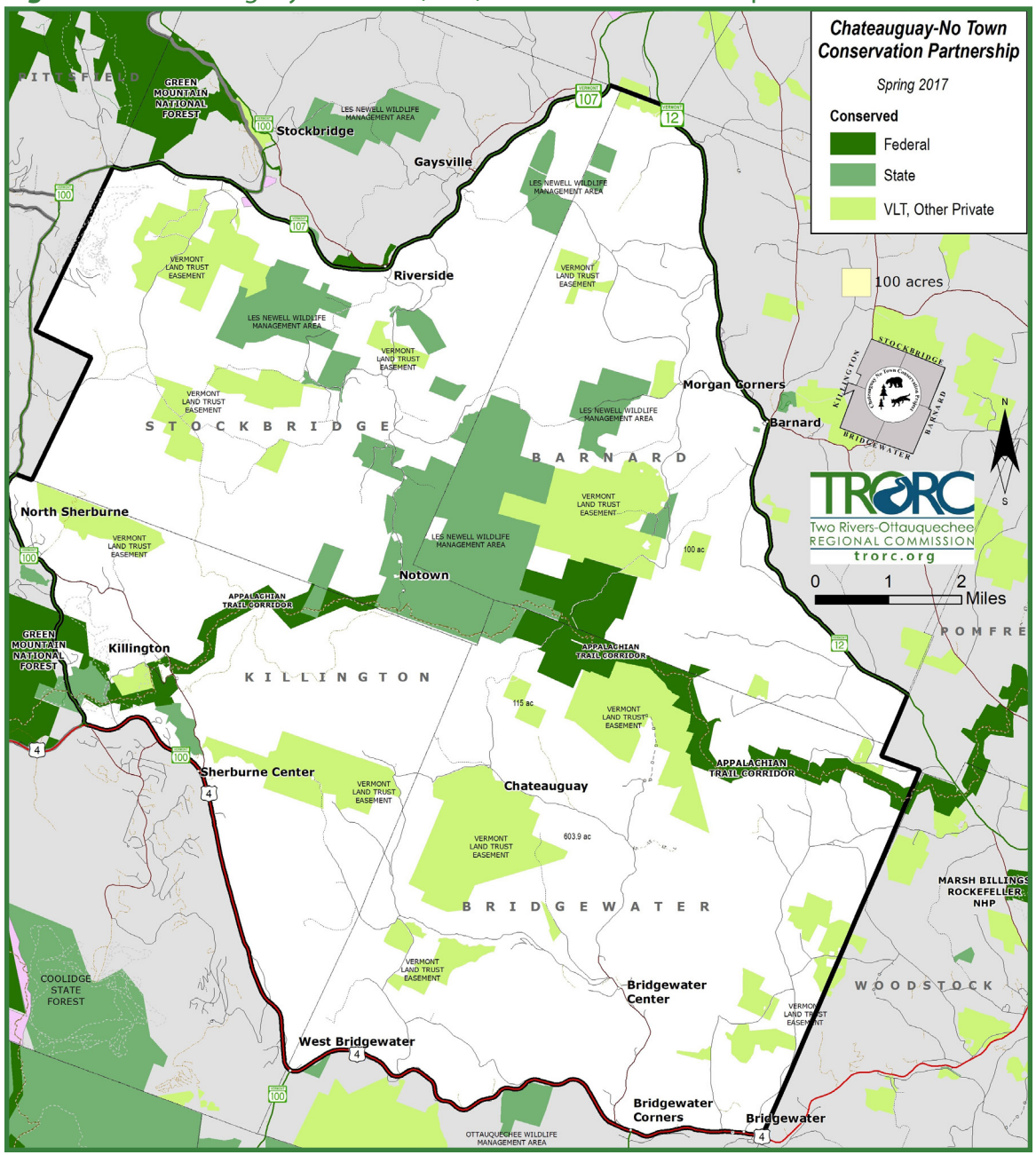


Table 3-1: Wildlife Present in Forest Patches

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

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

Figure 3-4: Chateauguay No Town (CNT) Conservation Area Map



owned by timber companies or families interested in using the land for wood production and land is enrolled in Vermont's Land Use Value Appraisal Program.

