

Addison County Regional Plan

Adopted July 18th, 2018
Amended February 9th, 2022



ADDISON COUNTY REGIONAL PLAN

Adopted July 18, 2018
Amended February 9, 2022

Addison County Regional Plan Adoption History

Adopted: April 13, 1994

Amended: September 13, 1995

The Transportation Section was completely revised.

Pages 6.0-1 through 6.1-30 from the April 13, 1994 version of the Plan were removed and replaced with pages 6.0-1 through 6.1-107 in the September 13, 1995 Plan.

Amended: October 21, 1998

The Future Land Use Section was revised in part.

Pages 9.0-1 through 9.1-6 from the April 13, 1994 version of the Plan were removed and replaced with pages 9.0-1 through 9.1-7 in the October 21, 1998 Plan.

Readopted: October 21, 1998

The entire Plan as amended on October 21, 1998 was formally readopted.

The cover page and the Regional Plan Adoption History page were replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections continue to be in effect under the October 21, 1998 readoption.

Amended: May 8, 2002

The Population and Housing Section was completely revised. The Introduction and Consistency Sections were revised in part.

The following pages from the April 13, 1994 version of the Plan were removed – i through x; 1.0-1 through 1.0-3; 3.0-1 through 3.2-24; and 10.0-1 through 10.2-11 – and were replaced with pages 1-1 through 1-10, 3-1 through 3-48 and 10-1 through 10-12 in the May 8, 2002 Plan.

Readopted: May 8, 2002

The entire Plan as amended on May 8, 2002 was formally readopted.

The cover page and the Regional Plan Adoption History page were replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections continue to be in effect under the May 8, 2002 readoption.

Amended: May 12, 2004

The Economy Section was completely revised. The Introduction and Consistency Sections were revised in part.

The following pages from the April 13, 1994 version of the Plan were removed – 5.1-1 through 5.1-19 – and replaced with pages 5-1 through 5-40 in the May 12, 2004 Plan. The following pages from the May 8, 2002 version of the Plan were removed – 1-1 through 1-10 and 10-1 through 10-12 – and replaced with pages 1-1 through 1-10 and 10-1 through 10-12 in the May 12, 2004 Plan.

Readopted: May 12, 2004

The entire Plan as amended on May 12, 2004 was formally readopted.

The cover page and the Regional Plan Adoption History page were replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections continue to be in effect under the May 12, 2004 readoption.

Amended: May 11, 2005

The Land Use Section was completely revised. The Introduction and Consistency Sections were revised in part.

The following pages from the October 21, 1998 version of the Plan were removed – 9.1-1 through 9.1-7 – and replaced with pages 8-1 through 8-9 in the May 11, 2005 Plan. The following pages from the May 12, 2004 version of the Plan were removed – 1-1 through 1-10 and 10-1 through 10-12 and replaced with pages 1-1 through 1-8 and 9-1 through 9-12 in the May 11, 2005 Plan.

Readopted: May 11, 2005

The entire Plan as amended on May 11, 2005 was formally readopted.

The cover page and the Regional Plan Adoption History page were replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections continue to be in effect under the May 11, 2005 readoption.

Amended: November 9, 2005

The Utilities, Facilities and Services Section was completely revised.

The following pages from the April 13, 1994 version of the Plan were removed – 7.1-1 through 7.14-2 and 8.1-1- 8.1-22 – and replaced with pages 7-1 through 7-109 in the November 9, 2005 Plan.

Readopted: November 9, 2005

The entire Plan as amended on November 9, 2005 was formally readopted.

The cover page and the Regional Plan Adoption History page were replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections continue to be in effect under the November 9, 2005 readoption.

Amended: May 14, 2008

The Transportation Section was completely revised; The Land Use Section and accompanying maps were updated.

The following pages from the September 13, 1995 version of the Plan were removed – Transportation Section 6.1-1 through 6.1-107 and replaced by a new Transportation Section pages 6-1 – 6-86, plus appendices A-G at pages 6-88 – 6-108. The Land Use Section pages 8.1- 8-9 from the May 11, 2005 plan amendments were removed and were replaced with pages 8-1 through 8-10 in the May 14, 2008 Plan.

Readopted: May 14, 2008

The entire Plan as amended on May 14, 2008 was formally readopted.

The cover page, Table of Contents and the Regional Plan Adoption History page were updated and replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections continue to be in effect under the May 14, 2008 re-adoption.

Amended: December 14, 2011

The Natural Resource Section was completely revised; The Land Use Plan Section maps were updated; the Historic, Cultural, Municipal and Recreation Facilities portion (part 7.6) of the Utilities and Facilities Section was updated.

The following pages from the May 14, 2008 version of the Plan were removed – Natural Resource Section 4.0-1 thru 4.9-5 and appendices A- E and replaced by a new Natural Resource Section pages 4-1 thru 4-108. The Historic, Cultural, Municipal and Recreation Facilities portion (part 7.6) of the Utilities and Facilities Section was replaced. The Land Use Section pages 8-7 thru 8-10 from the May 14, 2008 plan amendments were replaced.

Readopted: December 14, 2011

The entire Plan as amended on December 14, 2011 was formally readopted.

The cover page, Table of Contents and the Regional Plan Adoption History page were updated and replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections continue to be in effect under the December 14, 2011 re-adoption.

Amended: March 9, 2016

The Introduction, Substantial Regional Impact and Future Land Use Sections were completely revised and a new Section IIA, Implementation, was added.

The following pages from the December 14, 2011 version of the Plan were removed – The Introduction Section, pages 1-1 thru 1-8 and replaced by a new Introduction Section pages 1-1 thru 1-6. The Substantial Regional Impact Section, pages 2-1 thru 2-4 and replaced by a new Substantial Regional Impact Section, pages 2-1 thru 2-4; The Future Land Use Section, pages 8-1 thru 8-10 and replaced by a new Future Land Use Section, pages 8-1 thru 8-13.

Readopted: March 9, 2016

The entire Plan as amended on March 9, 2016 was formally readopted.

The cover page, Table of Contents and the Regional Plan Adoption History page were updated and replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections not replaced were re-adopted and continue to be in effect under the March 9, 2016 re-adoption.

Amended: April 11, 2018

The Transportation Section was completely revised.

The following pages from the March 9, 2016 version of the Plan were removed – the Transportation section, pages 6-1 thru 6-109 and replaced with a new Transportation section, pages 6-1 thru 6-57.

Readopted: April 11, 2018

The entire Plan as amended on April 11, 2018 was formally readopted.

The Transportation Section of the plan was updated and replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections not replaced were re-adopted and continue to be in effect under the April 11, 2018 re-adoption.

Amended: July 18, 2018

The Energy Section was completely revised.

The following pages from the April 11, 2018 version of the Plan were removed – the Energy section, pages 7-25 thru 7-45 and replaced with a new Energy section, pages 7-25 thru 7-103.

Readopted: July 18, 2018

The entire Plan as amended on July 18, 2018 was formally readopted.

The Energy Section of the plan was updated and replaced. Note: Each plan section retains the date the section was last amended in the header. However, all plan sections not replaced were re-adopted and continue to be in effect under the July 18, 2018 re-adoption.

Amended: February 9, 2022

The Population and Housing Section was completely revised.

The following pages from the July 18, 2018 version of the Plan were removed – the Population and Housing section, pages 3-1 thru 3-48 and replaced with a new Population and Housing section, pages 3-1 thru 3-53.

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1. INTRODUCTION

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1.1. Introduction to the Regional Plan

A. What Is a Regional Plan and a Regional Planning Commission?

Addison County Regional Planning Commission

In 1967, the Vermont Legislature passed measures enabling municipalities to join together to form regional commissions. Addison County Regional Planning Commission (ACRPC) is composed of delegates and alternates that are appointed by each municipality's legislative body (town selectboards or city aldermen). ACRPC has 38 municipal delegates, assuming all municipalities fill all available positions. Municipal representation reflects population; so larger municipalities have more representatives. All municipalities have at least one delegate. Alternates represent the municipality when the delegates cannot. Twenty towns and one city presently comprise ACRPC's members. The Commission also makes space available for six citizen interest group representatives.

The Regional Plan

This Regional Plan charts a course for the Region through the year 2021 and supersedes any prior plans. ACRPC will work to implement the Plan's goals, policies and programs.

B. The History of the Regional Plan

The passage of Act 200 in 1989 dramatically changed the content of regional plans. From 1990- 1994 ACRPC worked to create a plan satisfying the act. That work resulted in ACRPC's adoption of a Regional Plan on April 13, 1994. The commission agreed that five years should not lapse before the elements in the plan were revised. Plan sections are edited and revised when needed within the five year planning cycling rather than editing and revising the entire plan at the same time. The Plan re-adoption timeline depicts how ACRPC has updated its plan since its original 1994 plan.

C. How Is the Plan Used, When Does It Apply and Who Uses It?

The Commission drafted the Plan to serve as a useful source of information and data for municipal officials and citizens. Citizens and municipalities may use the Plan to support grant applications, infrastructure or conservation projects. The Plan has regulatory effect in a limited number of areas including: Act 250/Environmental Board Hearings, Solid Waste (facility certification 10 V.S.A. § 6605) and Public Good Determination Hearings (related to siting of electric generation or transmission facilities 30 V.S.A. § 248). Lastly, the Plan contains an Implementation Section that prioritizes recommended actions drawn from each section of the plan to help citizens or municipalities prioritize work in the Region.

Relationship to Municipal Plans

ACRPC intends that municipalities and citizens will use this plan as a guide and data resource in their planning work and will call their delegates or the commission office when they need additional assistance.



(March 9, 2016) **ACRPC**
Introduction

D. How Do I Read the Plan?

The plan is generally advisory in nature, purpose and effect. However, as previously noted, it does have a limited regulatory purpose. The plan is intended to strengthen local governments by providing regional information and planning guidance. It recognizes the independent tradition of local government and seeks to encourage and facilitate cooperation among these governments, regional agencies and state government.

Because of the natural association of all aspects of the Regional Plan, the policies in any section are not to be considered in isolation, but rather in conjunction with all sections and chapters in this Regional Plan. Statements designed to guide the growth and development of the region preface each section. The use of these guiding statements is defined here to help the reader understand the context in which they are used.

Goal(s)

Definition: Broad statements of what the region ultimately wants to achieve.

Comment: These are “timeless” overarching concepts, and as stated are not placed in any kind of schedule.

Objective(s)

Definition: Objectives constitute the steps necessary to reach the stated goals, expressed in a specific time frame in which an action should be completed.

Comment: Objective statements must be realistically feasible to achieve given the resources available within a specific time period. Individual goals could have multiple objectives associated with them.

Policy(s)

Definition: Enduring rules or standards that guide the implementation of the goals and objectives.

Comment: Policies contain the principles or standards that guide the choices concerning the implementation measures used to reach the plan's goals.

Recommended Actions

Definition: Specific actions to be taken to reach the stated goals and objectives.

Comment: Recommended actions spell out the individual steps necessary to accomplish goals (The who, what, when, where and how).

Structure of the Sections

Plan sections are organized as follows:

1. Introduction and Summary

This portion includes a brief explanation of the section and a “quick read” summary of the most salient points in the documentation and analysis section.

2. Goals, Policies and Recommendations

This portion lists the goals, policies and recommendations associated with each section of the plan. The plan also includes all of these goals, policies and recommendations at the beginning of the regional plan document so they can be found easily.

3. Documentation, Analysis and Appendixes

The documentation and analysis portion of each plan section provides regional statistics, history and analysis of the section topic. An appendix may accompany the topic discussion.

E. How Does the Plan Get Adopted and Revised?

The plan is adopted by a vote of the commissioners representing municipalities in the Regional Commission (24 VSA § 4348(f)). At least sixty percent of the municipal representatives must vote for adoption. ACRPC then submits the plan to the legislative bodies of the region's municipalities (town selectboards or the city mayor and alderman). The legislative bodies have a 35 day period of opportunity to veto the plan. If the commission receives certification from a majority of the municipalities in the region vetoing the proposed plan it is considered rejected. Unless a plan is rejected, it takes affect after the 35-day waiting period.

Regional Plans expire every five years after they are adopted. Each new Plan adopted by the commission includes updated information.

F. Acknowledgements

Since 1990 numerous committees, delegates, alternates, citizens, technical advisors and staff have spent hours working on the Regional Plan. Without their effort, the plan could not have been produced nor could it continue to be updated; many thanks to all.

Adam Lougee, *Executive Director*

1.2. Vision Statement

In the future, the Addison Region will be a place where...

1. You will find a diverse business economy, and in particular, a flourishing farm and forest economy with both local and out-of-region markets.
2. Residents find employment locally.
3. Natural resources (e.g., timber and agricultural resources) are exported as manufactured products rather than raw materials to the extent feasible (e.g., table versus raw lumber; ice cream versus fluid milk).
4. You will find small village and town clusters interspersed with economically viable open, forested and farmed working lands.
5. Growth is sustainable, monitored, and guided.
6. The economy is healthy, diverse and technologically varied.
7. The economy provides attractive job opportunities for the next generation.
8. Businesses are often locally owned and operated.
9. Educational opportunities keep pace with demands of society and the economy.
10. There continues to be substantial private ownership of resources so that people are independent and self-reliant and free to make their own decisions.
11. Cultural, recreational and civic opportunities are abundant, varied, and inspired.
12. Small-town sense of community is maintained, where people feel a sense of belonging and responsibility.
13. We continue to rank high in the quality of our air, water and soil.
14. Tourism continues to strengthen the local economy and provide employment opportunities.
15. The land base continues to reflect varying degrees of human impact, with portions of the region in wilderness, managed use and settlement.
16. The people have a strong understanding of, and support for, stewardship of land and other natural resources.
17. People continue to be attracted by the aesthetic qualities of both the natural and built environment.

1.3. Regional Plan Overall Goals

- A. Support development patterns that will maintain the historic character of the region; namely urban centers and villages separated by rural countryside.
- B. Encourage a strong and diverse economy that provides economic opportunity, satisfying and rewarding employment, improved income and economic growth.
- C. Assist in providing access to educational and vocational training opportunities that will foster full realization of the abilities of the population in the region.
- D. Facilitate a transportation system that balances the goals of safety, convenience, cost, energy efficiency, environmental protection, economic growth and recreation.
- E. Protect important natural and historic features of the region's landscape.
- F. Protect, and where conditions are substandard, enhance the quality of air, water, wildlife and land resources, as they exist independently and in relation to one another.
- G. Encourage conservation and efficient use of energy and the development of renewable energy resources.
- H. Maintain and enhance recreational opportunities for Vermont residents and visitors.
- I. Strengthen diversified sustainable agricultural and forest industries.
- J. Support the economic vitality of the region's downtowns.
- K. Encourage the efficient use of the region's natural resources and the appropriate extraction of earth resources and the proper restoration of the aesthetic qualities of the area.
- L. Encourage the availability of safe and affordable housing.
- M. Support an efficient system of public facilities and services to meet future needs.

2. SUBSTANTIAL REGIONAL IMPACT

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Title Twenty-four of the Vermont Statutes Annotated (VSA), Sub-Section 4345a(17), approved by the Legislature in 1989 requires that all regional plans include a “substantial regional impact” element. 24 V.S.A. §4345a(17). The primary purpose of the substantial regional impact element is for use in State regulatory proceedings. Act 250, the State of Vermont’s primary statewide land use regulation, evaluates development projects based upon the project’s impacts under ten broad ranging criteria and a number of sub-criteria. Criterion 10 of Act 250 requires the District Environmental Commission to find that a project conforms to the Town Plan and to the Regional Plan. Sometimes these plans disagree. In that case, the District Commission has to decide which plan to use. The substantial regional impact element of a regional plan provides each district commission with objective criteria to inform its decision.

Section 4345a(17) states that local plans apply in all cases, except when a conflict between the Town and Regional Plan exists, *Id.* The Addison Regional Plan’s Substantial Regional Impact element contains a detailed framework for determining when a project will trigger the Region’s substantial regional impact criteria. In general, projects with substantial regional impact or benefits significantly affect facilities, services, housing, etc. located outside the Town where the project is located, or impact or benefit a natural resource or infrastructure of regional significance and therefore fall under the purview of the regional plan.

ACRPC also uses the substantial regional impact criteria to determine the projects regulated by Act 250 in which ACRPC will actively participate. ACRPC’s process for choosing when and how it participates is also outlined in this section.

A. Authorization

Title Twenty four of the Vermont Statutes Annotated, Sub-section 4345A(17), requires that regional plans:

"define substantial regional impact as that term may be used with respect to its region."
24 V.S.A. § 4345A(17).

It then states that, "This definition shall be given due consideration, where relevant in State regulatory proceedings." Id.

Two state regulatory proceedings that specifically require the reviewing authority to review regional plans include:

1. Chapter 151 of Title 10 of the Vermont Statutes Annotated, entitled, "State Land Use and Development Plans", commonly known as "Act 250", which includes compliance with local and regional plans as one of the 10 criteria district commissions use to evaluate land development large enough to trigger jurisdiction;
2. Section 248 of Title 30 of the Vermont Statutes Annotated, which regulates utilities and large scale energy generation and transmission, also includes a subsection that requires the Public Service Board include compliance with local and regional plans in its review of a project's compliance with the "orderly development of a region". See 30 V.S.A. §248(b)(1).

B. Application

There are three specific situations in which these guidelines will be used:

1. First, ACRPC uses the "substantial regional impact" criteria to determine whether, it will actively participate in the Act 250/Section 248 process for any given project, and if it will participate, how it will participate;
2. Second, ACRPC's uses the "substantial regional impact" criteria to determine its course of action if a conflict exists with a local plan on a project determined to have a substantial regional impact; and
3. Third, the "substantial regional impact" section directs the District 9 Regional Commission and project applicants how ACRPC's Plan should be read in cases of conflict or potential conflict with a municipal plan.

ACRPC staff reviews all development subject to the jurisdiction of Act 250 or Section 248. The first way it applies the "substantial regional impact" criteria is to determine whether or not the project contains sufficient scope to demand ACRPC's attention. ACRPC's process for staff and committee evaluations of projects, and governing how ACRPC will participate in the process if it finds a project to have substantial regional impact, is described in Sub-section D of this chapter on process.

Part of ACRPC's process is to try to reconcile any differences between a municipal plan and the regional plan. If ACRPC and a municipality cannot agree about how to reconcile their respective plans and ACRPC finds a substantial regional impact, this Section instructs the District 9 Commission to give the Regional Plan effect over the local plan. This section also intends to limit the primacy of the Regional Plan only to those aspects of the development that affect substantial regional interests; otherwise the local plan should be given effect. In other words, if a project is deemed to have a substantial regional impact because it is located near a significant regional highway, only those aspects of the regional plan relating to traffic impacts on the highway will be given effect, otherwise the local plan will control.

C. Definition

Projects which trigger one of more of the following will be considered to be projects with "substantial regional impact."

1. A project or development which would substantially affect the traffic-carrying capacity of regionally significant highways, or substantially change the service area or capacity of inter-municipal facilities, including, but not limited to, union high school districts, or public water or sewer systems serving more than one municipality;
2. Physical improvements to a major employer's facility, which include expansion of a major employer (over 50 employees) by the addition of 25% or more employees, or by an increase of 25% or more in shipping/receiving activity using over-the-road vehicles;
3. Relocation of a major employer (over 50 employees) from one town to another;
4. Location of a new major employer (over 50 employees) in the Region;
5. Location or expansion of regional public and quasi-public facilities such as solid waste facilities, union district schools, the County courthouse, expansions or reductions in air/rail services, road improvements on Class I and Class II roads, power generation, and energy transmission facilities;
6. Projects which are located either on the same parcel, or on abutting parcels to "Regionally Significant Resources" as identified by the Regional Plan, Maps 8-2A & B, and have an impact on or benefit to these resources; or
7. Projects which will have significant off-site impacts on or benefits to "Regionally Significant Resources" as identified by the Regional Plan, Maps 8-2A & B, located at a distance from the project site.

D. Procedures for Review of Projects with Substantial Regional Impact

1. Staff will review each Act 250/ Section 248 project impacting the region and draft a memo to the Act250/Section 248 committee describing the project proposed and making an initial determination regarding whether the project as proposed triggers the substantial regional impact criteria as described in the Addison Plan. Any member of the

Commission or member of the Committee may also request that the Committee review any project for a substantial regional impact.

2. The Act 250/Section 248 Review Committee will serve as lead in reviewing projects that may have substantial regional impacts (“SRI”).
3. When reviewing a potential SRI project, the Committee will expand to include the Addison County Regional Planning Commissioner(s) from the town where the project is located, and from the other affected towns.
4. The Committee will first review the project to determine whether it has SRI.
5. If the Committee finds a project has SRI, the Committee will determine how and on which criteria it believes ACRPC should participate and make a recommendation to the full Commission or the Executive Board if the timeframe is short.
6. Conflict resolution--
 - a. In cases where a conflict between a municipal plan and the regional plan is not clearly established, due to generalized language, lack of sufficient data to determine conformance, etc., then the plans should be read to harmonize their intent;
 - b. In cases where a conflict between the local and regional plans is clearly defined, conflict resolution prior to the initial Act 250/Section 248 hearing is strongly supported by this Plan;
 - c. When such a mediation or negotiation effort results in an agreement between the affected town(s), and ACRPC Act 250/248 Committee, which mitigates impacts on the identified resource of regional importance, such that the intent of the applicable regional plan policies are met, such agreement will be presented to the full Commission for action with favorable recommendation by the Act 250/248 Committee. In reaching agreement, the parties will consult with the applicant and may consult with State agencies or other technical advisors as necessary. Such agreement, when approved by the Regional Commission, and the planning commission and legislative body of each participating town, will then become the joint testimony of the Town(s) and the Regional Commission on the subject(s) of the agreement; and
 - d. If a project impacts multiple towns, ACRPC will seek to provide a Regional solution that works favorably for all of its member towns. However, in areas where impacted towns split on their review of a project, ACRPC will exercise its independent judgment and conduct its review based upon the regional nature of and benefits and impacts of the project.
7. Staff will then participate in the review of the project pursuant to the instructions of the Commission.

2A. IMPLEMENTATION PLAN

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2A.1 Introduction

The Purpose of this section is to describe in summary the work that ACRPC will do to implement the goals contained in each section of this Regional Plan. Generally it quotes selected recommended actions from each section of the Plan, however, sometimes for efficiency, it combines two actions. This section does not include all actions ACRPC will take. Instead it focuses on the priorities from each section identified in the Plan and confirmed by ACRPC's committees, staff and workplans.

ACRPC constitutes a community development organization for the Region that, in conjunction with other state and local partners:

1. Creates policies and plans to guide and implement local and regional development and conservation goals;
2. Envisions and develops the community infrastructure necessary to promote and improve the region and its municipalities;
3. Identifies and supports conservation or sustainable use of regional or local natural resources; and
4. Participates in regional land use decision making processes (Act 250/Section 248) for projects with "significant regional impact" to promote the general good of the Region and its citizens.

Within this broad framework, ACRPC adopts the following implementation priorities for each of the planning areas this Plan addresses.

2A.2 Implementation Plan Recommended Actions

A. Population and Housing

Population

1. Track the demographic characteristics of the region's population;
2. Maintain historic demographic information for comparison to current trends;
3. Project future population change for each community in the Region; and
4. Provide information to the Region and its municipalities in a manner that promotes planning for demographic changes.

Housing

1. Work with municipalities to collect and disseminate housing-related information for the Region. Create a database to track housing statistics like sales and permits, link to information on grants and educational opportunities, and provide current information on the availability of housing units, especially for low-income, elderly or special needs households;
2. Assist municipalities interested in improving housing by developing ordinances for accessory apartments, zero-lot line developments, easing parking requirements, enabling cluster subdivisions, energy efficient buildings and density bonuses;
3. Promote and help implement public investments in water, sewer and roads in the Region's villages and downtown areas to improve opportunities for affordable housing.

B. Natural Resources

Water Resources

1. Work with the Agency of Natural Resources to educate the region's municipalities and citizens about the Lake Champlain Total Maximum Daily Load ("TMDL") which set goals for phosphorus reduction within the Otter Creek Section of Lake Champlain;
2. Support the work of the Addison County Riverwatch Collaborative to collect and disseminate information about water quality in Addison County;
3. Identify priority projects within each of the river sub-basins in the region that will improve water quality within the basin and Lake Champlain including:
 - a. Identify priority areas for green infrastructure to clean stormwater prior to it entering the regions rivers and lakes;
 - b. Work with VTrans and municipal road foremen/commissioners to identify priority road projects to mitigate impacts on water quality; encourage proper maintenance and sizing of bridges, culverts and other structures to accommodate flow from storm events and to mitigate flood hazards;
 - c. Assist municipalities to develop protection measures for their surface and groundwater resources through land use controls such as, stormwater management

- districts, flood and fluvial erosion hazard areas, shoreline and riparian buffers, and sourcewater protection areas; and
- d. Work with Addison County's farm and forestry community to promote and implement "Required Agricultural Practices" ("RAPs") and "Best Management Practices" ("BMPs") for forestry.

Working Lands: Agricultural and Forestry Resources

1. Create a regional plan and help municipalities create plans and regulations that recognize the value of the Region's working landscape and seek to preserve that landscape and the right to raise and harvest agricultural and forest products for future generations;
2. Support the work of land trusts and other voluntary conservation efforts in the Region;
3. Support statewide tax incentives like the Current Use Program to preserve large tracts of agricultural and forest land;
4. Work with Addison County Economic Development Corporation and other partners to promote the economic viability and growth of agricultural and forestry in support of Vermont's working landscape;
5. Support efforts to manage harmful invasive species.

Wildlife, Native Plants and Natural Communities

1. Periodically revise the Significant Regional Resources map within the regional plan identifying resources of regional significance;
2. Promote regional and municipal plans and regulations that recognize the value of wildlife, native plants and natural communities and seek to preserve each in viable population sizes within the Region and its municipalities;
3. Participate in land use applications (Act 250/Section 248) that impact regionally significant resources as identified in the Addison County Regional Plan;
4. Work to preserve large blocks of contiguous habitats, especially those that support east/west wildlife travel corridors;
5. Provide data and maps to help towns recognize and address significant plant, wildlife, and natural community habitat areas in town plans and other planning proceedings;
6. Assist municipalities in developing priority systems for the protection of wildlife and wildlife habitat areas, native plants and important natural communities.

Scenic Resources

1. Support village and downtown designation efforts to provide financial incentives that support historic preservation and mixed uses, including affordable housing;
2. Use ACRPC's mapping resources and expertise to encourage communities to identify areas of high scenic value through an inclusive public process;
3. Ensure that new commercial scale telecommunication towers, wind energy towers, solar facilities and other commercial scale energy generation sites and transmission corridors conduct proper siting analyses, including the technical feasibility of burying transmission lines, designed to encompass the lifecycle of the infrastructure and to address scenic resources, wildlife habitat and impacts on agricultural soils and forestry resources;

4. Encourage lighting plans and designs to address sky-glow and energy efficiency in all development proposals;
5. Encourage municipalities to incorporate the lighting guidelines set forth in “*Outdoor Lighting Manual for Vermont Municipalities*” in their zoning bylaws.