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

Like much of the Forest-Based Resource Areas, in the CNT multiple recreational activities are present, especially seasonal hunting camps, snowmobiling, and hiking. The Appalachian Trail passes through the central section of the CNT. The CNT also contains the 7,988 acre Les Newell Wildlife Management Area and provides valuable habitats for wildlife, including black bear, moose, bobcat, and deer. The entire CNT has been identified by the Vermont Department of Fish and Wildlife as bear production habitat. The CNT serves as a critical

link between the bear production areas south and north of US Route 4. The long-term stability of black bear depends on the retention of this area in a predominately undeveloped state.

Taylor Valley

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

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

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

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

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

Green Mountain National Forest (GMNF)

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

Orange County Headwaters (OCH)

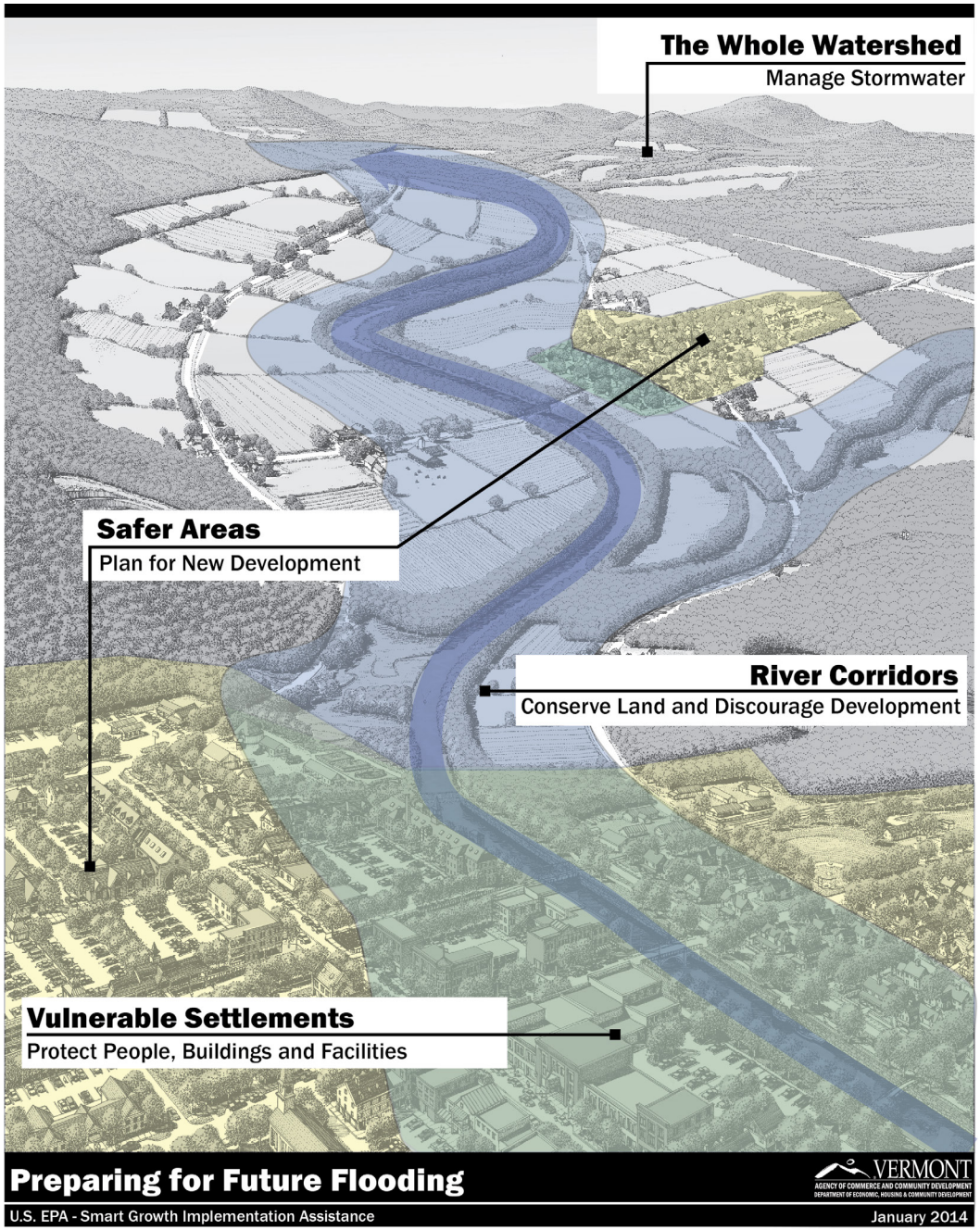
The OCH Project was started by landowners in the Towns of Washington and Corinth who had an interest in conservation. Through the Vermont Land Trust and the Upper Valley Land Trust, 31 OCH landowners have conserved 4,500 acres. Much of this land is forested.