Air Quality

1. Promote transportation uses and policies that encourage public transportation and transportation alternatives that limit the combustion of fossil fuels;
2. Recommend the local adoption of energy codes and standards that promote energy conservation;
3. Encourage citizen initiatives, like those of the Addison County Relocalization Network (“ACoRN”) and municipal energy committees to educate, promote and implement energy conservation initiatives and programs; and
4. Consider the relative locations of jobs and households when reviewing development proposals in view of transportation’s impact on air quality. Encourage mixed-use developments incorporating commercial and residential uses in village centers and downtowns.

Mineral and Earth Resources

1. Support the reasonable use and extraction of earth resources within the Region with conditions requiring proper site mitigation at closure and to mitigate operational impacts like noise and trucking;
2. Review town plans and zoning bylaws to insure the municipal intent regarding gravel extraction and mineral resources is clear and specific;
3. Develop a groundwater resource map layer to overlay on existing and proposed mineral resources and extraction sites.

C. Economy

1. Continue to actively work with partner organizations like the Addison County Economic Development Corporation and the Addison County Chamber of Commerce to plan and implement economic development strategies for the region;
2. Seek funding to assist with the identification, remediation and redevelopment of brownfield sites in the Addison Region;
3. Assist communities seeking downtown or village center designations; and
4. Utilize ACRPC’s mapping resources to promote and publicize the region’s historic, cultural, artistic, recreational and natural resources and tourism-based businesses.

D. Transportation

1. Maintain a strong Transportation Advisory Committee (“TAC”) to provide local and regional prioritization of state-owned transportation infrastructure. Local and regional priorities include implementing cost-effective system maintenance and improvements that promote system safety, preservation, and hazard mitigation;
2. Provide local and regional input into State transportation modal plans;
3. Work with local road foremen/commissioners to help document, prioritize and implement municipal transportation priorities;
4. Collect data and conduct traffic studies to inform future planning and prioritization work;
5. Engage in project development planning for municipal and regional projects; and
6. Work as project managers for local transportation projects that promote transportation alternatives and safety, specifically for bicycles, pedestrians, public transportation and alternative fuel vehicles.

E. Utilities Facilities and Services

Water Supply, Wastewater and Solid Waste

1. Work with the Region’s small water supply and wastewater systems to develop long-term plans for infrastructure capital budgeting;
2. Help interested municipalities create plans to develop and finance water, wastewater or stormwater infrastructure necessary to preserve and/or expand their village centers;
3. Provide and help create mapping resources for source groundwater protection; and
4. Work with and support the Addison County Solid Waste District to ensure all citizens have access to adequate waste disposal and recycling facilities.

Energy

1. Create a framework for regional planning and review of generation and transmission projects, including solar, wind, biomass, gas, and electric;
2. Continue to provide and support organizations that provide educational material that promotes energy efficiency and conservation; and
3. Discourage the use of eminent domain for energy generation or transmission projects.

Communications technology

1. Continue cooperative efforts with the Addison County Economic Development Corporation to seek development of communications infrastructure that meets the needs of the region’s businesses;
2. Assist in the dissemination of information to member municipalities relating to current communications services and infrastructure; and
3. Support efforts to mitigate the effects of disasters on communications infrastructure.

Health and Safety

1. Assist local service providers with data collection and support in grant writing;
2. Facilitate greater coordination and cooperation between law enforcement, fire and rescue services;
3. Assist municipalities in developing:
 - a. Local emergency plans
 - b. Land use plans including hazard mitigation strategies for known hazards, maps of vulnerable areas and lists of priority projects
 - c. Driveway standards designed to accommodate emergency vehicle access.
4. Continue to participate in and support the activities of the Addison County Emergency Planning Committee (LEPC #8);
5. Help LEPC #8 identify and map sites where hazardous materials are stored and used in the Region; and
6. Organize and conduct professional training opportunities regarding hazards and hazard mitigation.

Education

1. Maintain statistical information on the region's population to be incorporated into local plans to support grant applications and to aid schools in projecting enrollment and anticipating changes;
2. Continue to assist local schools with GIS services as needed; and
3. Continue to partner with educational institutions by offering internship and similar opportunities to students.

Historic, Cultural, Municipal and Recreational facilities

1. Assist municipalities interested in developing regulations that protect and promote adaptive reuse of historic structures, establishing historic advisory review boards, or in designating historic, downtown or village center districts;
2. Assist municipalities or organizations in developing GIS maps and data related to historic structures or from historic maps;
3. Support and assist municipalities or organizations with grant writing;
4. Assist municipalities or organizations in developing GIS maps and data illustrating the region's recreation resources; and
5. Aid municipalities and local organizations in developing and linking trail systems in the Region;

F. Future Land Use

Regional centers and villages:

1. Work with the Region's municipalities to structure their land use areas and regulations implementing them to clearly define and articulate village areas surrounded by rural areas;
2. Encourage residential development primarily in community centers and villages;
3. Work with Addison County Economic Development Corporation to provide incentives encouraging businesses to locate in downtowns and village centers;
4. Promote, plan for and construct public infrastructure like water and wastewater systems, sidewalks, bike lanes, stormwater, energy and communication systems that make locating in a regional center or village desirable; and
5. Support value added agricultural/wood products manufacturing in villages and downtowns to help transform locally harvested raw materials into marketable products from the working landscape.

Working lands and conservation areas:

1. Support the efforts of the Vermont Land Trust to conserve appropriately located agricultural and forestry lands;
2. Support the delineation boundary of the Green Mountain National Forest;
3. Work with the Region's municipalities to structure their land use areas and regulations implementing them to clearly define and articulate regulations protecting rural and conservation areas;
4. Promote Freedom to Farm policies within this plan and municipal plans in the Region;
5. Support taxation and other state policies that provide incentives to preserve working blocks of agricultural and forestry land; and
6. Work with Addison County Economic Development Corporation to encourage value added farm and forest product production in areas close to the harvest.

G. Resiliency and Emergency Management

1. Work with the Department of Emergency Management and Homeland Security ("DEMHS") to plan for disasters in local communities and to gather information locally or in the State Emergency Operations Center ("EOC") during and after a disaster;
2. Work with municipalities and the Local Emergency Planning Committee ("LEPC#8") to develop a regional network of emergency services offering mutual aid to one another;
3. Work with municipalities to develop local All Hazard Plans for each community to identify local potential hazards and Emergency Operation Plans ("EOPs") to identify the people and resources available to respond in the case of an emergency; and
4. Work across planning disciplines to include transportation, land use and natural resources planning in decisions regarding emergency management to increase the resiliency of systems and infrastructure.

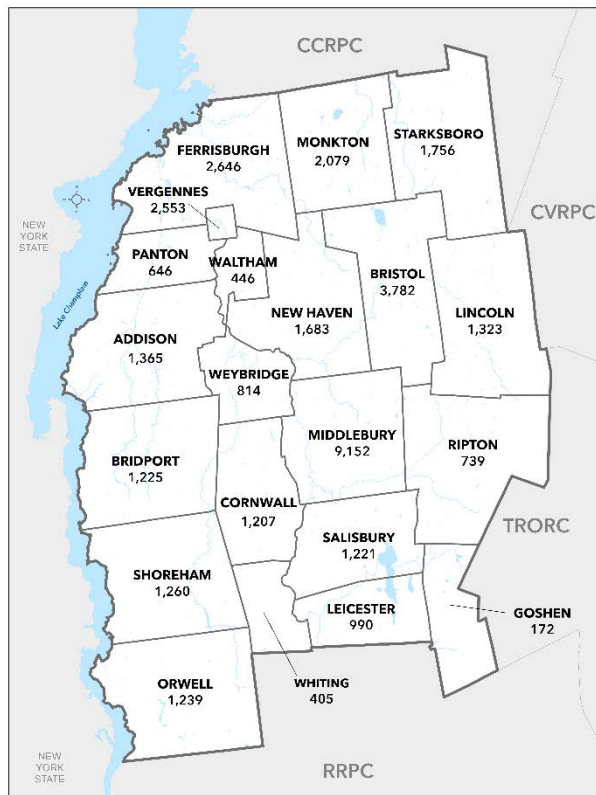
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Our Region's Population

In order to plan for the appropriate allocation of resources, infrastructure, education and services it is necessary to consider the demographic make-up of a community, its settlement patterns and rates of growth. Understanding the region's population and housing profile provides a foundation from which all other elements of this Regional Plan take shape. Age distribution, household size, housing stock and income are all factors that determine a region's housing needs and inform future planning. When population characteristics and housing trends are understood, public investments and policies can be thoughtfully and appropriately allocated to our communities.



According to the 2020 U.S. Decennial Census,¹ the Addison County Region had a total population of 36,703 in 21 municipalities ranging in size from 172 individuals in Goshen to 9,152 in Middlebury.² The region's four most populated municipalities – Middlebury, Bristol, Ferrisburgh and Vergennes – account for approximately 48% of the total population. Each of these communities is connected to a thriving downtown or village center that has supported its population over time. Middlebury, the county seat, is a commercial, institutional and cultural hub of the region, with a population twice that of the next largest town, Bristol (3782).

Approximately half of the population of Bristol lives in its village center, a compact, mixed-use grid of walkable streets, and the rest in the surrounding countryside.

Figure 1: Addison Region Towns and Populations

Ferrisburgh's 21 miles of Lake Champlain shoreline and its proximity to Chittenden County and Burlington contribute to its population total (2,646) which is very similar to Vergennes' total (2,553). Vergennes, which is only 2.5 square miles, was carved out of Ferrisburgh, Panton and New Haven in 1788 to form a city, the oldest and smallest in Vermont. Vergennes now serves as

¹ <https://www.census.gov/programs-surveys/popest/about/schedule.html>

² The towns of Granville and Hancock, while located in Addison County, are part of the Two-Rivers Ottauquechee Regional Commission and are not included in these population totals.

a regional commercial and employment base for the surrounding towns. The eastern mountain towns and small central farming communities have the lowest populations in the region. Western farming towns are slightly more populous due to vacation and second homes on the shores of Lake Champlain.

Settlement History

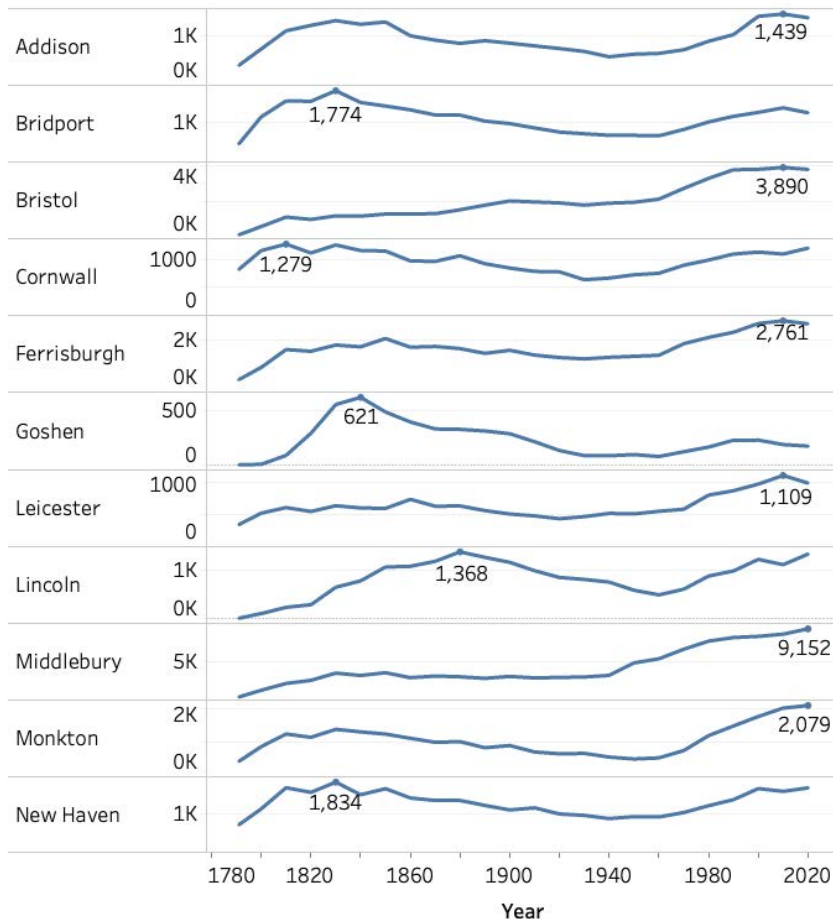
Otter Creek, flowing north through the Addison Region from Leicester to Lake Champlain in Ferrisburgh, is Vermont's longest river and integral to swamps and marshes throughout its basin. Human habitation along Otter Creek can be dated to between 10,000 and 11,000 years ago. Abenaki and Iroquois hunted, fished, gathered herbs and fruits, grew crops, and settled in this valley.³ Fertile soils, abundant fish and game, and a network of tributaries serving as trade and travel routes supported these early populations. In the early 17th century, French traders, explorers, and settlers migrated to and through the Otter Creek valley, drawn to the promise of productive farmlands and navigable waters. New agricultural and farming practices as well as settlement patterns introduced by the emigrants would forever transform the landscape and cultures of this region.

In 1791, the first year of the federal census, there were 7,081 people living in the Addison Region. The most populous towns, ranging from 701-825 residents, were the early agricultural settlements located in the Lake Champlain Valley of **Cornwall, New Haven, Orwell and Shoreham**. The region's population doubled in the next decade to 14,401, with all communities growing at a steady rate, and continued to increase until the middle of the century. In the early 1800s Merino sheep were introduced to the Region, setting off a farming boom that lasted for decades. By 1830, a total of **25,630** people were living in the Addison County region. During this period, Middlebury's population grew to **3,468**, making it the most populous town. Due to its central location and proximity to the Middlebury Falls, the town developed into an industrial hub for the region. Manufacturing mills for cotton, grain, paper, lumber and marble were constructed in great numbers along the river, powered by the falls. In 1800, Middlebury College was established, further diversifying the economic base of the community and providing employment and industry beyond agriculture. Hydro-powered mills and factories in Vergennes, on the Otter creek, and Bristol on the New Haven River grew local economies and supported the development of these communities. By 1840, the population growth of many rural

³ <https://www.ottercreekconservation.org/your-watershed/otter-creek/>

Figure 2: Addison Region Change in Population by Town

Source: US Census Bureau



communities in the region began to level off. The towns of Cornwall, Shoreham, New Haven, Bridport, Orwell, Whiting, Weybridge and Goshen had reached their peak populations to date.

During the mid-and late 1800s, rural areas throughout the northeast began to see an export of people to the Midwest for better farming and economic opportunities. The population in Addison County and Vermont also saw a decline, as families left for a promise of rich soils and "greener pastures", leaving the "hard scrabble" farming life of New England behind.

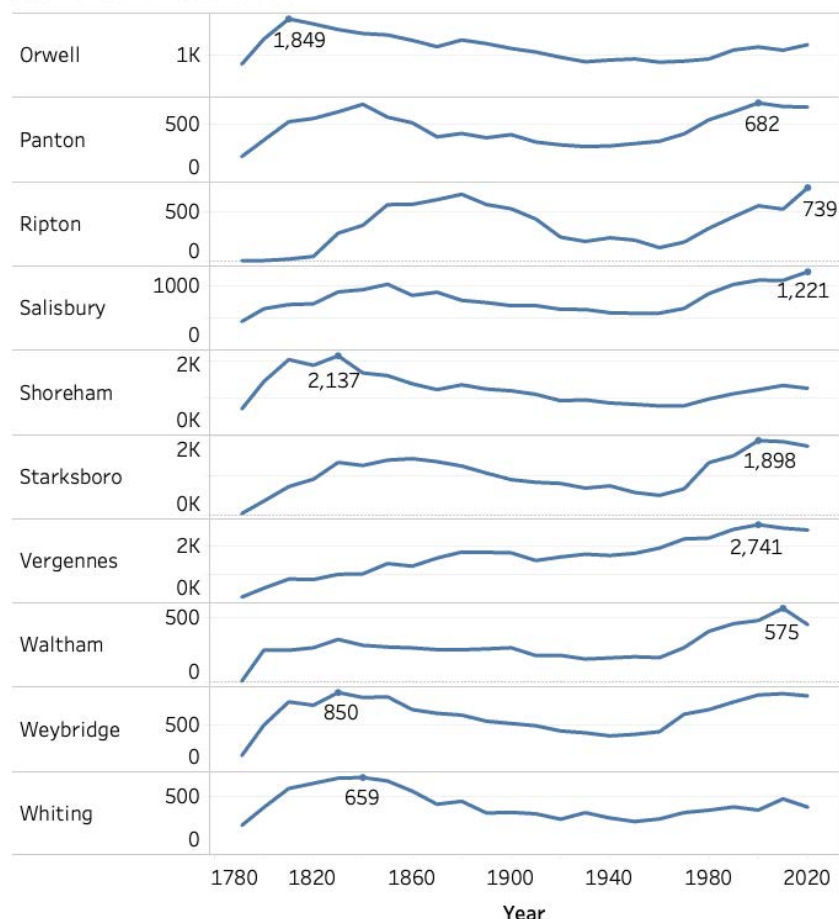
Successful Merino sheep farmers, wanting to expand their flocks and pastureland, bought up their neighbor's farms resulting in increased land prices adding to the struggle of farming in Addison County. Between 1850 and 1860 the region lost almost 3,000 residents. Farming communities whose growth had peaked in the early 1800s lost families at the greatest rates. Between 1830 and 1860, Shoreham and Bridport saw 35% and 26%, respectively, of their population leave Addison County.⁴

The towns of Bristol and Vergennes, however, experienced population growth due to a diversity of economic opportunities in these larger mill towns. Vergennes grew at a rate of 28% during this period.

⁴ <https://vtdigger.org/2021/03/28/then-again-youthful-exodus-from-vermont-actually-began-in-the-early-1800s/>

Figure 3: Addison Region Change in Population by Town

Source: US Census Bureau



The region's overall rapid drop in population subsided by 1870, but a slow decline in growth continued, in most communities, until the 1950s. Significant global events of the period, such as World War 1 and 2, the Great Depression and the 1918 Spanish flu, undoubtedly contributed to the pattern of economic stagnation and negative population growth in the region.

Recent Patterns

Around 1960, the nation saw a dramatic population shift occurring as people began to migrate into rural areas from suburban and urban centers. For the first

time in a century and a half, rural America grew faster than the nation's cities. From the 1960s to the 1990s, Vermont's population grew by 56%, faster than most states amid booming interest in rural life and the trend to get back to the land.⁵ By 1980, the population in the Addison Region had exceeded its previous peak of 25,630, seen in 1830, and reached 28,784 people. In 2000, the population reached 35,289, an increase of 81% since 1960.⁶

Throughout the 2000's, population growth slowed again to a rate of 3.5%. Between 2013 and 2018, the most recent ACS 5-year estimate, the growth rate has basically leveled, fluctuating between 0.1% and -0.1%, a pattern similar to that of the 1940s. Lincoln, Middlebury and Starksboro were the only towns that grew by any significant amount during this time, 300, 200 and 100 respectively.

⁵ <https://www.washingtonpost.com/us-policy/2019/03/02/rise-fall-most-european-state-union/>

⁶ <https://data.census.gov/cedsci/table?q=2000%20addison%20County&tid=DECENNIALDPSF42000.DP1>

Why Populations Change

When planning for the future, it is important to understand the components of population change. Population change is typically attributed to two factors:

- **net natural increase or decrease** (the difference between births and deaths) and
- **net migration** (the difference between in-migration and out-migration)

In the decades from 1970 to 2000, nearly all towns in the region experienced a net natural increase with more births than deaths. Over the same period, most towns saw more people moving into town than moving out, net in-migration.⁷

In the 1970s, growth occurred due to in-migration and in the 1980s, it was a high level of births that drove the population's natural increase. During the 1990s, the two forces were evenly paced, resulting in a steady population increase of 9.2%.

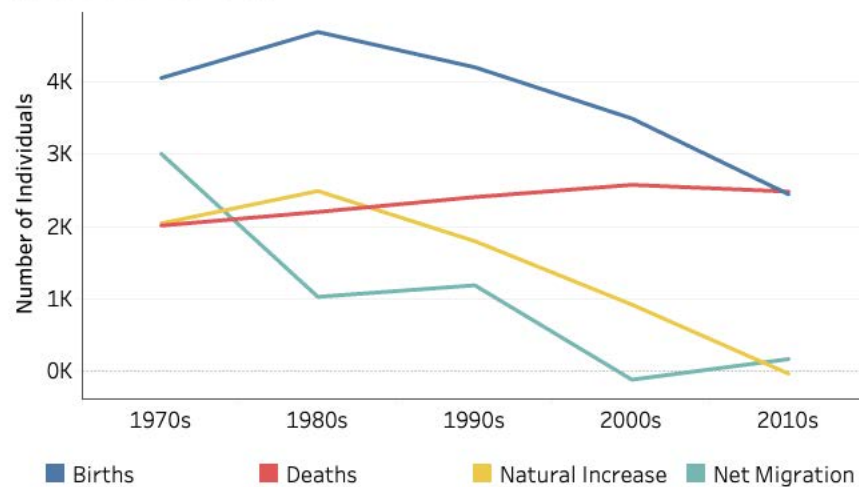
Starting in the 2000s, however, as the

populace began to age out of child bearing years, the birth rate began to decline and population growth began to stagnate. The stagnation of population growth is not unique to the Addison Region. In each year since 2016, the state as a whole has recorded more deaths than births, resulting in a negative “natural rate of increase.” This could be the first time this has occurred in Vermont’s history.⁸

The last time Vermont’s population dropped between two censuses was in 1940, when Vermont had 400 fewer residents than in 1930. Of course, the Great Depression of the 1930s caused massive economic dislocation across the country, and Vermont was not immune from its effects. Many Vermonters left the state during this period in an attempt to find work elsewhere and escape the grinding poverty of the time. Before that, only the 1910s witnessed a

Figure 4: Addison Region’s Changing Demographics (1970-2018)

Source: U.S. Census Bureau



⁷ <https://www.healthvermont.gov/health-statistics-vital-records/vital-records-population-data/vermont-population-estimates>

⁸ <https://vtdigger.org/2019/05/19/woolf-comes-birth-rate-everyone-vermont-beat/>

similar population decline caused by the 1918 Spanish flu. This pandemic killed between 50 and 100 million people worldwide (more than died in World War I), more than 1/2 million in the U.S., and 2,000 Vermonters in one year.

Birth and Death Rates

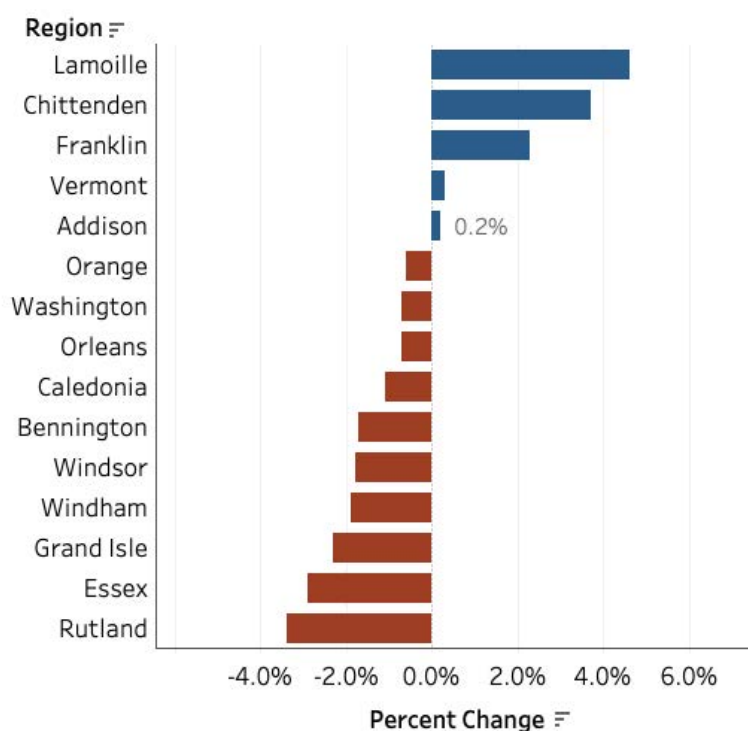
Birth and death rates are calculated in the same manner; the number of births or deaths multiplied by 1000, then divided by the total population of the region or the total number of birth or deaths out of 1000 people of a region. This value is also referred to as the 'crude' birth or death rate. The general fertility rate (GFR) indicates the births per 1000 women in the region, aged 15-44.⁹ Births in Vermont have declined significantly since the 1980s. From approximately 8,000 births per year in the 1980s, the number of babies born to Vermont women

dropped to approximately 6,500 in the late 1990s, declining further to 6,000 by 2006. After some fluctuations in the late 2000s, the number of births remained around 6,000 into the first half of the 2010s.¹⁰ In 2018 there were 5,431 babies born in Vermont, a 161-year low and well below the national average.¹¹ In comparison, there were 6,027 resident deaths in 2018, 17 more than in 2017.

Many factors, social, environmental, economic and cultural, can influence a region's fertility, birth and death rates. Often, higher levels of education will correlate with lower fertility rates. In 2016, Vermont women between the ages of 15 and 44, without a college degree, had a fertility rate 1.4 times higher than among women of the same age with a bachelor's degree. About 39% of Vermont women in 2016, 25 years or older, had bachelor degrees. Research has

Figure 5: Population Change in Vermont Counties

Source: Vermont State Data Center - American Community Survey



⁹ <https://www.pewresearch.org/fact-tank/2019/05/22/u-s-fertility-rate-explained/>

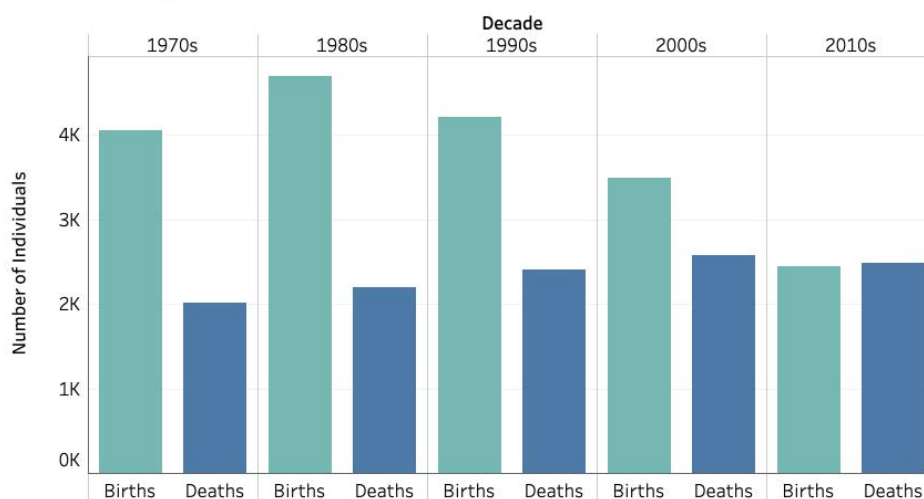
¹⁰ https://ljfo.vermont.gov/assets/docs/issue_briefs_and_memos/6b77c2d42c/Birth-Rates-and-Age-of-Mother.pdf

¹¹ <https://vtdigger.org/2019/05/19/woolf-comes-birth-rate-everyone-vermont-beat/>

shown that families will postpone having children during economic downturns, such as the Great Recession of the late 2000s. Advances in medicine, the promotion of healthy life styles and improved health care systems has resulted in longer life spans. The death rate in Vermont steadily declined from 11.2 in 1960 to 8.2 in 1990. From 2004 to 2017, however, the death rate rose to 9.6. This increase, is not a result of poor health care but a reflection of shifting demographics as Vermont's baby boom population ages. In 2018, 82% of the deaths in the Addison region were people 65 years of age and older with the primary causes of death being cancer and heart disease.¹²

Figure 6: Trends in Births and Deaths Across Addison Region (1970 - 2018)

Source: VT Vital Statistics



Historically, the Addison Region's population growth rate mirrors that of Vermont as a whole (see figure 5). Women born in 1980, the year Addison County recorded its highest birth rate, turned 40 in 2020, near the end of child-bearing years. The decline

in the number of babies born between 1980 and 1990 indicates that there will continue to be fewer women giving birth in the next 10 years. Recent trends, such as smaller families, the choice to have children later in life and more women pursuing full time careers, are trends that are expected to reinforce this pattern.