Pine Mountain Wildlife Management Area (WMA)

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

Other Lands

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



Source: EPA

C. Flood Resilience

Types of Flooding

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

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

Heavy storms can also cause fluvial channel erosion, in which the bank erodes and the channel migrates sideways and/or cuts deeper. Fast-moving water in a stream channel may undermine roads and structures and permanently change

the channel itself, predisposing other roads and structures to future flooding damage. Flash floods can also mobilize large amounts of gravel and woody debris, depositing these in less steep areas as well as plugging culverts and leading to even greater damage. In Vermont and the Region, most flood-related damage is caused by flash flooding and fluvial erosion (erosion of stream banks). Flooding is the worst current natural threat to residents and infrastructure in the TRO Region and the State.

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

Causes of Flooding

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

"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.

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

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

Implications of Climate Change and Flooding

According to a white paper produced by the Vermont Agency of Natural Resources (VT ANR)'s Climate Change Team, climate change will likely bring about conditions that exacerbate flooding in Vermont. The summer season is expected to lengthen overall, and the total precipitation is expected to increase in all seasons except the fall. The frequency of heavy precipitation events is likely to increase in all seasons, with the heaviest precipitation events occurring during the summer months. Perhaps more importantly, precipitation will likely occur in shorter, more intense bursts and, consequently,

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

~VT Agency of Natural Resources

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

will produce precipitation that runs off the land more than it filters into it. An increase in extreme precipitation is already documented in the Northeastern U.S., especially after 1996. Precipitation models currently used in designing and building road infrastructure, informing policy decisions, and in regulating the location where structures and facilities are built rely on historical data that is no longer accurate for current conditions and will only become less accurate as climate change continues.

Flood Damages

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

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

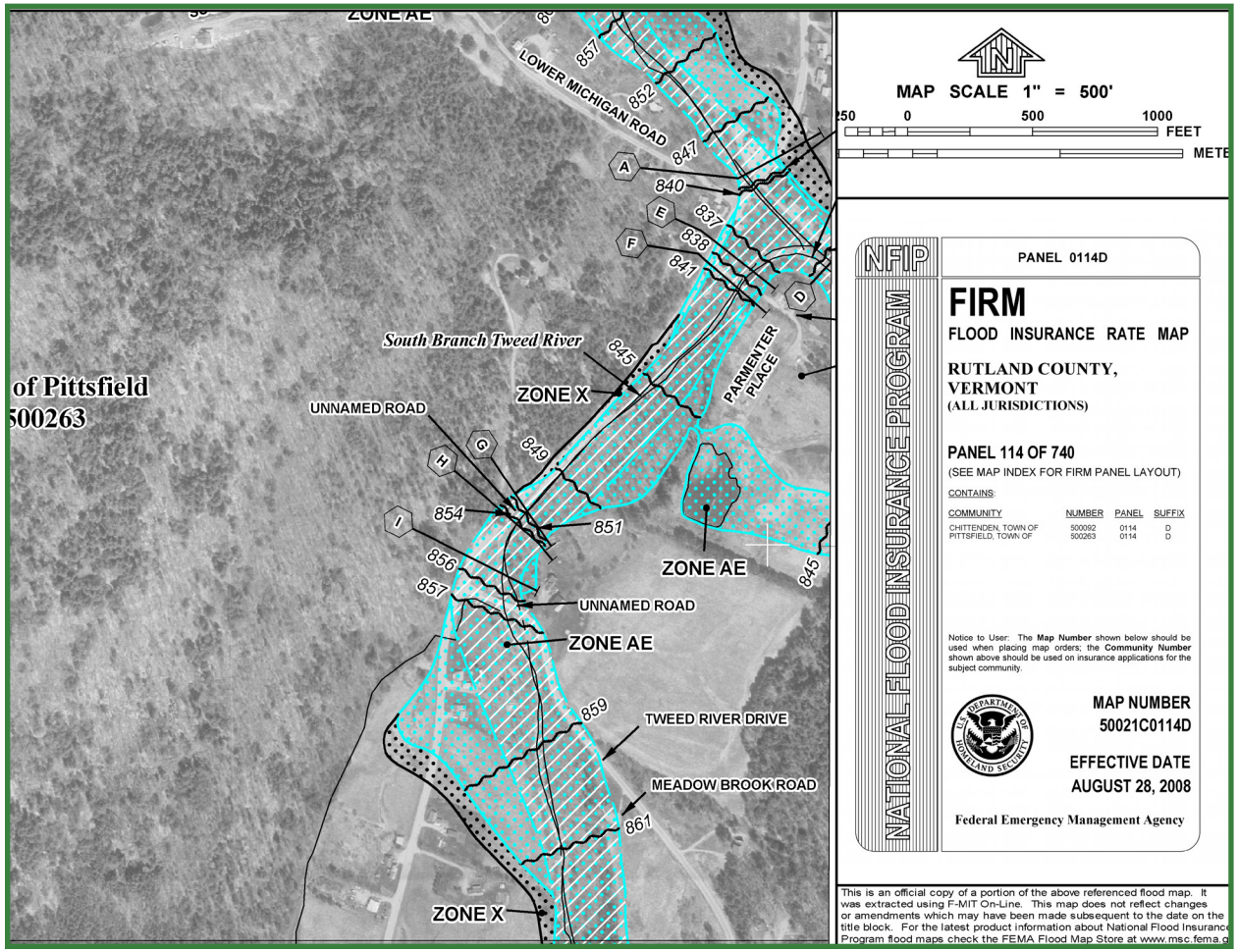
Vermont is a destination for travelers, especially in the fall foliage season. Due to the damaged road infrastructure after Irene travel was difficult. Finding an east-west route was especially difficult, as many of the major roads in the Region had been damaged at one section or another, including US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