In **2018**, there were **294 births** in the Addison Region; a birth rate of 8.0 and general fertility rate (GFR) of 42.7, while in the same year **342 deaths occurred with** a death rate of 9.2.

¹² <https://www.healthvermont.gov/stats/vital-records>

Covid-19 Pandemic

As of the writing of this plan, Vermont and the Addison Region are grappling with the impact of the Covid-19 pandemic on the Region's population. Death data can "provide a broader picture of what the impact of Covid-19 has been," There were the obvious causes: those who died of Covid, as well as the infections that went undetected. But it also points to the deaths that can be indirectly attributed to Covid: "There were the people who are afraid to go to the hospital or situations on the ground that people can't get emergency care because the hospitals were filled to capacity."

<https://vtdigger.org/2021/02/21/more-vermonters-than-average-died-in-2020-it-wasnt-just-because-of-covid>

Migration

Between 2010 and 2019, more people have moved out of Vermont to other areas than moved into the state. In 2018, about 700 more people left the state than arrived, in 2015 net out-migration sometimes exceeded 2,000 each year. Research suggests that Vermont is losing its working-class and middle-class residents, families and individuals with low and moderate incomes. Outward migration was particularly high among 45- to 64-year-olds earning \$25,000 to \$75,000.¹³ A 2014 University of Vermont survey asked current and former Vermonters why they wanted to stay or leave. Responses from former Vermonters ranged widely from jobs and income to diversity and the desire to live in an urban area. Some moved because of the weather. There was a clear consensus, however, among current Vermonters, as to why they have stayed. More than two-thirds cited their attachment to Vermont's natural landscape and more than half cited the state's culture, community, and family ties.¹⁴

Many residents move to Vermont specifically for the 'quality of life' it affords, regardless of potential lower salaries and financial gain due to the area's relatively low median income. Other individuals and families relocate to Vermont solely for employment opportunities. The Addison Region is home to the largest population of migrant farmworkers in the state, approximately 500-750 people.¹⁵ The region's dairy and produce farmers depend on this segment of the population to successfully operate. Due to documentation and immigration concerns, this migrant population may be under counted and underserved.

¹³ https://www.ncsl.org/Portals/1/Documents/fiscal/ESLFOA_VT_Taxpayer_Migration_by_Age_and_Income.pdf

¹⁴ <https://vtdigger.org/2019/09/13/people-are-leaving-vt-in-droves-where-are-they-going/>

¹⁵ <https://vtdigger.org/2020/06/23/moats-migrant-farm-workers-especially-vulnerable-to-effects-of-pandemic/>

As extreme weather, wildfires, earthquakes and other events, generally attributed to climate change, have become increasingly common in recent years, Vermont's relatively low level of exposure to such events has made it an attractive refuge for people looking to leave high risk areas of the country. Every major catastrophe brings more "refugees" into our area, attracted to Vermont's inland location, availability of water resources and a higher and dryer landscape. These characteristics, as well as a perceived affordable cost of living, are reasons cited for families and individuals migrating to the state.¹⁶

Population Projections

The current population of the Addison Region is significantly lower than previously projected. In 2000, the Addison Region's population was 35,289, with an expectation that it would increase to 42,564 by 2020.¹⁷ However, according to the 2017 American Community Survey, the population has increased by only 1,536 people to 36,825. Population projections assume that conditions that occurred in the past will continue into the future, such as mortality, birth and migration rates. Using 5-year, age cohort census data (i.e., 35-39 or 40-44-year-olds), projections can be calculated by factoring known mortality and migration rates. Certain assumptions are made regarding these projections, such as advances in healthcare resulting in lower death rates. Some changes, however, cannot be predicted, such as the following.

- Changes in the birth rate from social change different than what has occurred,
- Changes in healthcare practices or epidemics that could affect the mortality rates,
- Changing economic conditions that result in shifts in national (internal) migration,
- Changes in national immigration policies.¹⁸
- Changes resulting from in-migration of refugees from elsewhere in the country.

Interestingly, as of 2020-21, some of the above 'changes' are occurring and affecting the ability to calculate population projections for the Addison Region

¹⁶ <https://www.wbur.org/news/2021/04/21/climate-change-vermont-migration-population-influx>

¹⁷ <https://www.census.gov/data/developers/data-sets/decennial-census.2000.html>

¹⁸ <https://accd.vermont.gov/sites/accdnew/files/documents/CD/CPR/ACCD-DED-VTPopulationProjections-2010-2030.pdf>

Covid-19 Pandemic

In the short term, Vermont's relative stability and low infection rate have driven an increase in-migration to the state, as those in nearby cities seek safer residence. The long-term implications of this shift remain to be seen. According to preliminary survey responses, 64% of recent arrivals fit into a demographic that the state, in its own efforts to attract residents, has been targeting: people who are still in the workforce. Data from 222 responses shows that 40% of the new arrivals are under 35, 24% are ages 36 to 50, and 35% are 51 and older. About half of the new remote workers have completed college, and another 42% of them have a degree beyond college. Almost half said their employer would allow them to stay. And a full 70% described their location as "rural" or "very rural."

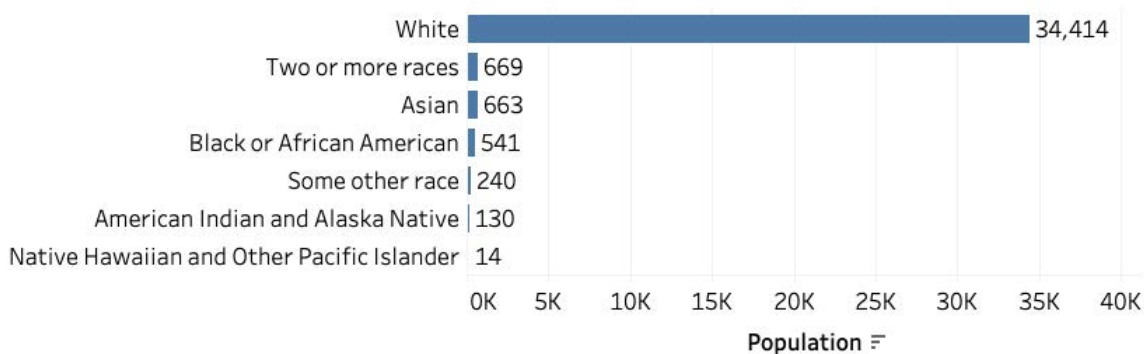
Demographics

Current Population Profile

Gender and racial demographic composition of the Addison Region mirrors that of the entire state. 50.3% of the region's population are female and 49.7% are male. 50.7% of the state's population are female while 49.3% are male. The largest segment of the population by race in the Addison Region identifies as 'White', at 93.8%. The next largest population share identifies as 'Two or more races' at 1.8%.

Figure 7: Racial Demographics of Addison County (2019)

Source: U.S. Census Bureau



The Aging Population

In 2000 about 25% of the population was school age, while about 11% was over 65. In 2010 the school age population dropped to 16.5% and over 65 rose to 13%. By 2018 the school age

population was 13.3% and the over 65 population was 18.5%.¹⁹ The population of the Addison Region is aging as the **median age** continue to rise.

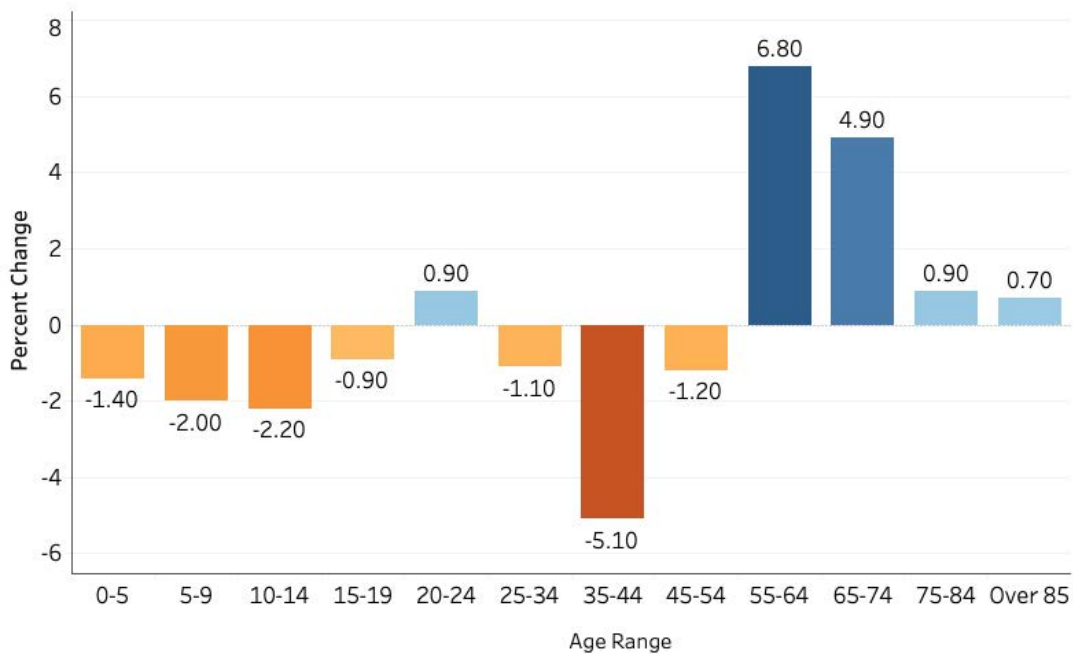
The median is one measure of the statistical center of the data. In this case, we can say that half of the population is younger than the median age and half of the population is older.

Table 1: Median Age in Addison Region	
Year	Median Age
2000	36.1
2010	40
2018	43.7

The population of working age Vermonters (25-64) decreased by 5% between 2010 and 2018. That population is expected to decrease another 9% between 2018-2030.²⁰ According to the 2020 Vermont Housing Needs Assessment, between 2020 and 2025, the median age of the head of an Addison County household will increase from 59 to 61 for owners and remain at 46 for renters. An estimated 36% of all householders in the county will be at least 65 years old and 4% will be at least 85 years old by 2025.²¹

Figure 8: Percent Change in Age Distribution (2000 - 2017)

Source: U.S. Census Bureau



The aging of the region's population will increase the demand for supportive services needed by these members of our community, such as transportation, healthcare, personal companionship and assistance with everyday activities. As this segment of population downsizes or transitions

¹⁹ <https://www.census.gov/topics/population/age-and-sex/data/tables.html>

²⁰ <https://vtdigger.org/2019/03/07/woolf-babies-gone/>

²¹ <https://accd.vermont.gov/sites/accdnew/files/documents/Housing/VT%20HNA%202020%20Report.pdf>

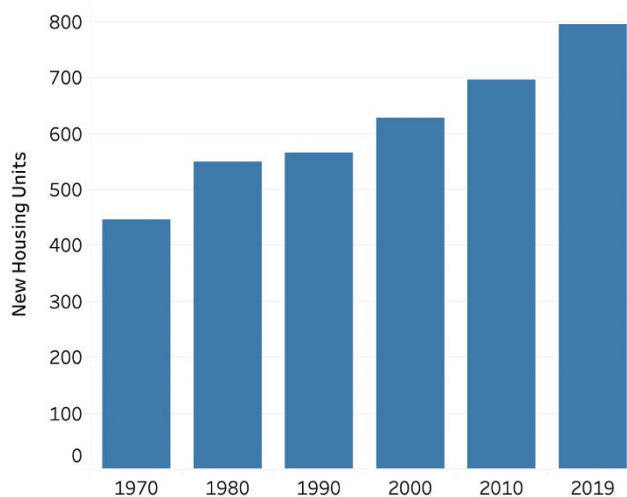
to supportive care, a significant increase in small scale homes and apartments, as well as senior and assisted living facilities will be needed to accommodate this housing shift.

Housing

Housing is a key element of any sustainable community. The stock should be adequate to house those who live and work in the community and have the potential to expand at a rate that can accommodate future population increases and economic growth. In addition, housing should support the region's growing elderly population, and attract new families with school age children. Available housing needs to be safe, energy efficient, sustainable, and accessible for the community's aging and vulnerable populations. Although the

Region has experienced minimal population growth over the last decade, demand for housing has increased due to smaller households and an acute shortage of suitable housing. To fully understand this issue and succeed in providing sufficient housing for the population, communities must assess the current composition of households and the characteristics of the existing housing stock in the Addison Region.

Figure 9: Number of Additional Housing Units Each Decade
Source: U.S. Census Bureau



Household Characteristics

Most of the region's population lives in households. A household is composed of one or more people who occupy a housing unit, but not all households contain families. Under the U.S. Census Bureau definition, family households consist of two or more individuals who are related by birth, marriage, or adoption, although they also may include other unrelated people. Non-family households consist of people who live alone or who share their residence with unrelated individuals.²² In 2018 there were a total of 14,427 family and non-family households in the 21 towns that make up the Addison Region.

The number of households in the Region has continued to grow but at a much-reduced rate than seen forty years ago. Between 1980 and 1990, there was a 2.2% annual growth rate in households, a rate of 0.57% occurred between 2010 and 2018.²³ As projected by the 2020

²² <https://www.datanetwork.org/wp-content/uploads/strategies-for-constructing-household-and-family-units.pdf>

²³ <https://www.census.gov/programs-surveys/acs> 2015-2018

Vermont Housing Needs Study, this rate is expected to continue its decline to 0.18% between 2020-2025.²⁴

Small Households

Changes in household composition have occurred in the recent decades. At the State level, the number of small households, numbering one or two people, has increased to 69% of total households in 2017. At the same time, the number of households comprising three to six people continues to

fall.²⁵ An increase in small households is seen in the Addison Region as well.

Between 1970 and 2000, the average household size dropped from 3.4 to 2.56 persons. In 2000, just over one-quarter of the region's households included a married couple with children. By 2018, the average

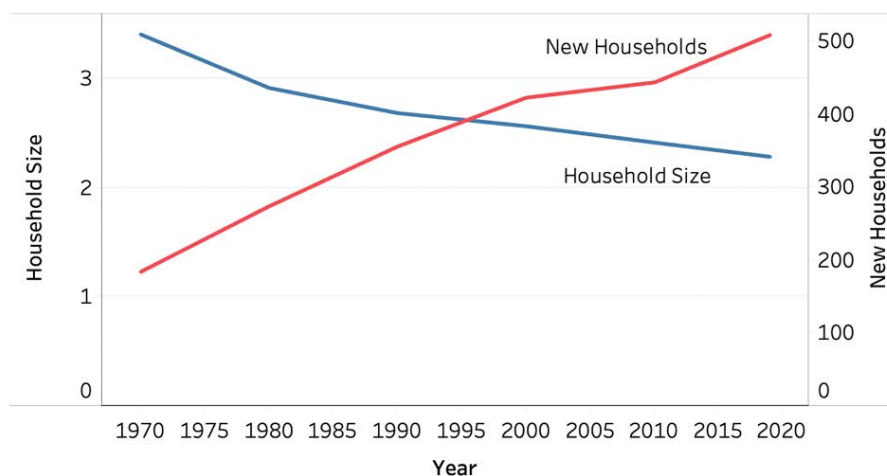
household size fell to 2.31 persons. For individual municipalities the average household size ranged from 1.7 to 2.84 persons. The greatest concentration of smaller households is seen in the region's more densely populated communities, Middlebury Village and Vergennes. Household size reflects not only the demographic of the Region's population but social and economic changes as well. An economic downturn may prolong the time adult children live at home; a rise in the divorce rate may increase the number of single-person households; longer lifespans increase the percentage of seniors living alone. Additionally, trending attitudes regarding marriage may boost the number of single parents and unmarried couples creating homes. The declining birth rate, as seen in the State and Region, also contributes to this pattern of smaller household size.

Group Quarters

The Census Bureau classifies all people not living in housing units as living in group quarters. As defined by the U.S. Census Bureau, a housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as

Figure 10: Number of New Households Compared to Change in Household Size (1970 - 2019)

Source: U.S. Census Bureau



²⁴ <https://accd.vermont.gov/sites/accdnew/files/documents/Housing/VT%20HNA%202020%20Report.pdf>

²⁵ Ibid.

separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall. A group quarters facility houses multiple, unrelated people, in a group living arrangement that is owned or managed by an entity or organization providing services for residents. These services may include custodial or medical care, as well as other types of assistance, and residency is commonly restricted to those receiving these services. Group quarters also may have controlled access to enter or leave.²⁶

There are two types of group quarters:

Institutional, such as; correctional facilities, nursing homes or mental health hospitals.

Non-Institutional, such as; college residence halls, military barracks, group homes, missions, shelters.²⁷

Middlebury has the largest concentration of people living in group quarters, most being Middlebury College students; 2611. Northlands Job Corps Training Center has 220 students on its campus in Vergennes. Both Middlebury and Vergennes have several residential and care facilities for seniors, individuals with disabilities as well as temporary and emergency shelters. Currently, most communities in the region have few or no group quarter facilities. However, due to the aging of the region's population, the number of group quarters serving seniors will need to increase. As of 2021, there was a shortage of senior apartment options and wait lists could be up to two years for subsidized units.²⁸

Senior Housing and Elder Care Facilities

Depending on the level of care and services available, senior facilities may comprise housing units or group quarters and in many cases a combination of both.

"An assisted living facility complex may have a skilled nursing floor or wing that meets the definition of a nursing facility and is, therefore, group quarters, while the rest of the living quarters in the facility are considered to be housing units. Congregate care facilities and continuing care retirement communities often consist of several different types of living quarters, with varying services and levels of care..."²⁹

²⁶ <https://www.census.gov/topics/income-poverty/poverty/guidance/group-quarters.htm>

²⁷ Ibid.

²⁸ Addison County Community Trust, <https://www.addisontrust.org/annual-report.html>

²⁹ <https://www.census.gov/prod/cen2010/doc/sfgu.pdf>, B-20

The following list outlines the levels of care for facility type.

Nursing Home/ Rehab Center, Level I, II: Nursing, medical, rehabilitation or other special care services.

Residential Care Home, Level III: 24-hour supervision and assistance for people who are dependent.

Residential Care Assisted Living, Level III: Supportive services to assist resident independence.

Senior Apartments, Level IV: Independent living, seniors only or mixed age.

Retirement Community Apartments/ Cottages, Level III, IV: A congregate living facility providing varied levels of independent and assisted living care, excluding nursing care.

Adult Family Care Homes, Level III, IV: Private residential homes caring for one to two elderly people.

Table 2: Senior Housing and Elder Care Facilities			
Town	Facility	Type/Level of Care	Capacity
Bristol	*Living Well Residential Care Home	Residential Care Home	15 residents
Bristol	*Pleasant Hills Senior Housing	Senior Apartments	16 Units
Middlebury	**Eastview at Middlebury and Meadowsweet at East View	Residential Care Assisted living, Retirement Community, Memory Care	62 Units
Middlebury	*Helen Porter Healthcare & Rehabilitation center	Nursing home, Memory Care, Rehab Center	105 residents
Middlebury	**The Otter Creek Retirement Community	Residential Care Assisted living, Retirement Community, Memory Care	44 residents 67 units
Middlebury	*Middlebury Commons	Senior Apartments	64 Units
Middlebury	*The Meadows	Senior Apartments	40 Units
Salisbury	*Shard Villa Residential Care Home	Residential Care Home	17 residents
Vergennes	*Armory Lane Senior Housing	Senior Apartments	25 households
Vergennes	*Ringer's Residential Care Home	Residential Care Home	9 residents
Vergennes	*Vergennes Residential	Residential care Home	18 residents
Vergennes	*Valley View Apartments	Senior Apartments	12 households
Vergennes	*Willow Apartments	Senior Apartments	16 Units

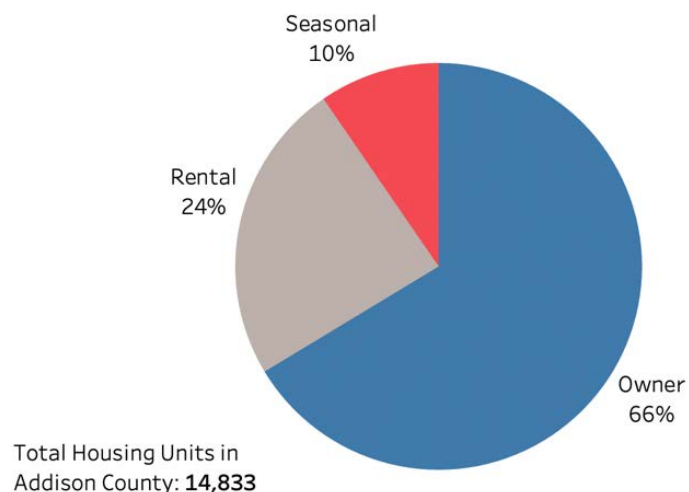
***Government funding subsidy payment options. ** Market Rate**

Many seniors are choosing to age in place, staying in their homes as long as possible or downsizing to a smaller housing unit. Moving in with family or ‘home sharing’ is an option for seniors who do not want to live alone. **HomeShareVT**, a program where two or more people share a home for mutual benefit, can provide companionship and help with daily chores and activities.³⁰ Support and Services at Home (**SASH**) is a federally funded program that staffs a wellness nurse and service coordinator to check on seniors, in senior housing or living independently or with a family member. SASH staff members refer residents to services such as medical appointments, transit services and meals on wheels. SASH services are available in Middlebury, Bristol, Vergennes and Shoreham.³¹

Current Housing Stock

Housing stock is comprised of the total housing units (HU), whether a single-family structure, an apartment, a condominium, a mobile home, a boarding house room, a tiny house or an accessory dwelling unit, in an identified area. In **2018**, Addison Region’s total stock of year-round and seasonal homes was 16,461.³² Households occupy the non-seasonal housing stock, equaling **14,883** units in the Region. Seasonal housing is defined as unsuitable for year-round living and therefore temporary housing and considered to be vacant by the Census Bureau.³³ Of the 14,883 housing units in the region 66.5% are owner occupied and 24% are rentals. Vacation homes, also considered vacant, can be seasonal or year-round. A 2019 study ranked Vermont at number two nationally for the number of vacation homes per capita.³⁴

Figure 11: Addison County Housing Units by Type (2018)
Source: U.S. Census Bureau



The Addison County Region and Vermont has seen a steady decrease in residential construction in the past 40 years.³⁵ Since 1980, the average annual growth rate of housing units has

³⁰ <https://www.homesharevermont.org>

³¹ <https://sashvt.org/>

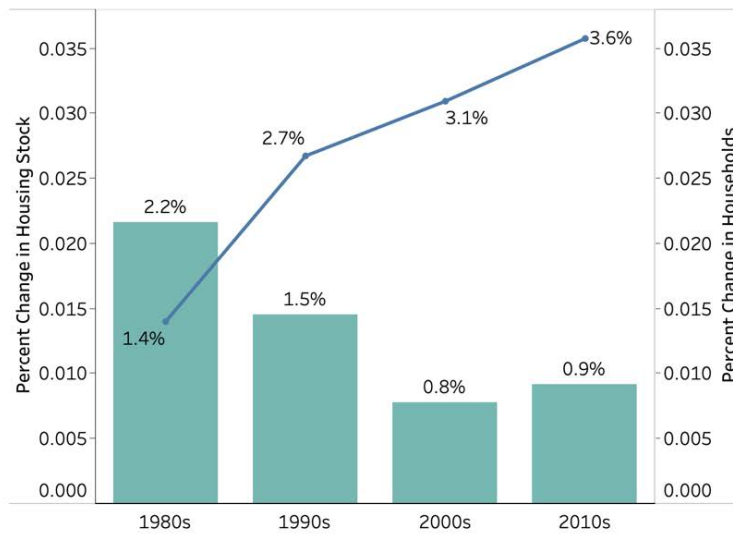
³² This is the total Housing Units (HU) in Addison County minus the HU in Granville and Hancock.

³³ <https://www.housingdata.org/profile/data-guide>

³⁴ <https://vtdigger.org/2019/08/05/study-vermont-is-no-2-nationwide-for-second-home-ownership/>

³⁵ Ibid.

Figure 12: Percent Change in Housing Stock Compared to Change in Number of Households Over Time
Source: U.S. Census Bureau



decreased by 1.38%, dropping to 0.78% during the 2000-2010 time period. Between 2010 and 2018 there has been a slight uptick in growth to 0.92%.³⁶

The rate of growth has varied widely amongst towns in the Region, however, with some municipalities seeing an increase in their housing stock. Bridport, Leicester, Orwell, Panton, Vergennes and Weybridge have returned to or slightly exceeded the rates of growth seen in the 1980s, whereas, Cornwall, Goshen, New Haven, Salisbury,

Shoreham, Waltham and Whiting have experienced negative rates of growth and the loss of existing housing stock.³⁷ A decline in home building ultimately reduces the availability of housing options for moderate and lower-income households by increasing the competition for the existing stock of affordable housing. New single-family home construction is often unaffordable for many households.

An Increase in stock will, however, allow for some households to move to a larger or more expensive home, freeing up smaller, moderately priced housing units. Smaller scale housing growth, such as the creation of accessory apartments or duplexes from existing single-family homes, can provide options for a wider range of homeowner and renter incomes.

Housing Occupancy

Total housing occupancy is defined by the vacancy rate: the number of homes for rent or purchase compared to the total number of homes used or intended for renter or homeowner. Based on the U.S. Census Bureau, American Community Survey 5-year estimates, 2013-2017, the rental vacancy rate for the Addison Region was **3%**. This rate is higher than the State as a whole but lower than what is considered healthy, 5%. In contrast, the vacancy rate of owned homes was 2.1%, which is considered healthy. These rates, however, have a considerable margin of error due to a small sample size and the potential inclusion of substandard housing units.³⁸ Overall, residential vacancy rates have come down significantly in the past decade since the Great Recession. In 2010, Vermont had a 7% rental vacancy rate which dropped to 3.4% in

³⁶ Ibid.

³⁷ <https://www.housingdata.org/profile/data-guide>

³⁸ <https://accd.vermont.gov/sites/accdnew/files/documents/Housing/VT%20HNA%202020%20Report.pdf>

2018. Low rates make it difficult for renters and homeowners to find affordable housing and creates upward pressure on prices.

Covid-19 Pandemic

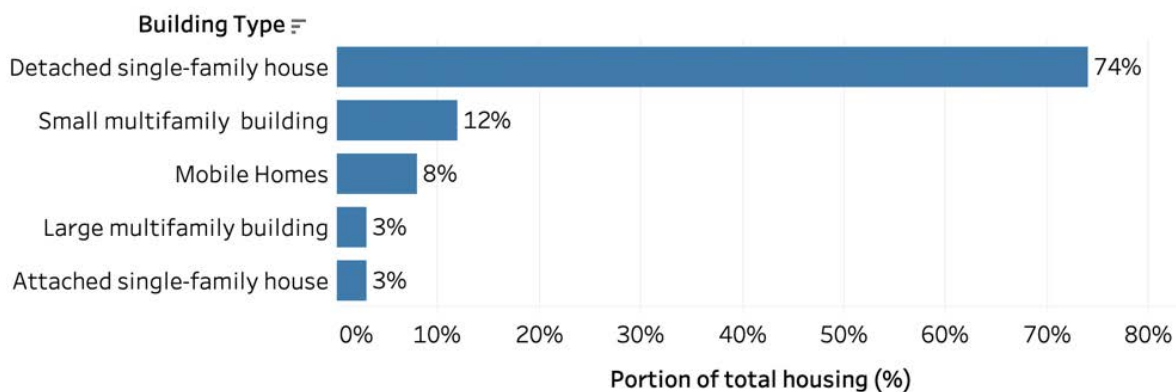
Since the beginning of the pandemic, vacancy rates have continued to decrease and home prices have sharply risen, creating an increasingly tight housing market. According to the Federal Reserve Bank of St. Louis³⁹, the Vermont rental vacancy rate dropped from 4.4% in 2019 to 3.3% in 2020 and the ownership rate from 1.3% to 0.7%, respectively. Both of these rates are below what is considered healthy for the housing market; 5% for rentals and 1.3% for home ownership. Addison County's vacancy rates are typically slightly higher than the State numbers but have dropped significantly since March 2020.

Types of Homes

The type and location of housing developed in a community has a direct effect on the pattern of the built environment and the cost of municipal services. Historically, housing in the Region was primarily single-family homes, located in compact village centers, where people lived, worked and could walk to services. Homes outside village and town centers were typically farms and other agricultural industries, often including housing for workers. Residential construction that occurred from the mid-1900s to the present, however, is scattered throughout the landscape. An increase in personal transportation (the automobile) removed

Figure 13: Housing Units by building Type (2018)

Source: U.S. Census Bureau



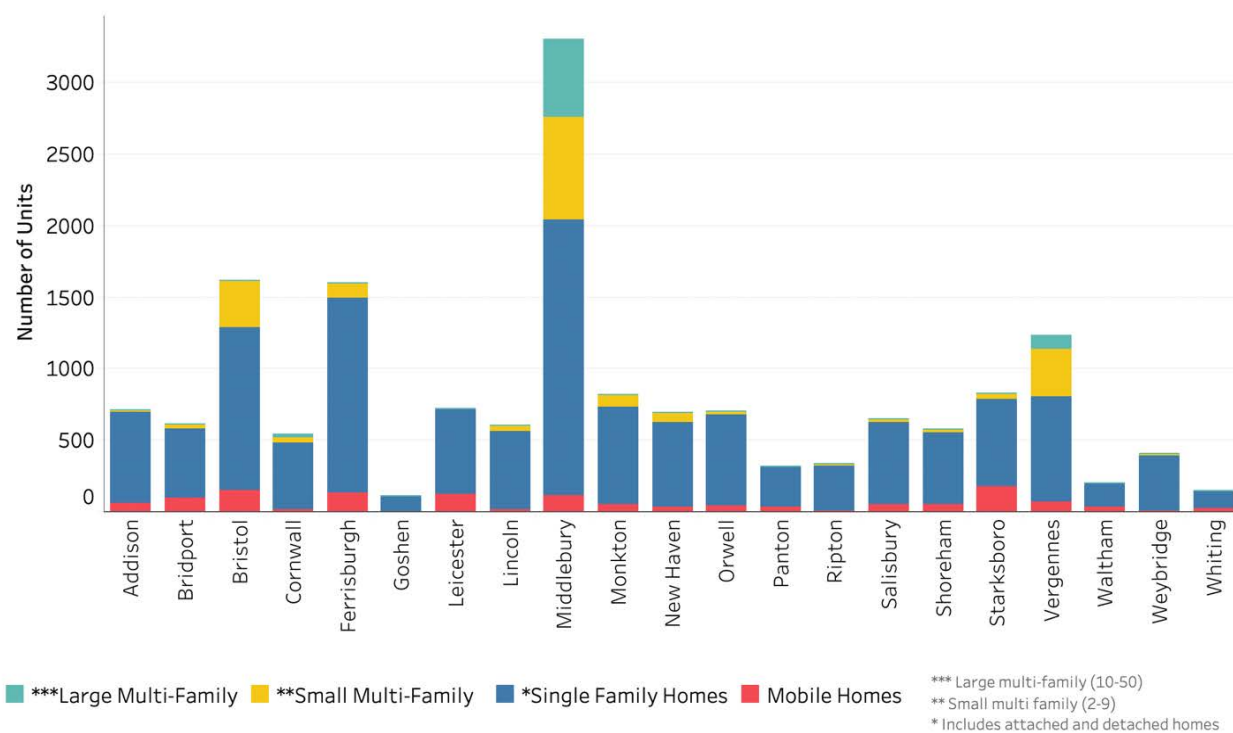
siting constraints on new housing development. State housing policy is aimed at reversing this trend by incentivizing housing development within the region's historic villages.

³⁹ <https://fred.stlouisfed.org/>

This plan supports housing in compact village centers but also recognizes that not everyone desires to live in densely settled areas. In 2018, single-family homes were still the most prevalent type of housing (74%) followed by small multifamily buildings of 2-9 units (12%) and mobile homes (8%). Larger multifamily units, 9-50 units (3%), are typically located in the denser population centers of Middlebury, Vergennes and Bristol, communities that have accessible services and degrees of public infrastructure (Figure 16). Infill construction of small or multifamily homes in rural villages and towns is often deterred or prohibited by outdated zoning and infrastructure constraints such as water and wastewater.

Figure 14: Housing Units by Town and Type

Source: U.S. Census Bureau



Mobile homes exist in every town but Goshen, representing the third highest percentage of housing units in the region. Mobile homes are a significant part of the Region's housing stock and provide affordable options for many households. However, the age and poor energy efficiency of many mobile homes significantly adds to a household's overall housing costs. In 2018, there were 1350 mobile homes in the Region. Approximately a quarter of these mobile homes are located in the region's 15 mobile home parks.⁴⁰ Mobile home parks, most built 50 years ago or more, face a range of challenges; financial, operational, infrastructure and market conditions, that puts their sustainability at risk. Critical concerns facing parks in Addison County Region include parks located in 100-year flood plains, parks at risk due to poor quality and vacant units, infrastructure issues including water and wastewater systems and large-scale capital improvement needs.⁴¹ Addison County Community Trust (ACCT), a non-profit housing developer, owns and maintains 9 of the 15 parks totaling 340 lots. As part of ACCT's mission,



Figure 15: McKnight Lane, affordable, net-zero energy, modular homes in Waltham.

they are committed to addressing these critical issues so that the parks can continue to serve as viable housing community alternatives in the region. For example, in 2017, ACCT collaborated with housing partners to repurpose an abandoned mobile home park in Waltham and install affordable, net-zero energy, modular homes (Figure 15).

⁴⁰ <https://accd.vermont.gov/housing/mobile-home-parks/registry>

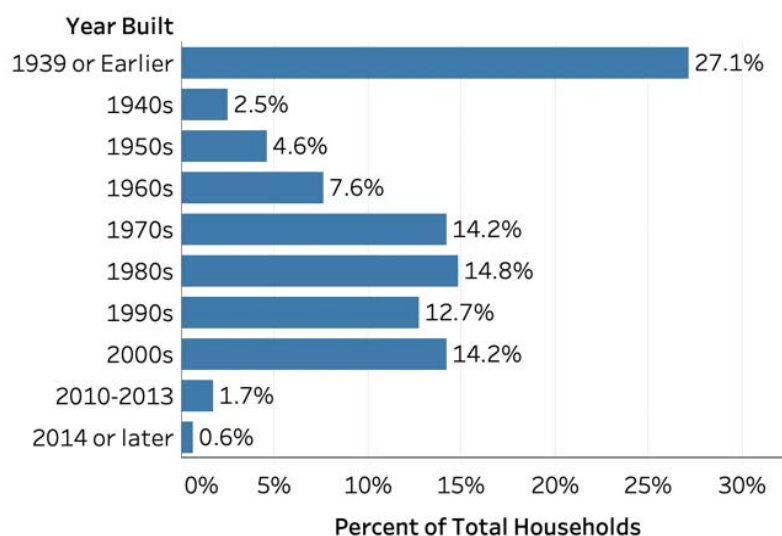
⁴¹ <https://vhcb.org/sites/default/files/pdfs/pubs/MHP-Study-2019.pdf>

Housing Age and Size

Older homes are an important part of the character and historical record of the villages and towns in the Addison County region. Just over 27% of the current housing stock was built prior to 1939.

After 1939, however, the region and state saw twenty years of slow growth, a 2-4 % rate of housing construction, until the building boom in the 1960s and 70s (Figure 16). It was during this time that many of the mobile home parks in the region were constructed.

Figure 16: Estimated Age of Housing as Proportion of Total
Source: U.S. Census Bureau



The median age home in the Addison Region was built in 1976.⁴² In Bristol, 50% of the houses were built prior to 1939, while in Vergennes, 36.5% fall into that category. Despite their charm, older homes are not the best fit for many households today. High energy and property maintenance costs can be financially burdensome. Accessibility issues for older and disabled persons may exist if homes have not been maintained, updated or retrofitted.

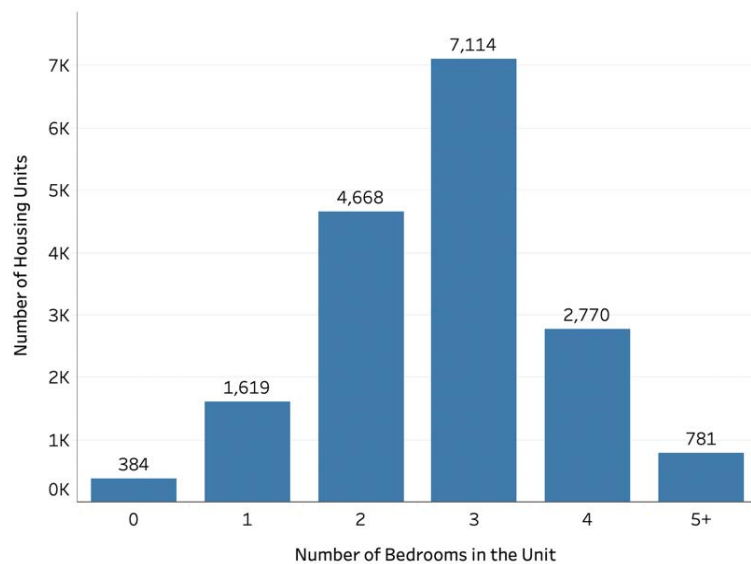
Older village homes can be large, constructed at a time when the average family size was much greater than it is today. Historic farmhouses were designed to house extended families and workers with numerous bedrooms and living areas. Similarly, single-family homes built for the 'nuclear family' (two parents and their children) do not match the needs of the growing number of smaller households. Counter intuitively, home size has increased 50% since the 1960s.⁴³ In 2019, the majority of existing housing units in the Addison Region were single family, owner occupied, three-or-more-bedroom homes, often on large village or rural lots. In 2018, 30% of households were one-person, but only 11% of the housing stock was a studio or one-bedroom unit. During the same period, 32% of households were composed of three or more people, but 62% of the housing stock had three or more bedrooms. Our current housing stock does not match the current needs of the Region.

⁴² <https://www.housingdata.org/profile/data-guide>

⁴³ Ibid.

Since new construction is significantly more expensive (per square foot) to purchase than the existing housing stock, repurposing our existing housing stock is one of the best ways to meet our housing needs.⁴⁴

Figure 17: Estimated Occupied Housing Units by Number of Bedrooms
Source: U.S. Census Bureau via VT Housing Data



Accessory Dwelling Units

This traditional home type is reemerging as a housing option that is compatible with the growing number of smaller households. There is no region-wide data of accessory dwelling units (ADUs), but the existing stock of large older homes, with barns or carriage houses, lends itself to this housing type.



Figure 18: Detached ADU

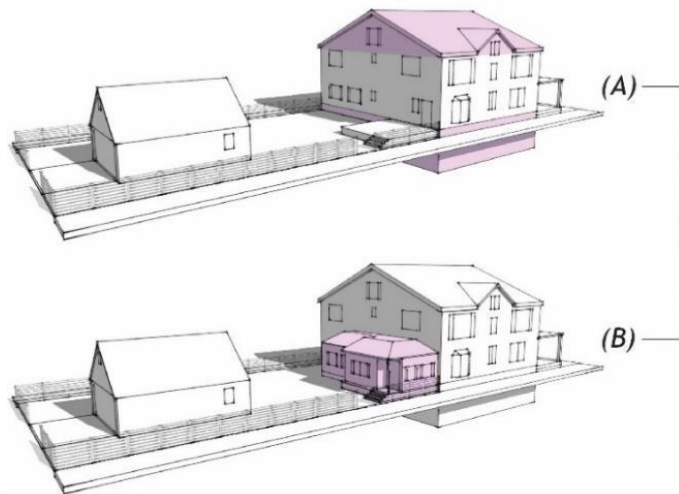
ADUs, historically known as Granny Flats, are efficiencies or 1-bedroom apartments, subordinate to the primary structure and located within an owner-occupied home or detached on the same lot. ADUs, typically, cannot exceed 30% of the size of the primary home, must obtain water/wastewater permits and, if detached, meet the required dimensional standards of the zoning district.

Renovating larger, older homes to create ADUs adds to the existing housing stock of an area and benefits homeowners by providing rental income or flexible living arrangements to meet the needs of multigenerational families.

⁴⁴ <https://vtdigger.org/2020/10/25/affordable-housing-vermont-ideas-solutions/>

Due to their decentralized nature, ADUs can create additional housing units without the overhead of larger developments. The benefits of ADUs are well known around the country as a practical means to increase housing options, however, financing of ADUs can be difficult for many homeowners, due to borrowing limits based on their primary home mortgages.⁴⁵ The Brattleboro Area Affordable Housing (BAAH) has an innovative program that provides technical support and small design and construction grants to assist in the creation of ADUs, which in turn will provide affordable units and additional income for the homeowner.⁴⁶

1. Attached Accessory Dwelling Unit (ADU)



2. Detached Accessory Dwelling Unit (ADU)

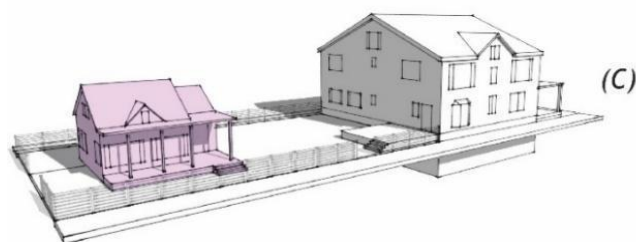


Figure 19: Attached versus detached ADUs.

⁴⁵ <https://accd.vermont.gov/housing/planning/adu>

⁴⁶ <https://baahvermont.org/our-programs/apartments-in-homes/>

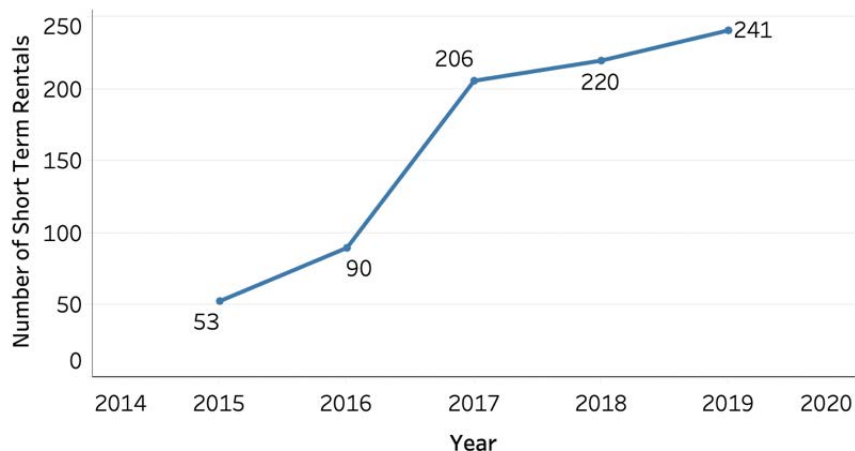
Short Term Rentals

Short-term rentals (STRs) are housing units that are rented typically as vacation rentals. Compared to the rest of Vermont, Addison County has a small percentage of STRs, about 3% of the state total. In 2018, 220 homes were consistently used as short-term rentals, approximately 1.3% of the housing stock. In 2019 that number increased 10% to 241 homes, (Figure 20).

If a short-term rental is a secondary use for a resident, a weekend or seasonal rental, the housing unit is considered owner occupied and part of the housing market, providing the homeowner with additional income. If a home is primarily used as a short-term rental, however, that housing unit is eliminated from the available housing stock. If the total number of STRs increases to a significant percentage, they can lower the region's vacancy rate and increase competition in the housing market.

Figure 20: Change in Total Short Term Rentals (2015 - 2019)

Source: U.S. Census Bureau



Homes purchased for use as permanent short-term rentals can drive up regional housing costs, impacting “affordability,” and availability of long-term rental housing.⁴⁷ A high percentage of short-term rentals can have a detrimental effect on neighborhoods as well, replacing year-round families with transitory

occupants and/or vacant homes. In Addison County, it is estimated that most of the short-term rentals fall into the category of seasonal homes, uninsulated camps and cottages that are not suited for year-round use.⁴⁸ Although, they do not currently pose a threat to the market, there are an increasing number of year-round STRs in neighborhoods in and around Middlebury that cater to families and alumni of the College. Not surprisingly, the regions in Vermont with the highest numbers of short-term rentals are home to large ski resorts and other significant recreational amenities that draw visitors year-round. Given the relatively low percentage of housing stock used exclusively as short-term rentals, their overall impact on the affordability of the housing market in the Addison Region is limited. Additionally, the negative impact is

⁴⁷ <https://vtdigger.org/2020/06/11/affordable-housing-advocates-worry-about-rise-in-short-term-rentals/>
10/8/21

⁴⁸ <https://www.housingdata.org/profile/data-guide>

outweighed by the beneficial added income many residents can achieve by leveraging their property in this manner.

Housing Affordability

Housing values have been rising steadily in Addison County over the past twenty years, mirroring the pattern of the State as a whole. This trend, combined with twenty years of low home construction rates (driven in part by high construction costs), an increase in total households and a reduction of household size has resulted in a critical shortage of adequate housing for a growing percentage of the Region's population.

Adequate housing can be defined as;

- Homes that are affordable for community members.
- Homes for single person households and first-time homeowners.
- Homes desirable for new families to move to the area, enroll their children in our schools, and fill jobs that support our economy.
- Homes that are appropriate for our elderly population to age in place in their community with their families and friends.
- Homes that are close to employment centers and/or public transportation.
- Homes that are safe and energy efficient.
- Homes that are appropriate for vulnerable populations.

Home Ownership Costs

From 2000 to 2020 the median housing price in the region rose by **117.6%**, from **\$122,00** to **\$265,500**. After the financial crisis of 2008, prices stagnated, fluctuating up and down slightly until 2016 when prices began to rise again (Figure 21).

Figure 21: Median Home Price Over Time

Source: U.S. Census Bureau

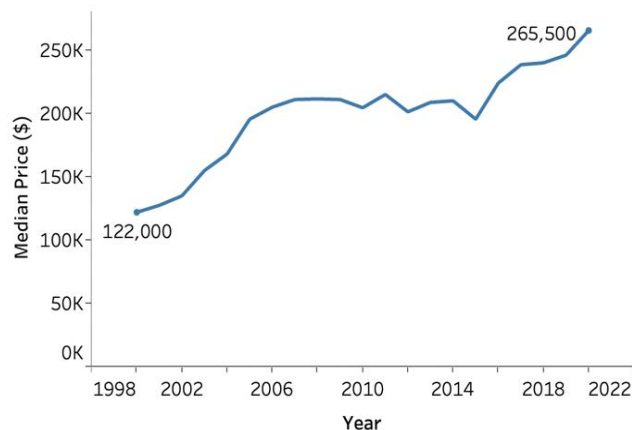
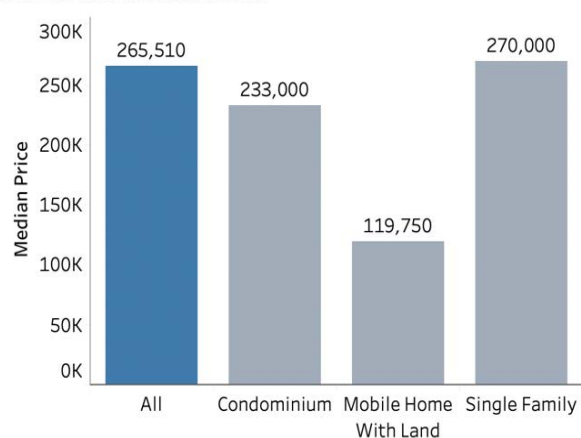


Figure 22: Median Price per Home Type (2019)

Source: U.S. Census Bureau



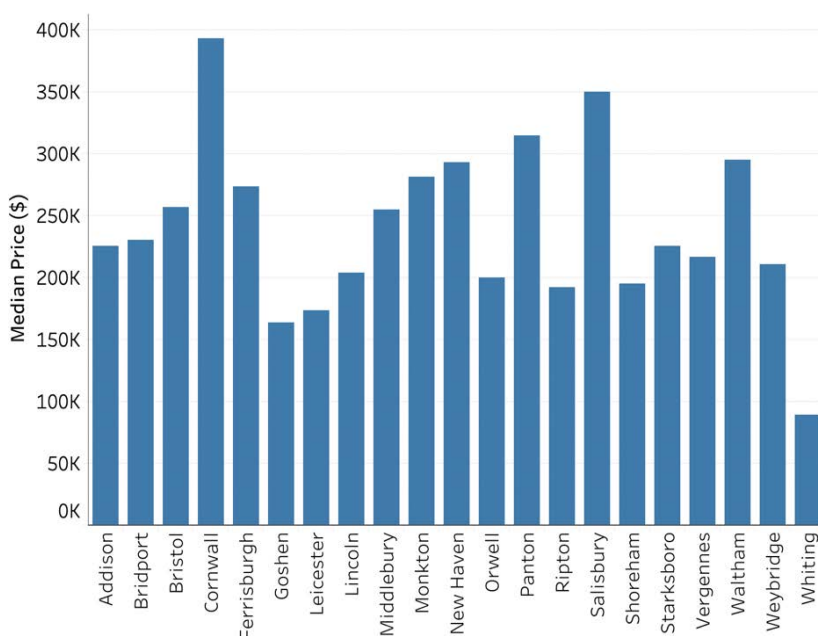
It is important to note that the median price value is the middle price, of all types of homes in the region or municipality, when listed from lowest to highest. Figure 22 shows the median price for several types of housing in Addison County; mobile home with land, condominium and single family and the overall median price when all the homes are combined. Figure 23 illustrates the range of median housing prices across municipalities in the Region. These home values are also indicative of the demand for housing in each community.

In 2019, the median housing price in Cornwall was \$393,000 compared to \$89,000 in Whiting. Cornwall's proximity to Middlebury makes it a desirable location for year-round and second home buyers attracted to the amenities of Middlebury village or with connections to Middlebury College. The greater demand for large single-family homes in Cornwall drives up the cost of all housing in the town and region, reducing affordable options for many. In Whiting, despite a low median home price, housing may be less desirable due to hidden costs, such as access to services, transportation or property maintenance issues. Fluctuation in the price of housing can be attributed to many factors. The costs of building materials and construction wages, zoning and permitting for site development, second home construction and short-term rental conversions all affect the market price of housing.

Zoning bylaws that require large minimum lot sizes, two acres and higher, increase the cost of housing and discourage developers from building smaller, less expensive units on these lots. Over time, one factor may have a greater impact than another depending on the current social, environmental or economic climate. High demand for housing in Chittenden County creates pressure for nearby Franklin, Lamoille, Addison and Grand Isle counties. These counties have the highest median home sale prices and rents in the state, next to Chittenden County.

Figure 23: Median Home Price by Town (2019)

Source: U.S. Census Bureau



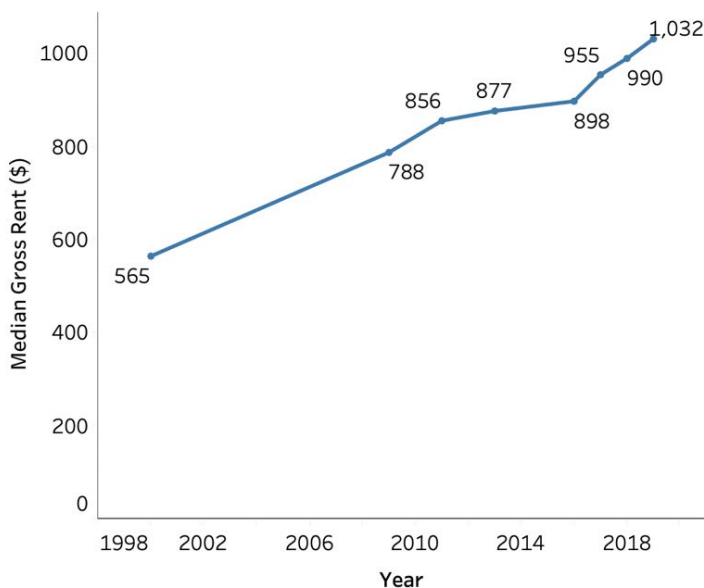
Rental Costs

Rental housing costs are, in turn, impacted by the current price and availability of owner-occupied homes. The pool of available housing in the rental market shrinks as potential buyers choose to rent due to a lack of ownership options. In 2019, approximately 24% of households in the region rented their homes. Gross median monthly rental rates for a one-bedroom have increased **83%**, from \$565 in 2000 to \$1,032 in 2019. The median gross rent equals the contract rent along with all the monthly utility and fuel costs. Rents in Addison County are the 3rd highest in the state after

Chittenden and Grand Isle Counties.⁴⁹ In 2020, Vermont experienced an influx of new residents due to the pandemic resulting in an increase in the demand for housing and the median price of available properties.

Figure 24: Median Rent Over Time

Source: U.S. Census Bureau



Covid -19 Pandemic

Throughout Vermont, home prices rose sharply during the summer of 2020 as people migrated to the state due to the Covid-19 pandemic, exacerbating an already tight housing market. Heightened interest from out-of-state buyers, a low vacancy rate, and favorable interest rates have all contributed to increased housing prices. Most of the real estate transactions involved higher priced homes of \$500,000 and up. Even so, the increased demand for housing has impacted the market at all levels, further limiting affordable options for local and first-time buyers. According to the Northwest Vermont Real Estate Market Report, the median price of single-family homes in Addison County rose to \$275,000 during the 2nd quarter of 2020, April to June. A recent report states that there was an increase of more than 1,000 residential property sales to out-of-state buyers in 2020 compared to in 2019, an increase of 38%, and the amount of money those buyers spent was up by 79%.