Flood Hazard and Fluvial Erosion Hazard Areas in the TRO Region

Flood Hazard Areas

There are two sets of official maps that can govern development in the floodplain in Vermont. Though they have limitations, these maps are the best current means of showing areas with higher flood risk. The first of these is the Federal Emergency

Figure 3-5: Example of a FIRM Map in Pittsfield



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

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

A significant portion of flood damage in Vermont occurs outside of the FEMA mapped areas along these smaller upland streams, as well as along road drainage systems that fail to convey the amount of water they are receiving. Since FEMA maps in the Region are concerned only with inundation and also assume that river channels never move, they

are poor at showing that these other areas along small streams or alongside channels are at risk from flash flooding and lateral erosion. This leads to these areas often not being recognized as flood-prone or to the risk being identified simply as high water. Property owners in such areas outside of SFHAs are not required to have flood insurance.

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

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

Flood Hazard Regulations

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

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

Home/Property Buyouts

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

Lands That Help Prevent Flooding

Wetlands

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

and this loss has increased flood risk.

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

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

TRORC recognizes the critical value of wetlands in relation to the health of the water, wildlife, and plant resources in the Region and to the ecosystem as a whole. TRORC supports and encourages communities to identify and inventory wetlands within the Region and to adopt mechanisms for their increased protection. This information can increase the effectiveness of the state and federal regulatory process. Towns and communities have the ability to adopt mechanisms that provide stricter protections than are required by the State. For more on wetlands, please see the Natural Resources chapter.

Riparian Buffers and Lands Adjacent to Streams

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

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

Upland Forests

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

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

Healthy and well-managed upland forests reduce flooding by intercepting rainfall so that the force of rain is less erosive, increasing the infiltration and storage of rainwater into rich soils, and soaking up massive amounts of water during the growing season. The TRO Region is home to many different kinds of forested areas. For instance, the Region contains some of the vast unbroken forested ridgelines of the Green Mountain National Forest, as well as several large blocks of conserved forested areas, like the Chateauguay No Town Conservation Project, which stretches across the towns of Barnard, Bridgewater, Stockbridge, and Killington.

These and other forested lands not only provide ecological, scenic, and economic benefits but also help mitigate flood damage.