<https://www.burlingtonfreepress.com/story/money/2021/04/13/property-transfer-data-reveals-38-jump-out-state-homebuyers/7204925002/>

⁴⁹ <https://accd.vermont.gov/sites/accdnew/files/documents/Housing/VT%20HNA%202020%20Report.pdf>

Household Income

Household income is the combined gross income of all members of a household who are 15 years or older regardless of relationship status. Family income is defined as income generated by people in the same household that are related by marriage or civil union and file their taxes jointly. This document will be looking at household income. According to the 2000 and 2010 U.S. Census the median income of the region's households was \$43,177 and \$57,937 respectively, a 34.2% increase over ten years. The 2014 Vermont Housing Needs Assessment projected that the

Region's median household income would decline to \$51,138 by 2015 due to residual effects of the national recession, reduced income of baby boomers retiring and growth among low-income households.⁵⁰ However, this figure gradually rose to \$68,825 by 2019, a 18.8% increase from \$57,937 in 2010. (Figure 25).

As seen in figures 22, 24 and 25, the cost of housing in the Addison Region has increased at a greater rate than household income. Between 2000-2019, the percent increase for median home prices was 101.6%, and 83.3% for median monthly rents. In contrast, the percent increase of median household incomes, for the same time period, was 59.5%.

Figure 25: Median Household Income

Source: U.S. Census Bureau

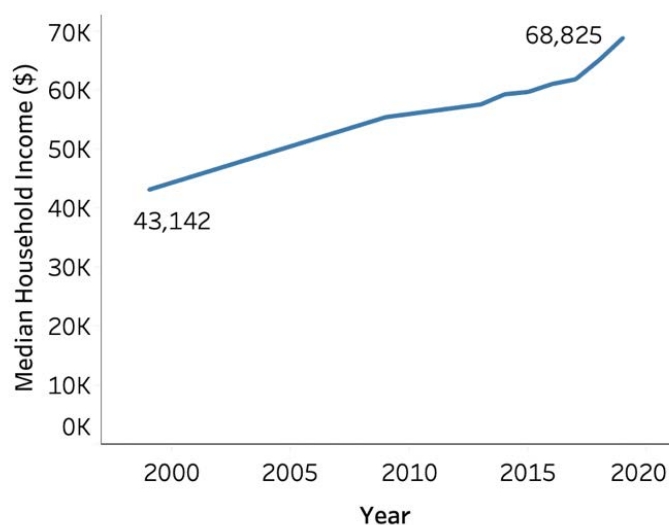
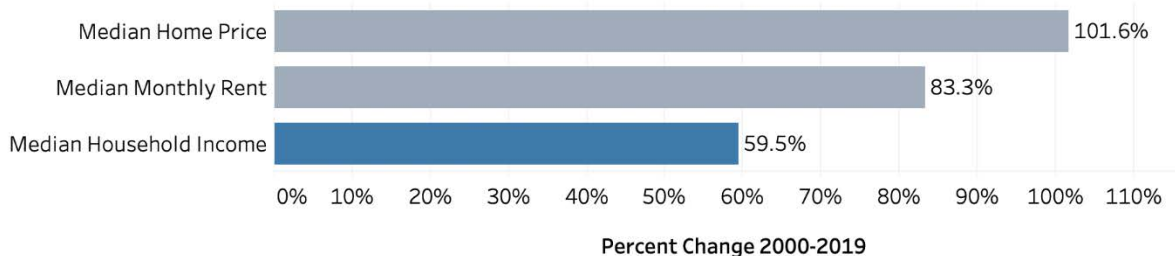


Figure 26: Change in Housing Cost and Household Income (2000-2019)

Source: U.S. Census Bureau



⁵⁰ <https://www.census.gov/topics/population/age-and-sex/data/tables.html>

In 2019, the average annual wage of an individual in Addison County was \$49,632.⁵¹ Many small households, 20% in the county, have only one salary or wage earner contributing to the total household income. **Table 3** breaks down median household income by town and tenure, tenure being the legal status by which a household occupies its home. This categorization further illustrates the income distribution in the region. In 11 out of the region's 21 towns, renter incomes were below that of the average individual wage for the county (*), a trend that is prevalent throughout the state.

Table 3: 2019 median household income by town and tenure⁵²

Town	Owner	Renter
Addison Region	78,029	46,188
Addison	89,167	79,583
Bridport	66,250	47,083*
Bristol	74,444	39,531*
Cornwall	97,946	76,875
Ferrisburgh	97,500	54,357
Goshen	77,969	N/A
Leicester	60,250	70,417
Lincoln	69,821	31,125*
Middlebury	76,685	45,506*
Monkton	89,063	93,851
New Haven	90,179	44,615*
Orwell	64,643	45,469*
Panton	78,083	46,250*
Ripton	72,143	N/A
Salisbury	81,641	57,583
Shoreham	61,389	36,696*
Starksboro	74,766	54,688
Vergennes	82,500	34,475*
Waltham	80,000	58,750
Weybridge	97,206	41,250*
Whiting	58,250	34,375*

⁵¹ <https://www.housingdata.org/profile/data-guide>

⁵² <https://www.housingdata.org/profile/data-guide>

Income Groups

Household income groups are categorized by a percentage of the Area Median Income (AMI) earned by households. Using a projected AMI of \$69,023, from the Addison County 2020 Housing Needs Assessment, table 4 illustrates the income range in each income group in the county.⁵³

Table 4: Household income range associated with income groups based on area median income	
Income Group	Household Income Range
≤30% of AMI: extremely low- income	\$20,707 or less
>30% to ≤ 50%: very low-income	\$20,708 - \$34,511
>50% to ≤ 80%: low-income	\$34,512 - \$55,218
>80% to ≤ 100%: moderate income	\$55,219 - \$69,023
>100%	> \$69,024

A region's '**workforce**' are the people in occupations who provide goods and services essential to their community and local economy. The household incomes of the region's workforce generally range between 60-120% of the AMI, \$41,414 - \$82,827. '**Workforce housing**' is defined as housing affordable for this population group.⁵⁴

Housing Affordability Gap

Affordable housing, as defined in state statute (24 V.S.A. § 4303 (1)), **is affordable if the total housing costs do not exceed 30% of the combined income of the household. For owner-occupied housing, household income cannot exceed 120% of the area median income (AMI), for rental housing household income cannot exceed 80% of AMI.** Housing costs include, but are not limited to, rent, mortgage, taxes, insurance, utility and heating costs. When households spend more than 30% of their income on housing it often becomes difficult to pay for basic living expenses, such as food, utilities, transportation, health care and childcare. According to U.S. Census Bureau 2018 estimates, more than one in three Vermont households pay an unsustainable percentage of their income towards housing costs.⁵⁵ The gap between what a household can afford and the income necessary to purchase or rent a home continues to grow in the Addison County region. In 2020, it is difficult for households that make the area median income (AMI) to afford median priced housing. From 2010 to 2018 the median home price increased by 17% while the median household income rose by 11%.

⁵³ <https://accd.vermont.gov/sites/accdnew/files/documents/Housing/VT%20HNA%202020%20Report.pdf>

⁵⁴ <https://urbanland.uli.org/industry-sectors/residential/affluent-communities-need-workforce-housing/>

⁵⁵ <https://www.housingdata.org/profile/data-guide>

This **affordability gap** increases the potential for moderate and lower-income families to become burdened by housing costs.

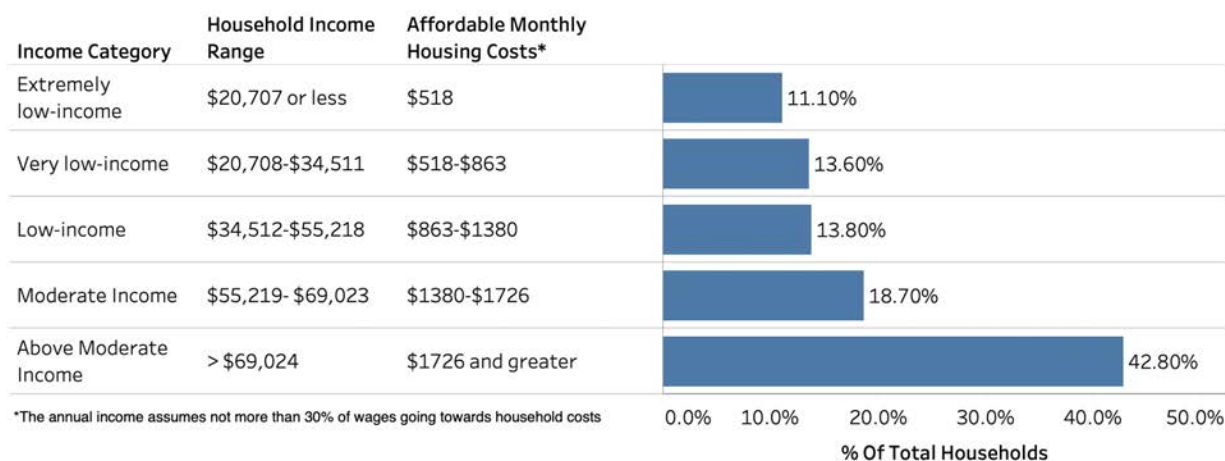
Housing Wage

The housing wage is indicative of whether wages are keeping pace with housing costs in a region. A housing wage is the combined wage a household must earn, working 40 hours a week, to afford a rental housing unit at HUD's Fair Market Rent (FMR), without paying more than 30% of its income towards housing costs (Table 5).

Table 5: Housing Wage		
# Of Bedrooms	Hourly Housing Wage	Annual Income Needed to Afford*
One-bedroom	\$16.85	\$35,040
Two- bedroom	\$20.40	\$42,440
Three-Bedroom	\$25.48	\$53,000
*The annual income assumes not more than 30% of wages going towards household costs		

Figure 27: Percent of Total Households, Household income range, and Affordable Housing Costs Per Income Category

Source: U.S. Census Bureau



Fair Market Rents (FMRs) are the 40th percentile of gross rents for typical, non-substandard rental units in a regional housing market.⁵⁶ In the Addison Region, as of 2018, the FMR for a 1-bedroom apartment was **\$875**, a 2-bedroom apartment, **\$1061** and a 3-bedroom apartment, **\$1325**.⁵⁷ To afford a two-bedroom apartment a single renter would need to earn a wage of **\$20.40** and an annual income of **\$42,440**. Currently, the average (mean) renter wage for

⁵⁶<https://www.housingdata.org/profile/data-guide>

⁵⁷ <https://reports.nlihc.org/oor/vermont> Out of Reach 2020: Vermont, National Low Income Housing Coalition.

Addison County households is **\$15.92**, leaving a rental wage gap of **\$4.48**. This gap especially impacts single people living alone, in particular single parents with children. As shown in figure 27, 24.7% of households make \$34,511 or less, which is not enough to afford a one-bedroom apartment at FMRs.

A household earning \$43,037, the county median renter income, can afford to rent a two-bedroom apartment but nothing larger. The price for most rental units in the region is above what the average working individual can afford. No Vermont county has market rate rental housing affordable for extremely low-income households.⁵⁸ In 2020, Vermont had the 16th highest housing wage in the country.

The 2018 median priced home in the region was \$240,000. To afford this house a buyer would need an annual income of at least \$66,923 and an estimated \$22,529 available for closing costs; 5% down payment, interest, taxes and insurance. A household earning the area median income for 2018, \$65,093, would be able to afford a home price of \$232,000 with closing costs estimated at \$21,918. Both of these scenarios assume that buyers would not spend more than 30% of their income on monthly housing costs and had the additional income for closing fees.⁵⁹

Figure 28: Housing Cost Burden for Owners and Renters In Addison Region (2018)

Source: U.S. Census Bureau

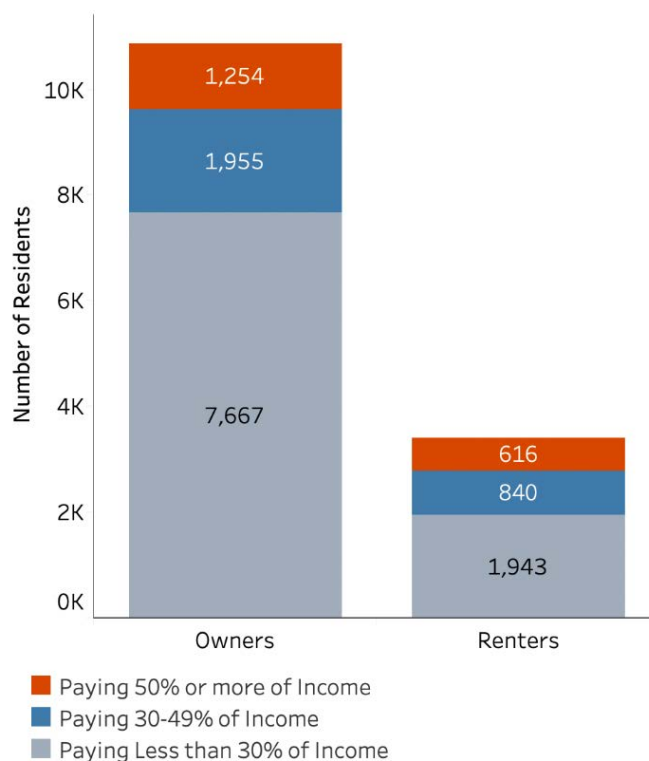


Figure 28 shows the number of households paying more than 30% of their monthly income for housing expenses which is the federal standard of housing affordability.⁶⁰

⁵⁸ <https://www.housingdata.org/node/54528> Mia Watson, March20,2019 'Vermont lacks housing for extremely low-income households'

⁵⁹ <https://www.housingdata.org/profile/data-guide>

⁶⁰ <https://www.housingdata.org/profile/data-guide>

In Addison County, more renter households proportionately, are burdened by housing costs than owners at both the over 30% and over 50% levels of income spending. Households spending more than 50% a month are considered severely cost-burdened.

Renters: 840 households were cost burdened; 616 households were severely cost burdened.

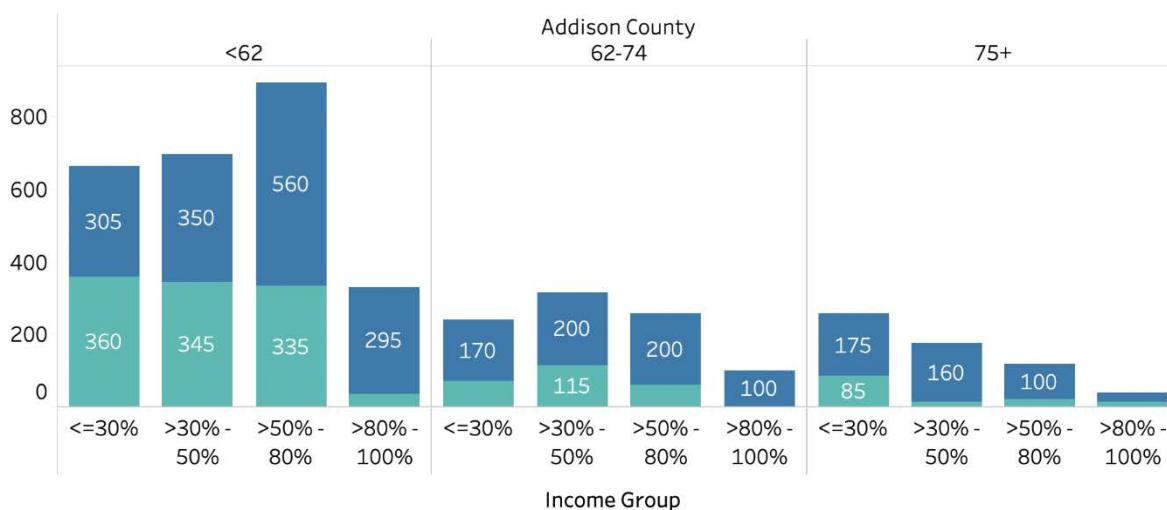
Owners: 1955 households were cost burdened; 1254 households were severely cost burdened.⁶¹

Substandard Housing

The lack of adequate and affordable housing available for lower-income households can create multiple housing problems and potential health and safety issues. The housing stock that is affordable to many low-income renters is often older and of poor quality. Substandard housing problems, in addition to a cost burdened household, can include an incomplete kitchen or bathroom, coal heat or no heat and overcrowding. A household is considered as having housing problems if any of these exist. Mobile homes built before 1976, or single-family homes with a property value of less than \$75,000, also qualify as “substandard”.⁶²

Figure 29: Number of Households with Housing Problems in Addison County

Source: U.S. Department of Housing and Urban Development (HUD), Comprehensive Housing Affordability Strategy (CHAS), 2015



Income groups

≤ 30% of HAMFI: Extremely low-income
 > 30% to ≤ 50% of HAMFI: Very low-income
 > 50% to ≤ 80% of HAMFI: Low-income
 > 80% to ≤ 100% of HAMFI: Moderate income

Household type

Owner Renter

HUD Area Median Family Income (HAMFI) is the middle family income for four-person households in a given area.

⁶¹ U.S. Census Bureau: American Community Survey 5-year estimates (Table B25070, B25091)

⁶² <https://accd.vermont.gov/sites/accdnew/files/documents/Housing/VT%20HNA%202020%20Report.pdf>

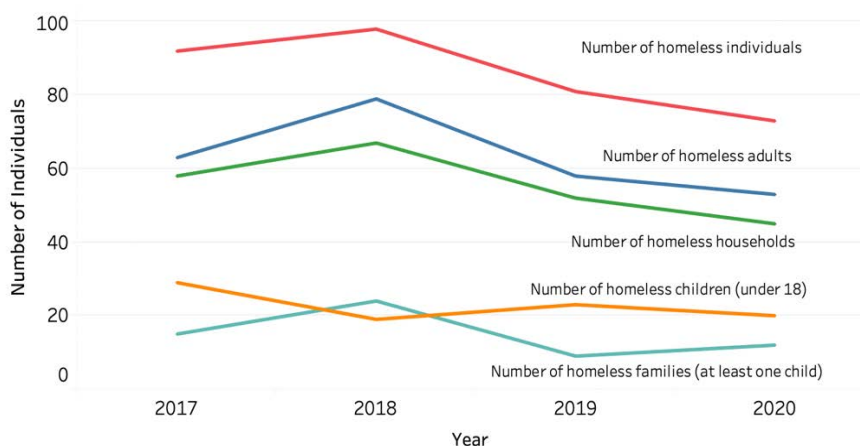
Maintenance issues tend to be more frequent with older structures, leading to additional costs and burdens. Older rental stock often lacks proper weatherization, resulting in higher heating costs and inefficiencies. For homeowners who are already cost burdened, paying for necessary home maintenance may be extremely difficult. When maintenance and property issues are not addressed, however, this can result in an overall deterioration of housing quality and potential health and safety concerns.⁶³

Most rental homes in Vermont are not regularly inspected for health and safety conditions. Therefore, uncertainty exists regarding the potential scope of problems within this significant portion of Vermont's housing stock. Vermont has a Rental Housing Health Code (RHHC) that all rental housing must comply with. As of this writing, municipalities enforce or fail to enforce this code. A bill to create a statewide system is currently under consideration in the legislature. Meanwhile, many tenants continue to live in substandard housing without the ability to move and potentially fearful of complaining.⁶⁴

Homelessness

Increased competition for housing, due to the shortage of appropriate, accessible and affordable homes, adds to the ongoing struggle to house vulnerable populations, such as low income, elderly, disabled and homeless households. During the 2020 Annual Point in Time (PIT) count, which takes place each January throughout one night, 73 Addison County residents were identified as experiencing homelessness.

Figure 30: One Night Count of the Homeless Population in the Addison Region
Source: VT Housing Data



This total represents individuals in shelters, transitional housing, publicly funded hotel rooms and individuals living outside. Figure 30 looks at some characteristics of this population from

⁶³ <https://www.housingdata.org/node/54528> Mia Watson, March 20, 2019 'Vermont lacks housing for extremely low-income households'

⁶⁴ <https://legislature.vermont.gov/Documents/2020/WorkGroups/Senate%20Appropriations/FY%202020%20BUDGET/12%20Advocates%20Testimony/H.542~Sarah%20Carpenter~Rental%20Housing%20Advisory%20Board~4-16-2019.pdf>

2017 to 2020.⁶⁵ The PIT count, however, does not include those who are at risk of homelessness or living temporarily with friends or family, inevitably underrepresenting this population.⁶⁶

The majority of the homeless population in the region is being served by the following emergency shelters:

Charter House Coalition and Warming Shelter, a non-profit, volunteer-based organization dedicated to providing basic food and housing in and around Middlebury and the

John Graham Emergency Shelter, providing transitional and emergency shelter for homeless individuals and families in Vergennes.

These facilities provide services that are not available in publicly funded hotels or transitional housing and work towards minimizing shelter stays and the goal of permanent housing for families and individuals.

Charter House Coalition Coordinated Entry (CE) is a process that aids individuals and families experiencing a housing crisis by quickly identifying, assessing, referring and connecting them to housing assistance based on their strengths and needs. A total of 93 households obtained permanent housing in 2019 through the CE process;

- 38 found unsubsidized rental housing,
- 33 found housing with subsidy
- 21 obtained housing with friends or family.

About a quarter of these households were families with children and approximately two-thirds included a person with a disability.⁶⁷

The following advocacy organizations also work to support homeless in our region:

VCEH Vermont Coalition to End Homelessness

VAHC Vermont Affordable Housing Coalition

HOPE Helping Overcome Poverty's Effects

⁶⁵ <https://helpingtohousevt.org/pointintime/2020-pit/>

⁶⁶ <https://www.housingdata.org/profile/data-guide>

⁶⁷ Addison County CHAT data meeting 2019.

Covid-19 Pandemic

In the summer of 2020, at the request of the Vermont Legislature, the Vermont Housing and Conservation Board (VHCB) managed the federal Coronavirus Aide, Relief, and Economic Security (CARES) Act funding to address long standing needs of increased and improved housing options for a rapidly growing number of individuals and households struggling with homelessness. Relief funds were used to secure and rehabilitate permanent housing for homeless households and make improvements to shelters around the state. At the outset of the pandemic, many shared housing facilities, such as homeless shelters, were unable to meet CDC health and safety protocols. At that time, most shelters closed, and transitioned many of the 2,000 homeless individuals in motel rooms across the state.

Housing Support Partners

Many households in the Region need support to acquire and maintain safe, appropriate, affordable and permanent housing in their communities. The following federal, state and regional agencies, organizations and programs all play a role in this effort through advocacy, land use planning policy, financing and development to achieve the goal of housing for all.

Federal and State Partners

The **U.S. Department of Housing and Urban Development (HUD)** provides funding for housing in the following ways:

- Project-based assistance: Where the subsidy is assigned to a specific housing unit built, developed and or managed for the purpose of accepting low-income tenants.
- Tenant-based assistance: Where the recipient receives financial assistance, usually in the form of a Housing Choice Voucher (HCV) to help cover the cost of any qualified housing unit.⁶⁸ Unfortunately, due to the tight housing market, 2.8% vacancy rate, there has been an underutilization of vouchers. Vouchers are time sensitive and recipients lose a percentage of this time waiting for appropriate housing. Much of the housing that is available is above the voucher payment standard and therefore, out of reach for voucher holders.

Federal Low Income Housing Tax Credits (LIHTC) and **Vermont Affordable Housing Tax Credits** enable funding for rental housing development and affordable home ownership opportunities. These tax credits are awarded by the **Vermont Housing Finance Agency (VHFA)** to local housing

⁶⁸ HUD.gov

developers. The credits are then sold to investors to raise the start-up capital needed for housing development.⁶⁹

Vermont Housing Finance Agency also offers a range of home buyer programs and assistance, for income qualified buyers, to promote affordable housing throughout the state, such as;

- Low down payments,
- Down payment and closing cost assistance,
- Vermont Property Transfer Tax reductions,
- Reduce your federal tax liability
- Lower mortgage insurance premiums = lower monthly payment

Vermont Housing and Conservation Board (VHCB) creates affordable housing and protects Vermont lands. Since 1974, VHCB has assisted in the creation of more than 13,420 affordable homes, the conservation of nearly 437,079 acres of agricultural and recreational lands and natural areas and the restoration of 74 historic community buildings.

Vermont Department of Housing and Community Development (DHCD) supports resilient communities and provides assistance and grant opportunities to enhance community development programs. DHCD coordinates and oversees the implementation of the state's housing policy, facilitates collaboration among state housing agencies and serves as a resource to housing providers. Additionally, the Vermont Community Development Program (VCDP) within the DHCD allocates Community Development Block Grants (CDBG) for housing development to communities statewide outside of Burlington, which has its own CDBG program.

Evernorth, a merger of Housing Vermont (**HV**) and Northern New England Housing Investment Fund (**NNEHIF**) to create a single nonprofit organization, serves low- and moderate-income people of Maine, New Hampshire and Vermont with affordable housing and community investments. Evernorth also works closely with local nonprofit and for-profit developers to help assess, underwrite, and manage a wide range of projects, including apartments for seniors, workforce housing, assisted living, and projects which rehabilitate and preserve scarce housing resources.⁷⁰ In the Addison region, Evernorth is a key partner in the development and rehab of these scarce housing resources through the LIHTC program, providing critical development capacity and offtakers for the tax credits.

⁶⁹ <https://www.vhfa.org/news/blog/vermont-housing-finance-agency-completes-successful-annual-sale-state-tax-credits>

⁷⁰ <https://evernorthus.org/building-communities/affordable-housing/>

Regional Partners

Neighborworks of Western Vermont

(NWWVT), a nonprofit, community development organization, located in Rutland, that supports mortgage and down payment assistance and facilitates repair and renovation of affordable housing, to address energy efficiency, health and safety issues. Priority projects include accessibility, weatherization, heating, electrical, roofs and helping seniors age in place.⁷¹

Addison County Community Trust

(ACCT), a non-profit housing trust serving the Region since 1989, is dedicated to creating permanent, highly energy efficient, and affordable homes.

Covid-19 Pandemic

CARES Act funding, released to the State during the pandemic, enabled the region's housing partners to execute the following projects:

1. 3 new energy efficient homes at KTP in Bristol, including rental assistance, to house homeless families.
2. The acquisition of 4 apartments in Weybridge, including rental assistance, to house homeless families.
3. Funding for landlords, earmarked for the rehab of substandard rental units for homeless families.

As of 2021, ACCT owns and manages 334 rental apartments and 9 mobile home parks with 340 owner-occupied home sites, as well as stewards permanent shared equity grants for 75 single family homes. In addition to property management, ACCT also provides residential services through SASH program for up to 200 county seniors ensuring they can age safely at home, and through the Family Support Program to vulnerable residents who need wraparound services to successfully maintain their housing.

In 2019, the Vermont Housing and Conservation Board awarded ACCT a \$20,000 technical assistance grant to create a comprehensive redevelopment plan for their mobile home parks to address their infrastructure needs and ensure they are financially sustainable.

⁷¹ <https://www.nwwvt.org/>

Current and Future Housing Needs

Summary

The current housing crisis/shortage is a complex issue. The age and size of existing stock, the cost of construction, materials and land, a lack of infrastructure in rural villages, incompatible zoning regulations and expensive regulatory processes inhibit the ability to create needed housing. Modest starter homes are unaffordable for young families or seniors wanting to downsize and age in place. A lack of *workforce housing* can result in long and expensive commutes when employees can't afford to live near their place of work. Despite an active network of housing support organizations and funding opportunities, many households in the region still do not have access to the housing they need, in many cases because it doesn't exist. In turn, the lack of appropriate and affordable housing in the region affects the region's communities in the following ways:

- Contributes to population changes as families can't afford homes in the region,
- Impacts schools,
- Impacts the economy,
- Increases housing insecurity for vulnerable populations,
- Reduction of the workforce, hard to find employees,
- Difficult for seniors to age in their homes and communities.

Education and Collaboration

In addition to the complexity of the housing issue, there may be fear or misconception that affordable or subsidized housing will have a negative effect on a community. It is essential that all residents, municipal representatives and leaders understand and acknowledge the housing needs of their neighbors. The current housing crisis is regional but the strategies and solutions used to address this crisis need to be specific to each community. There is no one size fits all solution. Challenges and opportunities faced in the City of Vergennes, for example, will differ from those faced in Shoreham. Equally important, the issues faced within a town's village center may be very different from those in its rural areas. Because the issues are distinct, the solutions will be as well. It is the community's responsibility to support the creation of housing that meets the needs and desires of residents and in a manner that enhances the goals and objectives of the town's plan. Local housing plans and projects developed through a process of public involvement and education, community input, and stakeholder collaboration will produce the most successful outcomes.

Addressing Housing Issues

Fair Share Housing and Fair Housing

The federal Fair Housing Act prohibits discrimination based on race, color, religion, gender, family status, or disability in matters of housing access. Vermont's Fair Housing statute includes age, marital status, sexual orientation and the reception of public assistance to this list of prohibitions.

Vermont's planning and zoning act, 24 V.S.A., Chapter 117, identifies the responsibilities and requirements of municipalities and regional commissions to promote and protect affordable housing options for its residents. For example:

- Single- and two-family homes cannot be subjected to site plan review.
- It is illegal to prohibit mobile homes or mobile home parks from a municipality.
- Municipalities must designate appropriate districts for multi-unit and multi-family dwellings.
- Accessory dwelling units (one-bedroom apartment or efficiencies) subordinate to a single-family dwelling must be considered a permitted use.
- Duly adopted municipal plans must include recommendations for addressing the housing needs of low- and moderate-income individuals, and should account for accessory dwelling units as a form of affordable housing.

Housing Commissions

The first step towards overcoming housing barriers is for communities and municipal leaders to fully understand the housing issues that exist within their own town. State law allows for the creation of municipal housing task force, or commissions (24 VSA §4433(5)). These commissions have the opportunity to work independent of local Planning Commissions in areas outside of planning and regulation on solving the dilemma of providing homes that people need and can afford. Through public outreach, surveys and events, housing commissions can connect with housing advocates, developers, realtors, state legislators and residents to develop a **housing action plan**.

Solutions and Tools

Solutions to housing barriers can be **regulatory or non-regulatory** in nature. Regulatory solutions are the result of revisions to a municipality's plan, bylaws and/or subdivision documents, specifically dimensional standards, permitted uses and process requirements. Non-regulatory solutions are derived from state and community development programs and grants, financial incentives for developers, collaboration with social services and partnerships with public and private organizations and individuals. None of the strategies proposed in this plan will address all of the region's housing needs, nor will they be appropriate for all communities. These are tools that will promote incremental increases in density, implementing a process of **gentle infill** in existing neighborhoods and creating needed affordable housing throughout the region.

Regulatory

Municipal Plan Goals

A town's municipal plan sets forth the overall goals for land use and development in the community. Planning goals that promote housing and include smart growth concepts such as, **compact and walkable centers, clustered development, density bonuses, transit-accessible communities and a variety of housing types and affordability**, enable proposed regulations aimed at addressing housing issues. Below are examples of zoning concepts and strategies that can be integrated into municipal bylaws.⁷²

Rework Density and Dimensional Requirement Bylaws

- Make the built pattern of historic villages centers, such as road frontage, building setbacks and lot coverage, the basis of dimensional standards for new development in these zones. Measure existing conditions and create dimensional standards that mirror these conditions, reinforcing the character of the area.
- Reduce minimum lot size or minimum unit size requirements. Bylaws that require a large minimum lot size (2 acres/dwelling unit) discourage the development of smaller and affordable housing, due to the higher purchase price of the land. Even when density is limited by a lack of town water and sewer, municipalities should allow small lots and encourage creative solutions to solve the infrastructure issues.



Figure 31: Left. Diagram of typical ¼ acre village lots, 4du/ac. Right. Same ¼ acre pattern of development but with greater allowable density, 12 DU/acre.

⁷² <https://www.housingdata.org/profile>, Regulatory tools for community housing needs.

- Separate density from lot size. Create a zoning bylaw that permits a dwelling units/acre density pattern that is consistent to the existing character of the village neighborhood and not determined by lot size. A ¼ acre lot could allow a duplex plus an accessory dwelling unit. The minimum lot size could remain ¼ acre. Defining density separately from lot size, allows for a variety of housing types and affordability.

Allow for a variety of housing types

- Allow duplexes and multifamily units in all residential zones. Duplexes can be allowed on the same sized lots as single-family homes. **(Figure 32, right)**
- Allow residential mixed-use and in-home business in residentially zoned areas.

Promote accessory dwelling units (ADUs)

Although allowed by right (24 VSA §4412(E), barriers to ADU development still exist. Municipalities can work to reduce these barriers through policy change and supporting programs that help with and technical and design assistance.⁷³



Figure 32: Example of duplex housing

- Simplify or reform application requirements for small scale development within existing structures.
- Waive or reduce permitting fees.
- Consider increasing the allowable size of accessory dwelling units based on the size, proportions and character of the primary structure and parcel.
- Provide design, technical and financial materials and resources to homeowners interested in creating Accessory Dwelling Units.



Figure 33: Examples of detached (left) and attached (right) Accessory Dwelling Units

⁷³ <https://accd.vermont.gov/sites/accdnew/files/documents/CD/CPR/ADU%20101.pdf>

Adaptive reuse of buildings

- Allow the conversion of pre-existing larger buildings, like barns, schools or commercial structures, into multifamily units, where appropriate through conditional use review.
- Renovate pre-existing historic homes into energy efficient, accessible, duplexes or multi-family homes.

Flexible parking regulations

- Reduce on-site parking requirements when projects are near public transit, services and available on-street parking.
- Waive parking requirements for mixed-use developments when commercial and residential demand peaks at different times of day.
- Allow stacked driveway spaces.

Clustered Development and Planned Unit Developments (PUDs)

These zoning tools allow greater flexibility in the configuration of buildings on a site, encouraging smaller structures and a more creative, efficient use of that site. This process can result in lower infrastructure costs due to coordination of construction and shared utility systems. Municipalities should develop specific standards for PUD review that conform to their town plan goals and objectives.⁷⁴ PUDs can:

- Support development density to be determined for an entire area (instead of a lot-by-lot basis).
- Encourage small lot, clustered development with minimal side yard setbacks.
- Require affordable housing and/or density bonuses.
- Allow for innovative design and energy efficiency through share resources and walkable communities.
- Preserve open space for communal use and the protection of natural resources.



Figure 34: Single family home converted into two housing units.



Figure 35: Bristol Cohousing, an example of a PUD

⁷⁴ <https://legislature.vermont.gov/statutes/section/24/117/04417>

Promote Affordability

- Allow permitting fee reductions, waivers, or deferments for affordable housing development projects.
- Broaden types of housing that are allowed “by right”, thus simplifying and reducing the cost of the permitting process.
- Simplify regulations by aligning with state permitting, if no specific reason for “extra protection” of resources is evident.

Non- Regulatory

Collaboration with private, public and non-profit partners.

- Municipalities and developers share the costs of sewer, water, sidewalks and other infrastructure.
- Investigate opportunities to build private housing developments on donated town land.
- Grant monies awarded to municipalities is invested into public-private partnerships to create affordable housing.
- Create partnerships between senior housing facilities and healthcare and elder services to develop independent housing options for vulnerable populations.
- Encourage community members to participate in **Home Share**. Housing committees and/or local advocates should promote the concept of home sharing through education and outreach.⁷⁵
- Support the work of non-profit housing organizations to maintain and improve existing affordable housing options in your communities, including mobile home communities.



Figure 36: Weathervane United

Beginning with a Community Block Grant to purchase one home in the center of Lincoln Village is now ten units in three homes, providing affordable housing for seniors. Sidewalks connect the community to the library, general store and town offices. Infrastructure is provided by the Town.

⁷⁵ <https://www.homesharevermont.org/about-us/>

Figure 37: Stoney Hill Development.

A mixed-use development, located within walking distance to schools and Bristol's downtown. The Town and Stoney Hill Properties, LLC initially partnered on a community development block grant (CDBG) to develop design and feasibility studies for this project. The town further invested by paying 50% of the infrastructure costs; sidewalks, water, and power with a grant the Northern Border Regional Commission (NBRC).



Illustration by Cushman Design Group

Figure 38: Armory Lane.

The Medicare-funded program, **Services and Support at Home (SASH)**, aimed at keeping seniors housed rather than in a hospital or nursing home, helps Armory Lane (right) offer quality care to its residents. The building has a full-time service coordinator and an on-site team, including a home health specialist, mental health specialist, and a nurse who is on site ten hours each week. This helps foster a sense of community, as it keeps residents healthy and turnover low.⁷⁶



Housing energy efficiency and weatherization programs

- Support state weatherization efforts at municipal levels. Encourage contractors, homeowners and landlords to invest in weatherization projects for existing affordable housing.⁷⁷
- Support net zero-ready modular home replacement projects in local mobile home communities.

⁷⁶ <https://www.vtaffordablehousing.org/>

⁷⁷ Neighborworks, <https://www.nwwvt.org/>

Develop wastewater solutions

The state of Vermont has formed an interagency Village Wastewater Initiative Committee (VWIC) led by the Department of Environmental Conservation (DEC). The committee works to develop tools and resources for developing rural wastewater systems and coordinates between funders and service providers.⁷⁸

- Create a local wastewater committee and determine needs for your community.
- Coordinate with ACRPC, the DEC and other funding sources.

Local rental codes and local enforcement:

- State local rental codes help to promote safe and healthy living conditions. Communities can enact local codes and create local registries. **The Vermont Rental Housing Program**, a fund established in recognition that Vermont's rental housing stock is some of the oldest in the country, provides incentives (grants, loans) for private owners to make weatherization and other improvements to their properties.

State designation programs

- **Downtown and Village Center Designation.** This incentive program enables communities to apply for state tax credits for renovation, rehabilitation and code improvements to historic and income producing properties in the designated area.
- **Neighborhood Development Areas (NDA).** This designation encourages infill, mix-income housing projects in compact walkable centers. Incentives for developers include exemption from Act 250, for qualified projects, and reduction of application fees. To be eligible for a NDA designation the project must be located in a Downtown or Village Center Designated area with municipal wastewater, ¼ acre zoning and complete streets.

Grant programs

An array of federal and state planning, development and construction grants are available to communities working to address their housing issues. The Vermont Department of Housing and Community Development (DHCD) has a comprehensive website and is a great resource for understanding funding options. The Addison County Regional Planning Commission (ACRPC) assists municipalities and community members navigate grant writing and project implementation processes.

Municipal Planning Grants (MPGs), small scale planning grants, can provide funding for exploring the feasibility of housing solutions in a community.

⁷⁸ https://dec.vermont.gov/sites/dec/files/village_ww/WastewaterWorkbook.pdf

Covid-19 Pandemic

The 2020-21 Covid-19 pandemic exacerbated the housing crisis in the Region, impacting households across income groups. A low housing vacancy rate and increased home prices were results of several factors. The influx of people moving to the state, away from urban centers, and purchasing homes often above the market price. Homeowners, previously considering relocating, postponed putting housing on the market. For many households, the loss of employment and an increased cost burden led to a loss of housing. Emergency shelters and congregate housing facilities had to close due to health risks of not being able to socially distance. A hopeful outcome of the 2020-21 pandemic has been a greater community awareness of housing issues in our region and state and how they can be addressed. CARES Act funding supported the renovation/ restoration of substandard housing units into adequate and affordable housing. Future monies from the American Recovery Plan Act (ARPA) are targeted for housing and supportive infrastructure such as water and wastewater systems. Municipalities will also receive ARPA funding for local needs due to Covid-19 impacts.

Goals and Implementation Actions

Goals

1: To increase the supply of available and appropriate housing to meet the needs of the Region's Population.

To meet this goal ACRPC shall:

1. *Explore and promote changes in municipal regulations and policies to support compact development, mixed-use and a variety of housing types in villages and downtown areas.*
2. *Support the maintenance and sustainability of existing affordable housing.*
3. *Assist rural communities in planning for water and sewer infrastructure needed for future housing development.*
4. *Help each municipality develop a comprehensive housing component of new or updated municipal plans.*

2: To ensure that the region's housing stock provides for all segments of the community.

To meet this goal ACRPC shall:

1. *Support the incorporation of 'universal design' in housing.*
2. *Encourage new and renovated housing projects that support aging in place and supportive housing programs, such as **Support and Services at Home (SASH)**.*
3. *Support new and renovated housing developments that are within walkable distance to retail, municipal services, educational and recreational facilities and public transportation.*

3: Collaborate with public and private organizations to develop solutions to current housing challenges facing our communities.

To meet this goal ACRPC shall:

1. *Support and collaborate with Addison County Community Trust (ACCT) and other non-profit, private development and financial organizations help create new housing and maintain existing units in the region.*
2. *Encourage developers and communities to create shared utility infrastructure (e.g., community septic and water systems) when appropriate.*

3. *Encourage the Dept. of Fire and Safety to review its rules and requirements impacting duplexes and ADUs. Amend such requirements (costs) so as not to exceed similar requirements (costs) for single family dwellings.*
4. *Encourage the Agency of Natural Resources (ANR) and Dept. of Environmental Conservation (DEC) to review its permitting system, to eliminate duplicate fees on community systems, and amend rules that increase the costs to operate or maintain small scale community water and wastewater systems.*
5. *Encourage our rural communities to create sustainable funding sources that would support community owned, small scale septic systems for new development in existing villages and downtown areas.*
6. *Advocate for the development of financial programs to assist first-time renters and homebuyers with security deposits and down-payments.*

4: Promote innovative and sustainable planning, design and construction of homes in order to achieve energy efficiency goals, reduction in housing costs and minimize environmental impacts.

To meet this goal ACRPC shall:

1. *Work with member municipalities to revise their regulations to encourage housing developers to locate projects in existing village centers, on vacant “infill” lots, close to jobs, public transportation and services.*
2. *Advocate for restoration and development of vacant or underused buildings to create new housing through adaptive reuse.*
3. *Help communities work towards meeting their statutory requirements for renewable energy targets, benchmarked at 2025 and 2050. Much of this assistance will focus on supporting the community's goals as outlined within their adopted Enhanced Energy Plans.*
4. *Encourage the construction of new homes in areas planned for growth, avoiding fragmentation of productive or ecologically important farm and forest lands.*
5. *Encourage municipalities to use public assets such as buildings, land and infrastructure to help reduce the cost of new housing projects.*

5: Promote public awareness of and support educational and outreach efforts regarding housing challenges in the Region.

To meet this goal ACRPC shall:

1. *Encourage municipalities to create local housing committees to evaluate and address housing needs in their communities.*
2. *Provide training and forums on housing issues, practices and opportunities for municipalities, landlords, property managers, real estate professionals and anyone involved in the sale, rental or financing of housing.*
3. *Educate municipalities on existing and future housing opportunities. Publicize successful case studies in the Region.*

Implementation Actions

ACRPC will:

- Work with each member municipality to identify existing population centers in their community and plan for future growth that supports increased housing opportunities and compact development within these areas. Support and work with municipalities to achieve the following tasks:
 - ❖ Obtain State Designations which encourage housing density in existing centers (e.g., Village Center, Downtowns, Neighborhood Development Areas)
 - ❖ Apply for grants focused on housing opportunities.
 - ❖ Create water and wastewater solutions needed to allow higher density housing.
 - ❖ Work with the State to develop a tax incentive program that encourages development of affordable rental properties.
 - ❖ Reform existing bylaws to support affordable and accessible housing. Important topics of reform to address are:
 - Dimensional standards; setbacks, road frontage, minimum lot size
 - Allowable uses,
 - Accessory dwelling units,
 - Parking requirements
- Work with each member municipality in planning for land-use in rural areas:
 - ❖ Research and promote strategies that facilitate construction of accessory dwelling units (ADU) on existing house lots. Important topics include:
 - Water/Wastewater permitting,
 - Adaptive reuse of existing buildings.
 - ❖ Rewrite Planned Unit Development (PUD) standards that employ conservation design principals such as, preservation of agricultural land, protection of natural resources and clustered development.

- Form an ad-hoc subcommittee of ACRPC with representation from each member municipality's planning commission to coordinate a region-wide approach to housing development and to address larger-scale issues which hinder local housing options. Tasks include:
 - ❖ Develop model bylaw language adoptable by member municipalities that will support affordable, accessible and small-scale housing.
 - ❖ Offer housing forums, workshops and round tables in each member municipality on a rotating basis.
 - ❖ Research regional septic solutions including cooperative operation of a pump out facility.
 - ❖ Develop model rental codes, that municipalities can adopt and enact, to help promote safe and healthy living conditions.

4. NATURAL RESOURCES

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4.1 SURFACE AND GROUNDWATER RESOURCES

A. SUMMARY

The region's surface and ground water resources are essential to its people, economy, and environment. They influence the cultural, social, economic, and environmental landscape of the region and offer scenic beauty and recreational opportunities. These water resources are essential to the high quality of life enjoyed by residents of the area and must be appropriately utilized, respected, managed, enhanced, and preserved to ensure the future vitality of the region and its inhabitants.

Most of the Addison County Region falls within The Otter Creek Basin, the second largest watershed in Vermont, draining an area of approximately 936 square miles. Nearly all of the sub-basins in Addison County flow into Otter Creek, which flows into Lake Champlain. There are also several sub-basins in the region that drain directly to Lake Champlain. The most prominent surface water resources in the area include Lake Champlain, Lake Dunmore, Fern Lake, Monkton Pond, Otter Creek, Lemon Fair River, New Haven River, Dead Creek, Middlebury River, Little Otter Creek, Lewis Creek, Mud Creek, East Creek, and the Neshobe River. Wetlands, vernal pools, fens, bogs, seeps, and aquifers are also integral components of the region's water systems, serving valuable functions, and linked through the hydrologic cycle.

Several watersheds, including specific water bodies and adjacent banks and shores, are identified as Regionally Significant. These are watersheds that have an effect on several Towns and/or provide particularly important resources to Addison County Residents. This list includes:

1. Bristol Pond
2. Dead Creek
3. Fern Lake
4. Lewis Creek
5. Lemon Fair River
6. Leicester River
7. Little Otter Creek
8. Lake Champlain
9. Lake Dunmore
10. Otter Creek
11. Middlebury River
12. Monkton Pond
13. Neshobe River
14. New Haven River
15. State Designated Wetlands over 20 Acres



Vermont has invested in programs to enhance the stability of streams and rivers, improve management of Vermont's vast network of dirt roads, protect and restore wetlands, limit polluted runoff from construction sites, implement soil-based conservation practices such as cover cropping, and provide technical and financial assistance to farmers to prevent discharges from barnyards and fields. ACRPC has participated in these programs at a sub-watershed scale and directly assisted municipalities in water quality planning.



B1. SURFACE WATER GOALS AND OBJECTIVES

GOALS

- 1. To maintain, protect, and improve the quality and quantity of surface waters in the region.*
- 2. To maintain, protect, and enhance functions and values of surface water systems including recreation, fisheries, wildlife habitat, water supplies, power generation, transportation, fisheries, irrigation and limited responsible waste disposal*

To meet these Goals it is our Objective to:

- a. Identify, protect, and enhance the quality of our waters, significant wetlands, vernal pools, fens, and bogs.
- b. Support ongoing monitoring of surface water quality.
- c. Support Lake Champlain Basin Planning efforts and Vermont DEC's Basin Planning efforts.
- d. Complete and maintain geomorphic assessments on all surface water where there is a reasonable likelihood of flooding.
- e. Work to restore and maintain stream equilibrium by developing and implementing river corridor plans.
- f. Reduce flooding and related damages through appropriate mitigation techniques.
- g. Encourage watershed based cooperation and educate towns and the general public about water quality and stream dynamics.
- h. Identify and work to improve proposed and existing land use activities that have a reasonable potential to threaten surface waters through pollution, depletion, or other means of degradation.
- i. Acknowledge and address the interrelationships between various water resources in planning processes.
- j. Maintain diverse areas of vegetation along surface waters sufficient to protect the dynamic viability of the stream or functional habitat or the waterbody.
- k. Work to protect our watersheds from the detrimental effects of invasive species.
- l. Encourage conservation of water resources.
- m. Encourage practices that reduce or eliminate the release of effluent that would have a significant negative impact on surface waters.
- n. Encourage development of waste water treatment technologies that will help protect and improve the quality of surface waters.
- o. Support research and development of local, small scale hydro-power facilities that maintain adequate surface flow and do not compromise surface water quality or habitat.



B2. GROUNDWATER GOALS AND OBJECTIVES

GOALS

- 1. To maintain, protect, and improve the quality and quantity of ground water in the region.*
- 2. To maintain, protect, and enhance functions and values of ground water systems including drinking water supplies, water for industry, commerce and agriculture, and recharge of surface water.*

To meet these Goals it is our Objective to:

- a. Support and encourage efforts to protect groundwater resources in local planning and decision making.
- b. Maintain, protect, and enhance the quality and quantity of groundwater resources, particularly where they might be degraded incrementally or where depletion has already occurred in violation of state and federal standards.
- c. Protect the public's right to adequate supplies of quality groundwater while allowing use of groundwater resources by new development.
- d. Limit land uses in mapped source water protection areas to those uses that do not have a significant negative impact on water quality.
- e. Identify, map, and monitor the condition of groundwater.
- f. Encourage practices that reduce or eliminate the release of effluent that would have a significant negative impact on groundwater and aquifers.
- g. Identify proposed and existing land use activities that have the potential to threaten groundwater resources through pollution, depletion, or other means of degradation.
- h. Recognize the interrelationships between various water resources.
- i. Encourage development of waste water treatment technologies that will help protect and improve the quality of groundwater.



(Adopted December 14, 2011) ACRPC

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C. RECOMMENDED ACTIONS

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plans, as issues or opportunities arise, to move towards accomplishing objectives and meeting the goals outlined above.

1. Encourage towns in the region to cooperate on a watershed-wide basis when planning for surface and ground water quality and use.
2. Be involved in watershed and basin planning efforts and encourage and support municipal and private involvement.
3. Support local ordinances that promote the use of Low Impact Development (LID) techniques, including limiting construction on steep slopes, to minimize impacts to water quality as a result of new development, redevelopment, and modifications to existing development.
4. Support Addison County Riverwatch Collaborative in its work to monitor and enhance regional water quality.
5. Assist municipalities to develop protection measures for their surface and groundwater resources through land use controls such as sewage disposal ordinances, stormwater management, flood and fluvial erosion hazard areas, shoreline and riparian buffers, and sourcewater protection areas.
6. Provide communities the support they need to be proactive in reducing flood and erosion hazards by adopting appropriate zoning regulations to limit development in hazardous areas including Fluvial Erosion Hazard Areas.
7. Provide educational materials and other resources regarding water quality to communities, citizens, and businesses.
8. Encourage State level incentives that enable local governments to play a more effective role in managing land use decisions in river corridors.
9. Encourage and support proper management of transportation infrastructure to minimize stormwater runoff and adverse water quality impacts.
10. Encourage proper maintenance and sizing of bridges, culverts and other structures to accommodate flow from storm events and to mitigate flood hazards.
11. Encourage agricultural and silvicultural enterprises to comply with Accepted Agricultural Practices (AAPs) and Best Management Practices (BMPs) to reduce runoff of pollutants from agricultural lands, farmsteads and forested areas.
12. Work with the Natural Resource Conservation Service, Otter Creek Natural Resources Conservation District, VT Geological Survey, United States Geological Survey, Agency of Natural Resources, non-profit conservation organizations, and with towns to identify and map groundwater supply, aquifers, and groundwater protection areas.



D. DOCUMENTATION & ANALYSIS

Surface waters provide or support many facets of our culture in the Addison Region. Among those are water for domestic, agricultural, and industrial consumption, a depository for wastes, treated and untreated, riparian and aquatic habitat for wildlife and plant life, recreation, scenic amenities, power generation, and the basic function of surface waters as part of the hydrologic and climatic cycles.

Lake Champlain

Lake Champlain is 120 miles long, 12 miles wide at its widest; 400 feet deep at its deepest, has 587 miles of shoreline, and 435 square miles of surface area. The Lake is divided into five distinct areas, each with different physical and chemical characteristics and water quality. These lake segments include: the South Lake (Addison County portions), the Main Lake (or Broad Lake), Malletts Bay, the Inland Sea, and Missisquoi Bay. The total area of the Lake Champlain Basin is 8,234 square miles. 90% of the water that enters Lake Champlain flows through the Lake's drainage basin before it reaches the Lake. Fifty-six percent of the Basin is in Vermont, 37% is in New York, and 7% is in the Province of Quebec.¹ Lake Champlain is directly influenced by land use activities in the Addison Region.

Table 1: Other Lakes And Ponds In The Region

WATERBODY	ACREAGE
Lake Dunmore	1,035
Fern Lake	69
Cedar Lake	118
Johnson Pond	34
Mud Pond	26
Richville Pond	160
Silver Lake	104
Spruce Pond	25
Sugar Hill Reservoir	58
Bristol Pond	199

Watersheds and Basin Planning

A watershed or basin is the land that water flows across or under on its way to a stream, river, or lake. The landscape is made up of many interconnected watersheds that can be defined at varying scales. The Vermont Agency of Natural Resources is working to develop water quality management plans for the 17 major river basins in the state. Nearly all of Addison County falls within the Otter Creek Basin, which drains to Lake Champlain. There are also several sub-basins in the region that drain directly to Lake Champlain. The basin

¹ From Lake Champlain Basin Program Atlas at www.lcbp.org



planning process emphasizes voluntary actions to solve identified problems and seeks to maximize public participation and involvement in local decision-making and action. The primary function of the watershed planning process is to bring communities together to identify, protect, and restore water quality conditions on a geographical basis.

The water quality of the lake is of utmost importance to the entire region. The Clean Water Act and the U.S. Environmental Protection Agency's (EPA) require states to develop a total maximum daily load (TMDL) for waterbodies that do not currently meet water quality standards. A TMDL is a "pollution budget" that calculates the amount of pollution the waterbody can tolerate and still maintain water quality standards. The process of calculating the TMDL for phosphorus in Lake Champlain was completed in 2002, and was subsequently approved by EPA. In 2009 the implementation plan was revised to address actions taken over the past six years and to re-affirm the future direction of the plan.