Stormwater and Impervious Surfaces

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

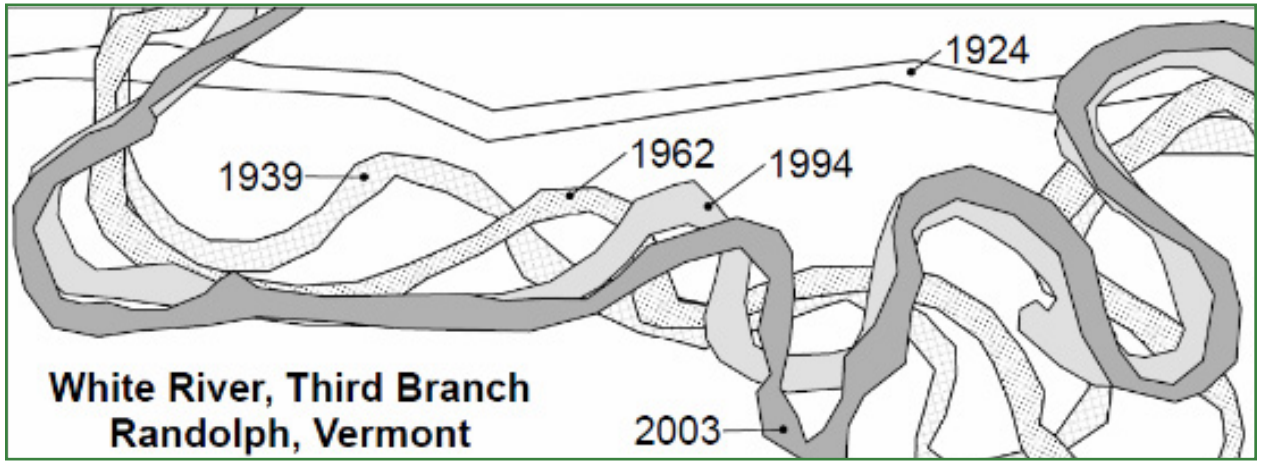
While widespread impervious surfaces are detrimental to water quality, and even as little as 10 percent impervious cover in a watershed can destabilize rivers, impervious surfaces in village centers and downtowns are the desired result of dense development and are important in the fabric of the Vermont landscape. It is critical to maintain the dense development of village centers and downtowns for their outright benefits to their community. However, it is also important to understand the stormwater runoff issues that exist and the various ways to mitigate their effects.

The Site-Specific Nature of Flooding

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

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

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



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

Goals and Policies: Overall Land Use

Goals

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

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

Policies

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

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

Policies: Regional Centers

Policies

1. Regional Centers should support a mixture of single family, two-family, and multi-family housing and should have the highest densities in the Region.
2. Commercial land uses, services, offices, wholesale business, industry, transport facilities, and community facilities and programs that serve regional needs and markets shall be located in Regional Centers.
3. Intense growth in Regional Centers is appropriate when a complete complement of public services such as water, sewer, and highways are available. To accommodate additional development, continued maintenance or expansion of such facilities must occur.
4. Local capital planning programs and public investment strategies must encourage renovation of existing buildings and in-filling within Regional Centers.
5. Retail establishments that provide goods and services to a regional clientele must be located within or immediately adjacent to Regional Centers and Town Centers to ensure that the vitality of these economic centers is maintained.

Policies: Regional Centers

Policies (continued)

6. Adaptive use of larger homes (including those of historic and architectural significance) for differing, more economical uses, such as offices and multi-unit housing, is consistent with this Plan. See the Historic Resources section for more information.
7. In historic districts or areas with a concentration of buildings with architectural or industrial significance, new development must be compatible with the existing character of the district or historic buildings but should not replicate the historic features exactly.
8. In areas containing structures and buildings of architectural or engineering significance, new development must be planned to be reasonably compatible with existing development and to not unduly impact the general and special character of the area.
9. Major developments like large governmental, medical, and commercial buildings must be located in Regional Centers where utilities, facilities, and populations are concentrated.
10. Highway investments within Regional Centers must include multi-modal transportation, pedestrian circulation, traffic calming, and streetscaping.

Policies: Town Centers

Policies

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

Policies: Village Settlements

Policies

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

Policies: Hamlet Areas

Policies

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

Policies: Industrial Areas

Policies

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

Policies: Mixed-Use Areas

Policies

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

Policies: Quechee Gorge Tourist Area

Policies

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

Policies: Interchange Areas - General

Policies

The following policies apply to all designated Interchange Areas:

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

Policies: Interchange Areas - General

Policies (continued)

e. A mixture of uses including non-residential and community facilities, and possibly residential;
f. Central focal points or public spaces serving the entire area;
g. A pattern and scale of development that complements traditional patterns and uses in Regional Growth Areas; and
h. Provision for park-and-ride commuter parking lots, transit access, and travel information services.