In 2008 the Conservation Law Foundation (CLF) filed suit asking the EPA to disapprove the 2002 approval of Vermont's Lake Champlain Phosphorus TMDL and seek establishment of a new TMDL. In 2010 the court allowed the EPA to undertake a voluntary review of the 2002 approval. EPA's decision to disapprove the TMDL was issued in early 2011. There were many components of the 2002 TMDL which were not challenged by CLF, and during the reevaluation by the EPA, two elements did not warrant approval. The portions of the TMDL addressing the margin of safety and the establishment of wasteload allocations based on assumptions that nonpoint source reductions would be achieved were found inadequate and inconsistent with EPA regulations and guidance. Following the determination, the EPA withdrew its 2002 approval of the Vermont TMDL. Under Federal law, upon disapproval of a TMDL the EPA must establish a new TMDL that will implement water quality standards. The EPA and the Vermont Agency of Natural Resources have agreed to work collaboratively to develop the new TMDL and the EPA has agreed to assist with funding.²

Vermont Water Quality Standards

The Water Resources Panel adopts state water quality standards and rules regulating, among other things, the use of public waters, lake levels, and development and other human impacts on significant wetlands and their protective buffer zones. The Panel also designates and protects significant wetlands and outstanding resource waters. These rules are administered or applied by the Agency of Natural Resources in its water-related permit programs. The Vermont Water Quality Standards establish general criteria to be achieved in

²<http://www.epa.gov/ne/eco/tmdl/pdfs/vt/LakeChamplainTMDLDisapprovalDecision.pdf>

Last accessed, March 22, 2011



state waters for the protection of human health and aquatic biota, designate fish habitat (warm and cold water), and establish water quality classifications for each of the state's Basins (Otter Creek Basin is Basin 3).

Water Quality Classifications

At the time of writing, all surface water in Vermont is classified as Class A (1), A (2,) or B. The classifications represent the water quality goals noted in the table below, and are not necessarily descriptive of existing water quality. All waters within the Addison Region (Lower Otter Creek, Basin 3) are Class B except those that serve as public water supplies (A(2)) and those located above 2500 feet (A(1)), unless specifically classified as A(2). Class A (2) waters in the region include: Brandy Brook, an unnamed tributary to Beaver Meadow Brook, an unnamed tributary to Lewis Creek, two unnamed tributaries to Little Otter Creek, and Notch Brook. Small sections of Class B reaches may be designated by a permit as Waste Management Zones and receive discharges of properly treated waste.

Table 2: Vermont Water Quality Classifications

Designated Uses	Class A(1) Ecological Waters	ClassA(2) Public Water Supplies	Class B Waters
Aquatic Biota, Wildlife & Aquatic Habitat (ALS)	√	√	√
Aesthetics (AES)	√	√	√
Swimming & Other Primary Contact Recreation (CR)	√		√
Boating, Fishing & Other Recreation Uses (2CR, FC)	√		√
Public Water Supplies		√	√
Irrigation of Crops & Other Agricultural Uses			√

303(D) List (2008)

Sections of the water bodies in Table 3 below appear on the 2008 303(d) List of Impaired Waters. These waters are scheduled for Total Maximum Daily Load (TMDL) development due to current impairments that prevent them from consistently meeting water quality standards. A TMDL is the amount of a particular pollutant that a particular stream, lake, estuary or other water body can accommodate without violating state water quality standards.



(Adopted December 14, 2011) ACRPC

Natural Resources

Table 3: 303(D) Listed Waterways, 2008

Water body	Pollutant	Use(s) Impaired	Surface Water Quality Problem(s)
Otter Creek	E Coli	Contact Recreation (swimming)	Agricultural runoff, possible failed septic systems
Little Otter Creek	E Coli, undefined	Aquatic life support, aesthetics, contact recreation	Agricultural runoff, possible failed septic systems
Lewis Creek	E Coli	Contact Recreation	Agricultural runoff, possible failed septic systems
Pond Brook	E Coli	Contact Recreation	Agricultural runoff, possible failed septic systems
Middlebury River	E Coli	Contact Recreation	Agricultural runoff, possible failed septic systems
Lake Champlain	PCBs	Fish Consumption	Elevated levels of PCBs in Lake Trout

Addison County River Watch Collaborative

The Addison County River Watch Collaborative (ACRWC) was formed in late 1997 to unite ongoing stream-monitoring efforts by citizens in the Addison County region. Citizen monitoring efforts for these streams have involved various water quality measurements, including bacteria, pH, total phosphorus (TP), total nitrogen (TN) and water temperature.

The ACRWC is one of a number of citizen water monitoring groups in Vermont whose volunteer members work to ensure the ecological integrity and the recreational viability of their communities' watersheds.

Goals of the ACRWC:

1. To monitor and assess the condition and uses of our local rivers, creeks, and streams over time.
2. To raise public awareness of and commitment to the ecological, economic, and social values and functions of our local rivers, creeks, and streams.
3. To support and praise actions by landowners that improve the health and quality of our local rivers, creeks, and streams.

All the watersheds studied by the ACRWC are considered by the Vermont Agency of Natural Resources to be part of the Otter Creek Basin, known as Vermont's Basin 3, and drain a large portion of the middle Champlain Valley in Vermont. Lewis Creek and Little Otter Creek drain directly into Lake Champlain in Ferrisburgh and, where they join the lake (at their mouths), they share a 400-acre wetland complex with deep emergent marshes, a lakeshore floodplain, and bottomland forests. The Middlebury, New Haven, and Lemon Fair Rivers are tributaries to Otter Creek, which then drains into Lake Champlain, also in the town of Ferrisburgh. (Dead Creek, another major tributary to Otter Creek, has not been studied by the collaborative.)



These watersheds include forested mountains, agricultural lowlands, urban/residential areas, and industrial areas. The study area also includes municipal and industrial sewage treatment facilities, as well as power generation dams on some of the rivers. The streams are valued and used by local citizens and tourists for boating, swimming, and fishing, and the waters and the trees along the banks provide important habitat for a wide range of flora and fauna.

Citizen monitoring efforts for these streams over many years have focused primarily on *E. coli* bacteria counts, total phosphorus levels, pH, and water temperature, with the addition of total nitrogen, dissolved phosphorus, turbidity and total suspended solids in recent years. The following overview is the analysis of 19 years worth of water quality sampling. Reports are available for each watershed from ACRWC.

Water Quality Report 1991-2010

a. Lemon Fair River

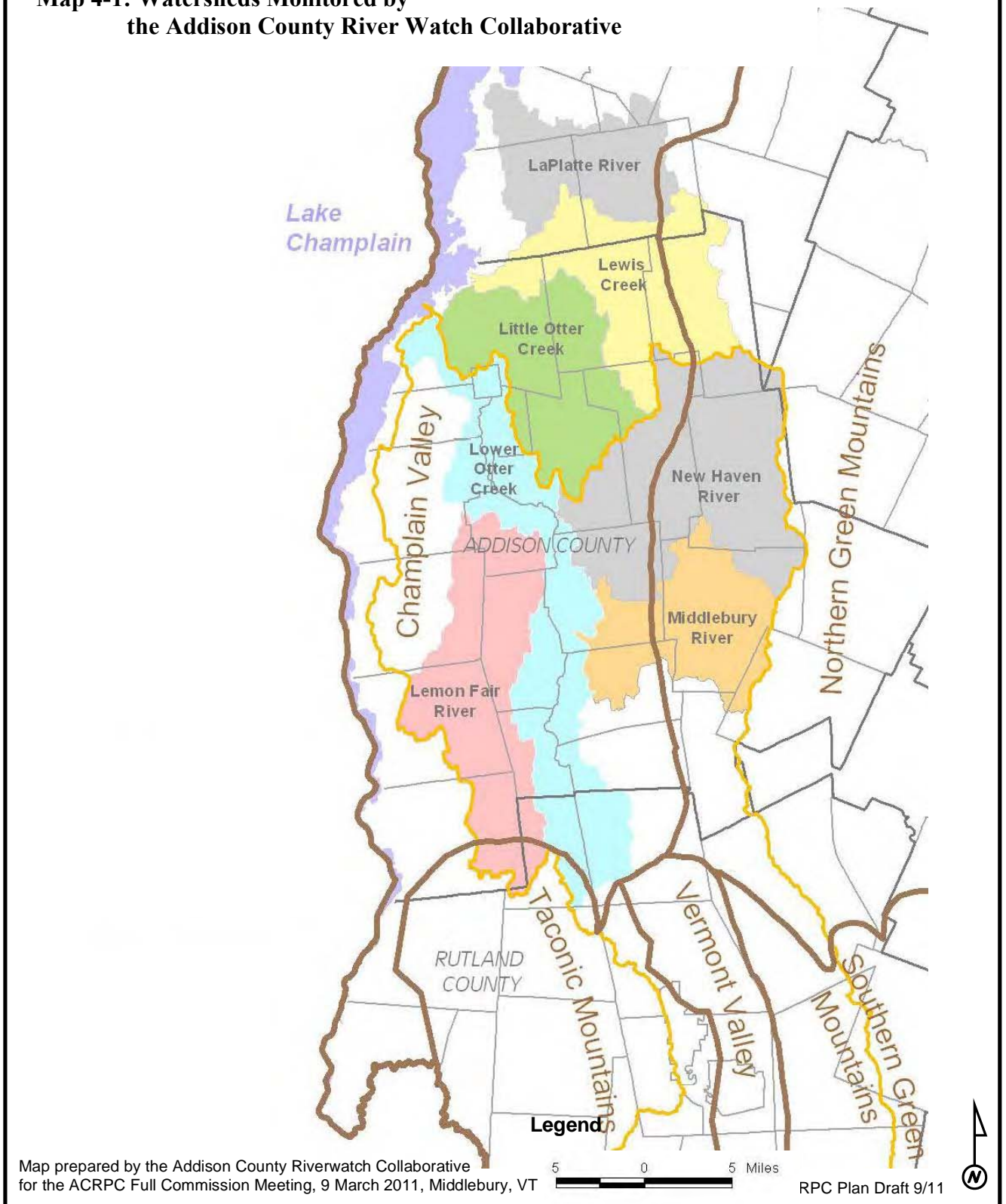
Lemon Fair *E. coli* counts in the Lemon Fair River tend to exceed the State Standard at all points sampled, varying little along the length of the stream. Turbidity levels in the Lemon Fair River tend to be high upstream, exceeding the State Standard, and to decrease downstream to a level about equal to the State Standard of 25 NTU. Maximum turbidity levels can reach very high levels upstream, and decrease downstream. Total phosphorus concentrations in the Lemon Fair River are very high at all points sampled, reaching extremely high maximum levels at times. The pattern does not follow that of turbidity indicating that its primary source is dissolved phosphorus in runoff from farms. Total nitrogen concentrations in the Lemon Fair River are consistently well below the State Standard for nitrate and vary little along the length of the river.



(Adopted December 14, 2011) ACRPC

Natural Resources

**Map 4-1: Watersheds Monitored by
the Addison County River Watch Collaborative**



b. Lewis Creek

Lewis Creek is listed by the State of Vermont as impaired for contact recreation from the Spear Street covered bridge (LCR7.25) to approximately river mile 19.5, a result of high *E. coli* counts and agricultural runoff. Its tributary Pond Brook (LCBD.5) is listed as impaired for 1.5 miles from its confluence with Lewis Creek. *E. coli* counts in Lewis Creek are high, exceeding the State Standard at all points sampled most of the time during the summers. Counts tend to be highest between LCR18.6 and Tyler Bridge Road (LCR14), and decrease downstream. Turbidity increases steadily downstream, and exceeds the State Standard during periods of high flow and runoff at most sampling sites. Turbidity reaches very high levels at times in Pond Brook. Total phosphorus concentrations increase steadily downstream mirroring turbidity levels, indicating that erosion is the primary source of phosphorus in Lewis Creek. Phosphorus concentrations reach high levels at times, and the jump in the concentrations below Pond Brook reflects a jump in the suspended sediment. Total phosphorus concentrations in Pond Brook tend to be very high, as do turbidity levels. Total nitrogen concentrations mirror those of *E. coli* and fall well below the State Standard for nitrate.

c. Little Otter Creek

Little Otter Creek is listed by the State of Vermont as impaired for aesthetic reasons, aquatic life support, and contact recreation as a result of agricultural runoff and high *E. coli* counts from its mouth to river mile 9. It is also listed as impaired for aquatic life support from mile 15.4 to mile 16.4 as a result of agricultural runoff. *E. coli* counts in Little Otter Creek consistently exceed the Vermont State Standard, increasing downstream to Middlebrook Road (LOC7.8), and then decreasing slightly to Route 7 in Ferrisburgh (LOC4.3). This pattern parallels both turbidity and phosphorus concentrations, and may reflect a need for improved farm management practices. Suspended sediment measured as turbidity typically increases downstream in Little Otter Creek to Middlebrook Road (LOC7.8) as a result of erosion and agricultural runoff, exceeding the State Standard at LOC7.8 and Lime Kiln Road (LOC11). The impacts of erosion and runoff are greatest when flows are high. Phosphorus concentrations are high in Little Otter Creek/Mud Creek, reflecting erosion and agricultural runoff. Phosphorus transported by suspended sediments from erosion and runoff, and dissolved phosphorus from farms in need of improved management; increase downstream during periods of high flow. Nitrogen levels in Little Otter Creek fall below the Vermont Standard for nitrate. Concentrations are highest at LOC14.4, and decrease steadily to low levels as a result of dilution before entering Lake Champlain.



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d. Middlebury River

The Middlebury River is listed by the State of Vermont as impaired for swimming from its mouth upstream to mile 2 as a result of agricultural runoff resulting in high E. coli counts. Looking back to 1991, the patterns of total phosphorus and E. coli suggest agricultural impacts. Total phosphorus concentrations in the Middlebury exceed the State Standard for phosphorus in Lake Champlain. Turbidity generally does not approach the Vermont State Standard in the Middlebury River. Increases, particularly in the maximum turbidity values, reflect sources above river mile 2. They are consistent with E. coli counts, and explain the rise in phosphorus concentrations. Total nitrogen concentrations are generally low, and exceed 1.0 mg/I as N only occasionally. Nitrate normally constitutes only a fraction of the total nitrogen, and does not approach the State Standard.

e. New Haven River

E. coli counts in the New Haven River generally are close to the State Standard, but rise to high levels during periods of high flow and runoff, greatly exceeding the standard for swimming waters. Turbidity levels in the New Haven River increase steadily downstream but are generally low and below the State Standard. However, at times of high flow and runoff, turbidity levels reach very high levels, greatly exceeding the State Standard near its mouth at NHR0.5. Total phosphorus concentrations in the New Haven River are generally low, increasing downstream as do turbidity levels, indicating that phosphorus in the river is mainly associated with suspended sediment. Moderately high phosphorus concentrations occur at times of high flow and runoff and are associated with high sediment loads. Total nitrogen concentrations in the New Haven River are at all times very low and well below the Vermont State Standard for nitrate.

f. Otter Creek

Otter Creek is listed by the State of Vermont as impaired for swimming from its mouth to the Vergennes Dam and upstream from the mouth of the Middlebury River to Weybridge Dam. E. coli counts tend to exceed the Vermont State Standard downstream from Middlebury (OTR23) to the Route 17 Bridge (OTR13). Counts at other locations often exceed the standard, especially during periods of high runoff. Turbidity levels in Otter Creek are generally well below the Vermont State Standard of 2S NTU, but approach or exceed the Standard at Belden Falls (OTR21) during periods of high flow and runoff. Concentrations of phosphorus in Otter Creek generally mirror those of suspended sediment in the water measured as turbidity. The primary source of phosphorus is erosion, and the phosphorus load transported by the river can be very high during periods of high flow. Total nitrogen concentrations in Otter Creek are consistently low and well below the Vermont State Standard for nitrate.



Shoreline Buffers, Riparian Buffers and River Corridors

Land use activities adjacent to lakes, rivers, and streams have direct impacts on surface water quality. Vegetated buffers adjacent to surface waters provide benefits that include but are not limited to: reduced soil loss, reduced stream bank and shoreline erosion, reduced sedimentation of aquatic habitat, filtration of sediment, nutrients, and pollutants in runoff, provision of cover habitat for aquatic biota and other wildlife, and shading of surface water to maintain cooler summer temperatures. Proper design, placement, and maintenance of septic systems, erosion control, limitations on development, and prudent management of vegetated buffers along shorelines and stream banks can all help to protect associated water quality. Municipalities are in the best position to develop protection measures for their own surface water resources by adequately addressing buffers, setbacks, and river corridors in their town plans and zoning bylaws. Towns can also address floodplains, wetlands not regulated by the state and storm water that results from new impervious cover below 1 acre.

Buffers are specified vegetated setbacks as measured from the top of bank/top of slope. Corridors are specified setbacks as measured from the meander centerline that should not extend laterally beyond the toe of the valley wall to create the area necessary to accommodate the dimensions, pattern, profile and fluvial processes of a stream in equilibrium (least erosive) condition. Both buffers and corridors are important. Smaller, steeper streams may be fully protected using buffer concepts. In wider valley settings, especially in Vermont where streams and rivers have been extensively manipulated man-made infrastructure may make it impracticable to create a buffer that is wide enough to provide the functions of a river corridor. River corridor and buffer provisions should be combined. A good river corridor zoning provision should also speak to the need for a vegetated buffer zone as measured from the top of bank/top of slope.

The Vermont Legislature has recently passed Act 110 (2010) creating a River Corridor Management Program to further river and shoreland protection.

Flood Hazard Areas

Under the National Flood Insurance Program (NFIP), the Federal Government makes insurance available to communities that implement and enforce measures that reduce future flood risks to new construction and substantial changes to existing construction, usually through the community's Zoning Bylaws. A major purpose of the NFIP is to alert communities to the danger of flooding and to assist them in reducing potential property losses from flooding. No federal assistance is provided for the repair or replacement of insurable structures located in flood hazard areas of communities which choose not to participate in the program.

Flood Hazard Areas are officially designated on FIRM (Federal Insurance Rate Maps), prepared and published by FEMA (Federal Emergency Management Agency). The flood hazard areas in most Vermont communities are generally associated with the larger rivers. In many instances FIRM mapped flood areas do not reflect the true extent of flood prone areas.



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Communities can adopt requirements that are more stringent than the minimum measures acceptable for NFIP participation.

Stream Geomorphic Assessment And Fluvial Erosion Hazards (FEH)

Rivers are not static in the landscape. The shape of a river channel, including its width, depth, pattern, and slope, changes over time due to the action of water, sediment, and debris draining from the surrounding watershed. Rivers in “dynamic equilibrium” carry water, sediment, and debris, even during high water, without changes occurring in the depth, width, length, or slope of the channel (the channel may move and shift position within the landscape, but these other factors remain relatively constant). Human land uses, especially within river corridors, that significantly alter the runoff patterns of water and sediment can disrupt the equilibrium of a river system. When development changes the relationship of the river with its floodplain or constrains the river from maintaining or re-establishing equilibrium conditions, the result is often costly losses due to erosion. This erosion can also contribute to increased sediment and nutrients that can compromise water quality and aquatic habitat.

The degree of adjustment many streams will go through to establish and maintain equilibrium (having a dimension, pattern, and profile where erosion is minimized) will be significant. It is not safe or environmentally sound to encroach within 15, 30, or in some cases even 100 feet or more of the riverbank. Consideration of stream geomorphology and long term river dynamics in land-use decision-making can protect and restore water quality and habitats, and mitigate damages and economic losses incurred as a result of floods and fluvial erosion. Towns should identify and protect Flood Hazard Areas that consider both flooding and erosion hazards (i.e. inundation and fluvial erosion).

Point And Non Point Source Pollution

Point source pollution is pollution resulting from discharges of waste from identifiable points, such as a smokestacks or sewage treatment plants. Nonpoint source (NPS) pollution comes from many diffuse sources and is more difficult to monitor and manage than point sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water. These pollutants include:

- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas
- Oil, grease, and toxic chemicals from urban runoff and energy production
- Sediment from crop and forest lands, eroding streambanks, and improperly managed construction sites
- Salt and sand from winter roadway management
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems



Stormwater Runoff

Stormwater from precipitation reaches streams and lakes in two ways: through surface runoff, and through infiltration and groundwater flows. “Stormwater runoff” refers to the surface runoff. Unless it comes from natural areas, surface runoff can have many negative effects on water quality and aquatic habitat. In general, surface flows are warmer, dirtier, and flashier, while groundwater flows are colder, cleaner and more stable. When water flows over pavement, it picks up nutrients, metals, hydrocarbons, and bacteria – all the substances that make snow from roadways look black. When it flows over construction sites or plowed fields, it picks up sediment, fertilizers and pesticides. When it flows over lawns, it picks up lawn chemicals. Particular areas such feedlots or large parking lots can deliver especially large pollution loads during storms.

In urban areas, the amount of impervious surface is the key factor in predicting the amount of pollution coming from those areas. Not only is water quality degraded, but stream structure is damaged as well. Runoff from impervious surfaces rushes suddenly into streams during storms, then stops when the precipitation is over. As a consequence, small streams in urban areas erode and widen to accommodate the heavier flows. They lose their pool and riffle structure, become silted up, and their habitat value declines. This situation is in contrast to natural hydrology, as forests and meadows absorb water and release it more slowly into the ground and into streams.

Low Impact Development is based on reducing the impervious surfaces that generate stormwater flows and treating those flows at their source. Most Addison County towns have not implemented this technology in a major way. Since the 1990s, however, research has found that it is both more economical and more effective to try to keep the precipitation close to where it lands. This approach involves using many small, localized elements such as rain gardens, bioswales, porous pavement, and green roofs, which let water soak into the ground and be absorbed by plants. Although there are some sites where water infiltration is not advisable, such as around landfills and leaking underground storage tanks; for the most part, water infiltration mimics the natural hydrology and is healthier for the watershed.

In rural areas, any land without permanent vegetative cover is a potential source of polluted runoff from soil, chemicals, and manure. Runoff control measures include soil conservation practices, winter cover crops, manure management and buffers along waterways. Lake Champlain receives about half its phosphorus pollution from agriculture and about half from urban areas, so it is important to focus on both sources.

Aquatic Nuisance Plants And Animals

An increasing number of aquatic nuisance plants and animals threaten the Lake Champlain Basin's native fish, wildlife, and plants and impede recreational activities. Sometimes, they have substantial ecological and economic impacts. These species enter Lake Champlain via the Champlain Canal, the Richelieu River and Canal, and over land primarily through human activities such as boating and bait transport. At least four dozen aquatic



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nuisance species are currently present in the Basin (2005 ANS Management Plan). The following are of particular concern for the Lake and/or high priority species for management.

Table 4:Nuisance Species

Nuisance Plants	Nuisance Animals
Eurasian Watermilfoil	Sea Lamprey
Japanese Knotweed	Alewife
Purple Loosestrife	Tench
Water Chestnut	White Perch
	Zebra Mussel

Preventing the spread of these organisms to other water bodies and preventing the establishment of populations of new nuisance or invasive species that have not yet arrived should be of highest priority. The Regional Planning Commission supports comprehensive management of nuisance and invasive species, along with continued control, research and monitoring efforts.

Wetlands

In Vermont, Wetlands are delineated based on vegetation, soils, and hydrology, and are regulated under the *Vermont Wetland Rules*. Many of Vermont's wetlands have already been lost or severely impaired due to draining, dredging, filling, pollution, or other activities. The protection of significant wetlands is essential to maintain the ecological and socio-economic functions they serve including:

- **Flood Control:** Wetlands associated with streams slow flood waters, provide flood storage, and reduce peak flood levels.
- **Shoreline anchoring:** Wetlands provide erosion control by dissipating wave and current activity, binding substrates, and by trapping stream sediments.
- **Water quality:** Wetlands process heavy metals, pesticides, and other toxic substances; and remove nutrients from runoff.
- **Habitat:** Wetlands provide habitat for a wide variety of plants and animals, including a disproportionately high number of threatened or endangered species, compared to other ecosystem types.
- **Socio-economic value:** Wetlands are utilized by humans for their recreational, scenic, historic, educational, and cultural values.

Wetlands are protected by various state, federal, and local regulations. The National Wetland's Inventory maps (originally prepared in 1977-78) for the state of Vermont are referred to as the Vermont Significant Wetland Inventory (VSWI) and are the basis for determining the presence of a significant wetland. Federal and local regulations may have a different basis. Due to the general nature of the data, field checks by State Wetland's staff are required to determine the actual presence of a wetland. The *Vermont Wetland Rules* require non-exempt uses to go through a conditional use review to determine their impact on



the identified wetland functions. Permits can be issued if impacts are minimal or if mitigation measures are approved. Areas used for agricultural and silvicultural activities that comply with Accepted Management Practices are considered permitted uses. The Rules require non-exempt uses to undergo a conditional use review. Permits may be issued if impacts are minimal, or if mitigation measures are approved.

The Vermont Wetland Rules establish three classes of wetlands that are used to determine the level of protection. Class One and Two wetlands are “significant wetlands” and are protected under the Rules. Class Three wetlands are not protected under the Rules, but may be protected by other federal, state, or local regulations.



Ground Water³

Ground water is water that was once on the "surface" which has infiltrated into the soil to fill the spaces between sand, gravel and rock, and the fractures in the bedrock. The rate that water can work its way into and through soils varies depending on land use, physical aspects of the soil, intensity and duration of a particular rain storm, soil slope and other factors.

High quality drinking water from several of the public water systems and from individually drilled wells in the Addison Region is derived from the Region's ground water. Groundwater also serves agricultural, commercial and industrial water needs. Groundwater is a preferred source of drinking water because it is usually of high quality, and is generally less influenced than surface water by seasonal fluctuations and environmental impacts. As the Region's population grows, land use intensifies, and rates of water extraction increase for residential, commercial, and industrial use, communities should continue to identify and develop measures that will protect their ground water resources.

During the 1960's and 1970's the State of Vermont undertook geologic studies to determine where these "good" ground water supplies were likely to be found. In the northern part of the Addison Region the best sources of ground water were found in the unconsolidated sediment (sand and gravel) in the stream valleys. The highest potentials in the Region were found along the western base of the Green Mountains in the kame, outwash and lake sand, and gravel deposits left after the last glacial period.

The areas identified as having the best ground water supply potential (medium to high yield at depths to 200 feet), were primarily found in a narrow band running north-south starting on the eastern side of Starksboro, continuing south roughly through the center of Bristol, south through the eastern side of Middlebury, continuing south through Lake Dunmore, and along the western edge of the Green Mountains.

The resource value of the state's groundwater has also recently been addressed by the legislature in Act 199, 2010. The Agency of Natural Resources now issues a permit for new, or increased, withdrawals of groundwater of greater than 57,600 gallons per day. While this withdrawal level is unlikely to affect many public water supplies, it does address industrial-scale withdrawals. Activities such as snow making, beverage production, industrial processing, commercial car washes, wood product manufacturing, golf course watering, mine dewatering, or similar uses would be regulated.

Aquifers

Aquifers are groundwater storage areas created by water-bearing layers of soil, sand, gravel, or rock. Aquifers can yield significant quantities of water to wells and springs.

³ Additional discussion of groundwater resources and sourcewater protection areas can be found in the Utilities, Facilities, and Services section of this Plan.



Aquifers receive replenishment of their water from areas called "recharge areas." These recharge areas are also conduits for any surface contamination. Understanding how a particular aquifer is recharged also helps to understand how it can be contaminated.

Threats to Ground Water Resources

The quality of a community's water resources depends on its land use and waste disposal practices, and the location of these land uses in relation to their ground water supplies.