6. Municipalities with Interchange Areas are encouraged to promote creation and adoption of an Official Map, per 24 VSA §4421, to provide a legal means of creating an interconnected network of streets, walkways, and other public facilities or amenities on land designated as interchange development areas. Concepts employed in Master Plans and the Official Map should employ traditional streetscape patterns and designs deemed compatible with existing Regional Growth Areas.
7. Principal retail establishments must be located in Regional Growth Areas to minimize the blighting effects of sprawl and strip development along major highways, to protect the vitality of our villages and downtowns, and to maintain rural character.

Policies: Quechee Interchange

Policies

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

Policies: Randolph Interchange

Policies

1. The development of large-scale retail at the Randolph interchange—including shopping centers, malls, auto dealerships, and big-box stores—is inconsistent with this Plan.
2. Small-scale retail uses secondary or subordinate to primary uses and non-traditional to downtown Randolph or its village areas may be acceptable uses subject to in-depth review and evaluation by the Selectboard and Planning Commission.

Policies: Randolph Interchange

Policies (continued)

3. Any project planned for the interchange must employ design and construction standards that will ensure that development does not unduly impair the scenic resources of the area.
4. New development should be sited in areas that are not highly scenic, visible, or environmentally sensitive.
5. Future development at the interchange that requires improvements to Route 66, including traffic signals, turning lanes, or roundabouts, must be carefully evaluated. These should only be authorized where it is determined such a privately funded investment will not unreasonably endanger or interfere with the function, efficiency, safety, or use of this route.
6. New development must coordinate with existing development on shared access or retrofit access point locations to improve safety.
7. The types of land development appropriate for this interchange include offices, light industrial, residential, appropriately scaled traveler-oriented uses, and other similar uses that are not intended to draw on regional populations.
8. Principal retail establishments must be located in Regional Growth Areas to minimize the blighting effects of sprawl and strip development along major highways, to protect the vitality of our villages and downtowns, and to maintain rural character.

Policies: Royalton Interchange

Policies

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

Goals, Policies, and Recommendations: Rural Areas

Goals

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

Goals, Policies, and Recommendations: Rural Areas

Policies (continued)

1. Development shall be at a scale that is less dense than adjacent Regional Growth Areas.
2. Except along paved roads, development density greater than one principal structure per two acres is not appropriate to maintain rural character, but lot sizes are encouraged to be smaller than this in subdivisions so as to preserve a larger portion of the remaining lot as undeveloped and still meet overall density goals.
3. New freestanding, individual multi-unit residential buildings containing five units or less per structure are appropriate along Class 3 or better roads in order to stay in keeping with rural scale, but larger ones are not, excepting inns, outdoor recreation, and other lodging. However, a development may contain more than one such multi-unit building. Individual buildings with more than five residential units each are not appropriate in this Area. This unit limit does not apply to adaptive reuses, or to rooms in senior care facilities, outdoor recreation, or lodging establishments.
4. Adaptive reuses, such as small light industrial operations or multiple housing units, are encouraged in older existing large structures as towns desire, but care must be taken to not lead to development too intensive for the rural character.
5. Development of resource-based commercial uses is appropriate in these areas, with safeguards to protect neighbors from undue adverse impacts from noise, dust, and other nuisances (see also Section H in the Natural Resources chapter for more on extraction policies).
6. In Rural Areas that abut state highways and that are no greater than a quarter mile to Regional Growth Areas, land-consumptive uses may be appropriate, provided that they do not have an adverse impact on the character of the adjacent Regional Growth Area and that they mitigate the impacts of sprawl and strip development.
7. Projects subject to Act 250 must be planned and sited to satisfy the following:
    a. Utilize compact development design and locate new development or lots near or adjacent to existing road infrastructure and away from productive fields or forests to conserve the maximum feasible amount of usable farm, pasture land, or managed woodland;
    b. Locate non-agricultural buildings next to or within the forest edge (if any), instead of in open fields, to enable new construction to be screened by natural landscape features;
    c. Minimize buildings, utilities, or structures blocking or interrupting scenic vistas as viewed from a public highway;
    d. Take reasonable steps to protect historic features, wetlands, stream buffers, forest blocks, wildlife crossing areas, necessary wildlife habitat, and habitat connectors; and
    e. Give consideration to burying power and phone lines, if cost effective, when new roads are being constructed.
8. Use of planned unit developments or conservation subdivision design schemes is strongly encouraged as a means of providing rural development that concentrates development on part of a parcel in order to preserve larger lots that are more useful for farming, forestry, or wildlife habitat. Towns should consider incentives such as density bonuses.
9. Non-residential uses, including small service businesses, small professional offices, and inns are acceptable land uses for Rural Areas provided that such uses are located near existing transportation infrastructure; planned at a residential scale and form; are not primary or dominant uses in an area; would not unduly conflict with existing or planned residential, forestry, or agricultural uses; and do not unduly affect rural character.
10. TRORC supports the right of a resident to use a minor portion of a dwelling unit for a home occupation, which is customary in Rural Areas, provided it does not create a nuisance or have an undue adverse effect on the values noted in this Plan as being important to sustaining the character of Rural Areas.
11. Major retail enterprises or service centers that draw principally on regional market shares (including factory outlets, large grocery stores, fast-food establishments, and shopping malls) shall not be permitted in Rural Areas.

Goals, Policies, and Recommendations: Rural Areas

Policies (continued)

12. Development shall be designed to take reasonable steps to minimize accesses onto public roads, and projects that would create traffic demands that require the paving of rural gravel roads are not appropriate in Rural Areas.

Recommendations

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

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

Goals

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

Policies

1. Land above 2,500 feet elevation shall be maintained predominantly in a natural wilderness state, except in cases of wind power and/or telecommunications projects endorsed by this Plan.
2. Acquisition of lands, or conservation easements on lands, by the Federal Government, the State of Vermont and nonprofits is encouraged between willing parties. Management plans prepared for conserved or acquired areas must recognize the concept of preservation as well as forest utilization.
3. Outdoor recreation and forestry uses are encouraged provided these uses do not unduly impact other significant resources of the site.
4. Timber production is encouraged in this land use area provided it is done in accordance with best management practices and managed and harvested in ways that keep soil erosion and sedimentation of streams to a minimum.
5. Motorized recreation must be limited to designated existing trail/road networks and new connections between trails and be compatible with any critical wildlife habitat and water quality protections. Retention of snowmobile trails, many of which go over private land and are part of the statewide VAST trail network, is a priority. Conservation plans developed for landowners in this land use area should reflect, where practicable, the desire to retain this network of trails and not close or cut off important trail routes.
6. New structures capable of being occupied year-round are not appropriate in interior (greater than 300 feet from the forest edge) parts of these areas, but noncommercial seasonal camps serving hunters, snowmobilers, and other outdoor recreational users are appropriate.

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

Policies (continued)

7. Any use deemed appropriate to elevations over 2,500 feet should be sensitive to slow vegetative recovery and severe soil limitations and must avoid erosion.
8. Subdivisions and other development subject to Act 250 on lots over 30 acres shall minimize impacts on forestry potential and habitat values of undeveloped areas by concentrating development at the forest edge near other development and roads; use small lot sizes and shapes so that at least 80 percent of the land remains in a large undeveloped tract; minimize clearing of forest; and avoid the creation of additional roads or power lines that would further future development into interior areas.
9. Large subdivisions of more than ten structures are inconsistent with this Plan.
10. Outdoor recreation is encouraged. Development of snowmobile, hiking, and cross-country ski trails and similar recreational facilities are appropriate uses subject to meeting acceptable management practices and applicable state law.
11. Formal designation of Class II groundwater areas and Class A1 and B1 surface waters by the State of Vermont is encouraged within the land use area.
12. No development in its built-out state shall create more than one acre of impervious surface.
13. New developments must take reasonable steps to avoid disruption or loss of major identified wildlife corridor crossings. Transportation enhancement projects should be pursued to mitigate vehicle conflicts with wildlife, including signage and education and awareness programs along road corridors that host significant numbers of wildlife crossings. In addition, initiatives should provide for improvements to the transportation infrastructure to reduce vehicle collisions and wildlife fatalities.
14. Upgrading or paving gravel roads, upgrading electric distribution lines, or extension of utilities is not appropriate in this area, except as needed to serve outside areas, unless the public is clearly benefited thereby and where it is determined not to compromise the land use goals and policies for this Area.

Recommendations

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

Goals, Policies, and Recommendations: Flood Resilience

Goals

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

Policies

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

Goals, Policies, and Recommendations: Flood Resilience

Policies (continued)

1. Structural development or intensive land uses shall not occur in Class I and Class II wetlands unless there is an overriding public interest.
2. The purchase of flood easements is encouraged to both reduce flood risk to structures and to support owners who leave lands open.
3. Emergency planning for flood response and recovery is encouraged.

Recommendations

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

Land Use Endnotes

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