Groundwater, in contrast to surface water, generally moves very slowly (from a few feet to a few inches per year). Contamination can be difficult to detect. Once a supply source is contaminated it can be very expensive to replace, if supplies of adequate quality and quantity can be found to replace the contaminated source. An exception to the slow movement of ground water is the ground water stored in fractured bedrock. Contaminated ground water moving through fractures in bedrock can move relatively long distances, relatively rapidly, polluting groundwater at distant and unpredictable locations.

Major sources of contamination include underground storage tanks, municipal landfills, regulated hazardous waste (hazardous wastes managed in the course of running a business, including wastes from municipalities and from businesses operated out of a home), septic tanks, road salting, and some agricultural activities. Common contaminants include petrochemicals (from leaking tanks and spills), leachate from landfills and old dumps, hazardous waste, and elevated levels of sodium and chloride from highway salting and salt storage. The most prevalent contaminating substances routinely tested include volatile and synthetic organic chemicals, nitrates, brine/salinity, metals, radioactive materials (naturally occurring from radon), pesticides and petroleum products. Bacteria and nitrogen can also contaminate groundwater supplies.

Communities can take steps to protect their ground water resources. This involves identifying and mapping their important ground water resources; identifying the land uses in the community which can contaminate water supplies; distributing information to inform citizens; and determining what method of protection makes the most sense in the community. It can start with working with potential contaminators on a voluntary effort and range to efforts more regulatory in nature, to outright purchase of property, depending on the importance and vulnerability of the source. Provision of community sewer systems may provide protection.

Addison Region's municipalities have the opportunity to perform land use planning for these critical areas. Rather than depleting groundwater resources or finding themselves in the situation of having to control, monitor and clean-up contamination, they can take a proactive, cost effective approach to prevent excessive draw-down or contamination.



Sourcewater Protection Areas (SPA)

In Vermont, ground and surface waters that supply public water systems are designated “wellheads” and the areas associated with them are called “sourcewater protection areas.” These areas come under the Vermont Sourcewater Protection Program, which is designed to coordinate various entities in the long-term protection of these areas.

A *Surface Water SPA* is the watershed area contributing surface water and groundwater flow to the drinking water intake. Most Surface Water SPAs are divided into Zones 1, 2, and 3. These zones are areas where impacts are likely, probable, or possible and are developed to help water systems prioritize source protection efforts.

A *Groundwater SPA* is the land area beneath which groundwater flows to a well, spring, or infiltration gallery. A contaminant released to the land surface or subsurface in a Groundwater SPA would be reasonably likely to move toward, and reach, the drinking water source. Zones 1, 2, and 3 are developed as noted above.⁴

Additional Resources

- Addison County River Watch Collaborative
- Bristol Pond Association
- Lake Champlain Basin Program

The Lake Champlain Basin Program (LCBP) works in partnership with government agencies from New York, Vermont, and Quebec, private organizations, local communities, and individuals to coordinate and fund efforts which benefit the Lake Champlain Basin's water quality, fisheries, wetlands, wildlife, recreation, and cultural resources. These efforts are guided by the plan Opportunities for Action, a pollution prevention, control, and restoration plan. It was first endorsed in October of 1996 and a new version of the plan was signed in April 2003.

- Lake Champlain Committee

The Lake Champlain Committee is a non-profit organization established in 1963 and based in Burlington. Their mission is to protect Lake Champlain’s environmental integrity and recreational resources for this and future generations through science-based advocacy, education and collaborative action.

- Lake Champlain Restoration Association

LCRA is a community service association of volunteers dedicated to the restoration of Lake Champlain. The mission of the Association is to educate the public about the effects of nuisance aquatic weeds and to promote the restoration and improvement of Lake Champlain for the benefit of those who live along its shores and use its waters. The Association is based in Bridport, VT.

- Cedar Lake Association (Monkton Pond in Monkton)
- Lake Dunmore/Fern Lake Association

⁴Vermont Rural Water Association assists towns in developing Sourcewater Protection Areas



A local organization that works to protect and enhance the natural vitality of Lake Dunmore and Fern Lake while preserving the recreational and lifestyle interests of the lake community

- Lewis Creek Association

The mission of Lewis Creek Association is to protect, maintain and restore ecological health while promoting social values that support sustainable community development in the Lewis Creek watershed region and Vermont.

- NRCS
- Otter Creek Natural Resource Conservation District
- Vermont DEC Water Quality Division
- Vermont Rural Water Association



4.2 AGRICULTURAL RESOURCES

A. SUMMARY

Agriculture is a driving economic and cultural force in the Addison Region and continues to play an important role in land-use, social, and community patterns. While dairy farming is the primary agricultural activity, the variety of agricultural endeavors pursued in the region continues to grow and diversify. Addison county is a hub for dairy and dairy processing, apples and apple-processing, grains, meat production and processing, vegetable production and a producer of beer, wine, cheeses, bread, honey and maple syrup. Agriculture's role in our livelihoods and economy, and its regulation in both local and statewide governing bodies are essential.

This subsection of the regional plan encourages protection of the region's agricultural resources. Such protection can be provided by landowners, non-profits, local government, state government, and land trusts, all of which can be acting in mutually supportive ways. This plan encourages land use planning that protects agricultural lands for their economic and cultural values and benefits. The plan also supports land management practices that minimize agriculture's potential negative impacts to other resources including but not limited to soils, surface and ground water quality, and wildlife habitat.

Preserving and enhancing our agricultural economy will require a thoughtful approach to meet the needs of individual families and of the industry while maintaining the physical and societal structure so important to Vermont residents and guests. This is not an issue that can be addressed in isolation by any one town or county exclusive of the efforts of neighboring towns or counties.

Local agriculture can be viewed as a 'Food System'⁵ that incorporates inputs, production, processing, wholesale and retail distribution, sales and waste management. Small scale growers may be able to complete this cycle entirely within the County, while medium sized commercial growers may need to reach outside the County to complete the cycle. In either case, the Regional Plan encourages sustainable agricultural practices.

Agriculture continues to change while land development pressures increase. Agriculture and development issues are often pitted against each other since in many cases the best agricultural land is also easy to develop. The Regional Plan supports efforts to enhance communication and collaboration to accommodate these two land-use goals. Healthy and vibrant communities with a strong, sustainable agricultural sector are regional goals.

⁵ Farm to Plate Initiative (F2P), <http://www.vsjf.org/project-details/5/farm-to-plate-initiative>; Last accessed Sept 23, 2010.



B. AGRICULTURAL LANDS GOALS AND OBJECTIVES

GOALS

A. Preserve prime, statewide, and locally important agricultural land.

To meet this Goal it is our Objective to:

- a) Recognize the diverse values and benefits provided to the public by agricultural land (including but not limited to: food, energy, and fiber production, scenic and cultural landscapes for residents and visitors, and recreational opportunities).
- b) Encourage sound land use planning and clustered development to protect viable agricultural land and to preserve the open landscape.
- c) Promote the equitable taxation of agricultural lands through (but not limited to) local assessments that reflect current use. Encourage the Legislature to fully fund a program with serious withdrawal penalties that reduces the tax burden on agricultural and forest land owners who follow sustainable land use practices and are not holding their land for speculation, and ensure that it is adequately staffed (i.e. such as the Use Value Appraisal Program).

B. Conserve important agricultural lands to maintain environmental integrity, provide for present and future agricultural use, and accommodate appropriate development.

To meet this Goal it is our Objective to:

- a) Encourage protection, enhancement, and sustainable stewardship of the quality of agricultural lands to minimize off-farm impacts.
- b) Encourage implementation of Best Management Practices (BMPs) and Accepted Agricultural Practices (AAP's).
- c) Encourage agricultural practices that maintain and enhance ecosystem diversity within the region (including land set aside in long term easements) to benefit water quality and plant and animal habitat.
- d) Encourage municipalities to consider agricultural lands in local planning and decision making.



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C. Strengthen and support research, development, and marketing of a diversified agricultural economy, (including energy crops and the development of alternative fuel sources and other value-added products). Strengthen local markets for agricultural products.

To meet this Goal it is our Objective to:

- a) Encourage the strengthening and diversification of existing farming enterprises, including agricultural support services.
- b) Encourage the local processing, manufacturing, distribution and marketing of value added agricultural products that are compatible with surrounding land uses in collaboration with local farms.



C. AGRICULTURAL LANDS RECOMMENDED ACTIONS

1. Review existing inventories and ranking schemes used to prioritize agricultural lands for protection.
2. Assist communities in developing overlay districts, transfer of development rights, and agriculture zoning that can be used to implement protection and conservation measures.
3. Work with local and regional development agencies and businesses to expand programs related to availability of federal, state, and regional loan programs, business planning, and other business strategies to assist local farmers.
4. Work with the Vermont Agency of Agriculture, Vermont Agency of Natural Resources, Natural Resource Conservation Service (NRCS) and Otter Creek Natural Resource Conservation District (OCNRCD) to develop and promote programs that help farmers maintain agricultural operations while protecting surface waters and agricultural land.
5. Work to expand opportunities for the enrollment of wetlands, buffer areas near waterways, vernal pools, and important ecological areas in the Current Use Program to encourage protection of these resources.
6. Cooperate with land trusts and landowners that are interested in permanently protecting agricultural soils through conservation easements, and estate planning.
7. Work with Economic Development and other partners to promote the economic viability and growth of agricultural and forestry in support of Vermont's working landscape.



D. DOCUMENTATION & ANALYSIS

Farmland is an important resource in Addison County. It provides a base for the agricultural economy and preserves the scenic landscapes that characterize the region. Addison County agribusiness also provides support to agriculture in neighboring counties. The number and size of farms in Addison County continues to change, yet agriculture remains a major economic and cultural force. Dairy farms, orchards, vegetable farms and associated businesses are the region's agricultural mainstay. The number of smaller farms serving the region through Community Supported Agriculture (CSA), farmer's markets and local grocery stores continues to grow. These farms are also serving larger markets with their meats, fruits, vegetables, and cheeses, in addition to other products.

Addison County farmers have always played a key role in local government and community affairs. It is important that governing bodies have an understanding of the needs of rural areas, and especially agricultural communities. The non-farming community can aid the agricultural community by purchasing local products and premium "Vermont" brands, and by supporting the growing array of farm enterprises. Local schools should also work to foster understanding of the importance of local agriculture.

In order to protect the environment, farmers are required to comply with regulations issued by a number of governmental agencies. Many farmers are leaders in environmental protection because of their dependence on and intimate knowledge of the land. The region must continue to seek balance between environmental and economic needs in relation to agriculture. The Regional Plan supports innovative environmental and agricultural endeavors that will help Vermont and Vermont Farmers be leaders in environmental and agricultural relations.

The Documentation and Analysis Section provides data related to the state of agriculture in the region, as well as descriptions of several key issues and programs in regional agriculture.



Addison County Agricultural Data

Table 5: Agricultural Statistics, Addison County, VT: 1987, 1992, 1997, 2002, 2007[†]

	1987	1992	1997	2002	2007
Number of Farms	714	683	784	676	773
Acreage in Farms	220,949	209,677	209,469	193,376	187,482
Avg. Size of Farm (acres)	309	307	267	286	243
Median Size of Farm (acres)					
Market Value of Products Sold-Avg. Farm (\$1,000)	105,990	137,039	112,718	105,923	161,417
FARMS BY SIZE					
1 to 9 acres		25	44	48	76
10-49 acres		101	98	167	197
50-179 acres		139	180	170	223
180-499 acres		291	233	180	178
500-999 acres		105	92	66	59
1,000 acres or more		22	36	45	40
LIVESTOCK AND POULTRY: INVENTORY					
Beef cows	1,222	1,337	1,460	1,209	862
Milk cows	33,440	34,912	35,372	32,797	32,172
Hogs and pigs	222	346	287	123	269
Sheep and lambs	4,454	2,113	1,544	1,737	1552
Milk Goats	Not reported	Not reported	125	1,056	1367
Layers 20 weeks and older	D*	D*	D*	D*	D*
Broilers and other meat-type sold	328	373	D*	D*	D*
CROPS HARVESTED (ACRES)					
Corn for grain	4,690	3,370 (or seed)	2,612 (or seed)	1,279	943
Corn for silage or green chop	14,734	21,777	27,326	24,330	22,727
Hay	12,345	12,160	87,083	80,608	76,047
Grass			47,860	55,134	36,276
Soybeans					1634
Vegetables	118	132	175	258	140
Maple Syrup (taps)			94,924	100,698	146,342
Land in Orchards	2,152	2,123	1,732	1,326	1109

[†] In 1976, the US Congress authorized a census of agriculture for 1978, 1982, and for years ending in "2" and "7" in succeeding years. This schedule coincides with the other specialized census reports such as manufacturing, retail trade, construction, etc.

*Withheld to avoid disclosing data for individual farms

Source: US Census of Agriculture



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Organic Production

Organic farms and processors account for a growing segment of the agricultural economy in Addison County. The Northeast Organic Farming Association of Vermont (NOFA-VT) tracks the number of organic farmers and processors it has certified by county. As of December 2007, there were 65 organic farmers and processors in Addison County (13% of total certified organic producers in Vermont). Detailed county level data are not available; however, the following 3 tables illustrate trends in organic production statewide through 2010. (From NOFA-VT)

Table 6: Vermont Certified Organic Producers

2010 TOTALS*	
Total Producers	580
Processors (non-farm)	53
Processors (on-farm)	20
Vegetable	142
Field Crop	75
Dairy	203
Livestock	77
Maple Syrup	102

*Farms producing a variety of products may be listed more than once.

Table 7: Growth In Organic Certification In Vermont 1993-2010

YEAR	NUMBER OF CERTIFIED ORGANIC DAIRIES IN VERMONT	NUMBER OF CERTIFIED ORGANIC PRODUCERS	TOTAL NUMBER OF ACRES OF CERTIFIED ORGANIC PRODUCTION
1993	3	78	
1994	3	90	
1995	14	106	
1996	28	150	
1997	35	170	
1998	33	179	
1999	38	187	15,967
2000	47	212	22,148
2001	55	230	23,638
2002	59	253	24,351
2003	64	289	30,387
2004	79	332	35,826
2005	93	366	48,759
2006	129	394	66,827
2007	204	487	85,147
2008	200	535	92,192
2009	200	548	98,461
2010	203	580	102,637



Table 8: Certified Organic Acreage In Vermont, 2010

CROP	ACREAGE
Pasture	23,562
Feed Grains	1377
Cereal Grains	531
Soybeans (food grade)	876
Wheat	626
Hay Land	51,778
Silage	1294
Vegetable	1143
Fruit	238
Oil Seed Crops	77
Sugar Bush	20,261
Other (mushrooms, x-mas trees, cover crop, etc)	816
Green House (sq.ft)	644,211 sq.ft ~ 14.7 acres

Business Management and Support Services

Business management is an increasingly important part of the farming operation. The University of Vermont Cooperative Extension Service provides timely, research-based information and education to Vermont's farmers. UVM Extension offers services designed to increase agricultural business profitability, support forest and farm stewardship and safety, encourage expanded markets for locally produced foods, and facilitate farm transfers to maintain a working landscape.

A local concentration of farms is necessary to maintain agricultural support businesses such as feed, fertilizer, equipment dealers, and agricultural processing facilities. Towns need to understand this concept when they prepare land use plans and zoning and subdivision regulations, locate or expand public facilities, or make decisions about protection of other land-based resources which have the effect of directing other forms of development into areas that support a density of agricultural enterprises.

The Regional Commission should cooperate with the Extension System and farm organizations in co-sponsoring workshops and other programs such as "Ag in the Classroom", to better educate the general public in the complexity of issues involved in the productive use and conservation of agricultural land.

The Addison County Local Foods Collaborative (ACLFC) is a recent initiative of the Addison County Relocalization Network (ACORN). Its mission is to network the key stakeholders in the local farm and food economy, to coordinate needs and to identify strategic gaps and opportunities. They want to identify opportunities to optimize our ability to grow much more food in the region, to help producers make a sustainable living from truly sustainable agriculture. In March of 2010, ACORN co-produced the first edition of the Addison County Guide to Local Foods and Farms with the *Addison Independent* and



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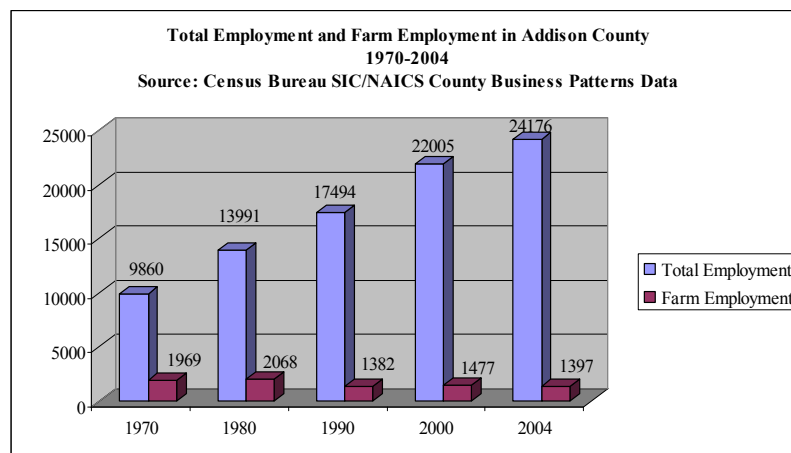
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distributed over 10,000 copies throughout the county.⁶ The Regional Commission should collaborate with ACORN and ACLFC to promote local food growers.

It is challenging for farmers to find low-cost, reliable labor. Migrant and seasonal workers are important to the region and the economy of the state as a whole. When local applicants for seasonal labor positions cannot be found, alternative sources of labor include migrant farm workers and H-2A workers.

The H-2A Temporary Agricultural Worker program allows farmers to apply for non-immigrant alien workers to work on a seasonal or temporary basis (the only means currently available to employers who want to legally utilize aliens in temporary farm jobs). Specific conditions must be met to protect the employment of similar U.S. workers. Any employer who has been certified for a specific number of H-2A jobs must have initially attempted to find U.S. workers to fill these slots. Even after H-2A workers are recruited employers must continue to engage in "positive recruitment" of U.S. workers. The employer must agree to accept U.S. workers until 50% of the certified contract period has been completed.

Figure 1: Total Employment and Farm Employment in Addison County



Use Value Appraisal (Current Use)

Vermont's Agricultural and Managed Forest Land Use Value Program, also known as the Current Use Program, offers landowners property taxation based on the productive value of land rather than on the traditional "highest and best" use of the land. The Current Use Program began in 1977 and has provided tax relief to owners of farm and forest land who choose to enroll. The Legislature reimburses municipalities so that local tax rates are not influenced by enrollment in the program. In 2006, approximately 2 million acres of farm and forest land in Vermont were enrolled in the current use program. That is approximately 1/3

⁶ 2010 Strategic Plan for the Addison County Local Food Collaborative (DRAFT), Jonathan Cocoran, Addison County Relocalization Network (ACORN), June 25, 2010.



of the total acreage of the state of Vermont. In Addison County approximately 200,000 acres of farm (133,000) and forest land (67,000) are enrolled in the current use program. In 2006, those enrolled in the program in Addison County paid an average of 86% less in taxes than they would if not enrolled in the program.

The primary goals of the Current Use program are to maintain the State's productive agricultural and forest land; to encourage and assist in conservation and preservation, to prevent accelerated conversion of these lands to more intensive use, and to achieve more equitable taxation for undeveloped lands. (32 V.S.A 3751).

Sources: *Review and Analysis of the Use Value Appraisal Program, October, 2007*, Prepared for the Vermont Legislature by: Deb Brighton, David Brynn, Glenn Rogers, Martha Sullivan, and Brendan Weiner, VNRC website, VT Dept of Taxes



Conserved Agricultural Lands

Table 9: Farms Conserved in Addison County by Vermont Land Trust

YEAR	NEW FARMS PER YEAR	TOTAL FARMS	PERCENT CHANGE
1996		49	
1997	13	62	
1998	11	73	17.74%
1999	16	89	21.92%
2000	18	107	20.22%
2001	18	125	16.82%
2002	16	141	12.80%
2003	14	155	9.93%
2004	10	165	6.45%
2005	8	173	4.85%
2006	8	181	4.62%
2007	6	187	3.31%

Table 10: Acreage Conserved in Addison County by Vermont Land Trust

YEAR	NEW ACRES PER YEAR*	TOTAL ACRES	PERCENT CHANGE
1996		13,436	
1997	4865	18,301	36.21%
1998	3263	21,564	17.83%
1999	4013	25,577	18.61%
2000	4077	29,654	15.94%
2001	4853	34,507	16.37%
2002	3595	38,102	10.42%
2003	2461	40,563	6.46%
2004	2324	42,887	5.73%
2005	1507	44,394	3.51%
2006	1067	45,461	2.40%
2007	1660	47,121	3.65%

*Acreages may include forest land but are predominantly farmland.

Source: Vermont Land Trust



Soils

Addison County soils were mapped by the USDA Natural Resources Conservation Service (NRCS). NRCS's Important Farmland ratings help to identify soil map units that represent the best land for producing food, feed, fiber, forage, and oilseed crops. Vermont's "Important Farmlands" inventories identify soil map units that are Prime Farmland, Unique Farmland (none currently in Vermont), Additional Farmland of Statewide Importance, and Additional Farmland of Local Importance. Most of the soil data described here can be downloaded from the VCGI or NRCS websites and are available at ACRPC.

Since 1985, NRCS has also classified land by Agriculture Value Groups (most recent revisions made in March 2003). This classification system can be used to compare the "relative value" for crop production of one soil map unit to another. This information can be useful in administering national, state, and local land use programs and regulations.

Primary Agricultural Soils (criteria 9b) and Productive Forest Soils (criteria 9c) are defined in Act 250 and were updated in 2006 (10 V.S.A. section 601 (15) as revised in May 2006). In addition to the NRC rating criteria, the Act 250 definition considers whether the land's size and location are capable of supporting or contributing to an economic or commercial agricultural operation. Agricultural Value Groups are considered in making these further determinations. (For more on criteria 9c, see Forestry section.)

In April 2007 Vermont's Secretary of Agriculture issued Guidelines to assist municipal and regional planning commissions in identifying agricultural lands in their land use planning processes (as required by the agricultural lands identification process established in 6 VSA § 8).

The Guidelines promote use of USDA/NRCS Soils information for land classification, advocate agricultural land planning at the local level, including agricultural zoning and subdivision regulations that target lower quality agricultural soils to the extent possible, and emphasize the importance of farming, farmers, and farmland to the visual and community structure of the state.

SOILS AND ASSOCIATED NATURAL COMMUNITIES

USDA-NRCS issued a report in 2005 linking Vermont soils with natural communities based on the book *Wetland, Woodland, Wildland - A Guide to the Natural Communities of Vermont* by Thompson and Sorenson. According to the report, "it is a supplement to the Woodland Management and Productivity tables found in Vermont soil survey reports. Foresters can use the information in managing woodlands more effectively. Others can use the information to gain a better understanding of the natural landscape and use it as a tool in conservation and land use planning efforts."



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SOIL RATINGS AND RESIDENTIAL ONSITE WASTE DISPOSAL

NRCS has issued a report providing information on the soils in Vermont in relation to their suitability for residential on-site waste disposal systems. In the report, “the soil properties that affect on-site waste disposal suitability and design have been compared to regulations set forth by the 2002 Vermont Environmental Protection Rules. Soil map units are separated into five general suitability groups and then further separated into twenty-three subgroups to help in locating onsite waste disposal facilities.

Sources: *2003 Ancillary Soil Ratings for Residential On-site Waste Disposal in Vermont, USDA Natural Resource Conservation Service, Colchester, VT, July 2004*

AAPS & BMPS

Accepted Agricultural Practices (AAPs) are statewide restrictions designed to reduce nonpoint pollutant discharges through implementation of improved farming techniques. The program emphasizes improved techniques rather than investments in structures and equipment. AAPs contain standards for fertilizer and pesticide storage, fertilizer application, nutrient applications limits, vegetative buffer zones, anti-siphon devices and excessive soil loss. AAPs represent minimum management standards below which agricultural activities would adversely impact water quality. The intent is that farmers can meet these standards using existing equipment, improved management techniques, and traditional practices.

Best Management Practices (BMPs) are more restrictive than AAPs and are site specific practices prescribed to correct a specific water quality problem on a farm. BMPs typically require installation of structures, such as manure storage system, to reduce agricultural nonpoint source pollution. USDA and the State Agency of Agriculture provide financial assistance in implementing BMPs, with technical assistance provided by NRCS and University of Vermont agricultural specialists. BMPs are being used extensively to reduce phosphorus and nitrogen loads in Lake Champlain.

Wetlands

Wetlands comprise a significant portion of farmland, especially in Addison County, which has a high proportion of clay soils. Much of this land is, and has historically been, in cultivation. Wetlands, no matter where they are located, provide water storage and purification functions and may provide habitat for many common plants, birds and wildlife. Wetlands may also provide habitat for rare and endangered species. Water storage and purification functions may benefit a farmer by controlling flooding and by treating runoff. However, farmers may impact a wetland with siltation from excessive runoff, or by runoff of excessive nutrients and/or pesticides. Farmers and farm organizations are very aware of these problems and are working to correct them. All of the above can diminish the ability of a wetland to perform its basic functions by altering vegetation, hydrology or the microbiology of the wetland.



Wildlife Habitat

Agricultural activities can significantly change wildlife habitat, resulting in both positive and negative impacts to a wide variety of species.

Habitat for rare and endangered species and for other wildlife does occur within farmland. Rare and endangered species habitat is often small in size and may be maintained by crop management practices. In some cases, wildlife habitat may be incompatible with agricultural development and appropriate steps should be taken to preserve this habitat to benefit wildlife. The regional plan supports efforts to return fallow land to high quality wildlife habitat, including small areas of lands that are rendered un-farmable by larger equipment and economies of scale. Delaying mowing until late in the season in these areas would help the decline of a number of grassland birds and honey bees.

Deer wintering areas are not located in open fields and do not directly impact cropping patterns although deer can cause crop losses by heavy browsing during the growing season. Expansion of fields can have a serious impact since it removes winter feed and shelter for a variety of species.

Deer wintering areas, once established, tend to be used year after year. Therefore destruction of a wintering area, or reduction in size, can cause an immediate reduction in the deer herd, especially in a winter with deep snows and severe cold which hamper the search for a new wintering area.

Agricultural Lands Enhancement Incentives

CONSERVATION RESERVE ENHANCEMENT PROGRAM (CREP)

The Conservation Reserve Enhancement Program (CREP) aims to improve water quality in streams and lakes by helping agricultural landowners to voluntarily establish vegetative buffers that filter runoff by trapping sediment, fertilizers, and pesticides.

Landowners are compensated for the loss of productive agricultural land through upfront incentive payments and annual rental payments based on the total acreage dedicated to forested buffers (35 foot minimum width) or vegetated filter strips (25 foot minimum width). Contracts are for either 15 or 30 years, during which time the buffers must be maintained by the contracted individual. Federal cost-share and incentive payments are available to cover 90% of the implementation costs associated with permanent fencing, alternative water systems, stream crossings, and vegetative buffer establishment. In some instances the costs may be 100% covered. NRCS is instrumental in implementing this program in the Addison region.



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The USDA also administers the statewide Environmental Quality Incentives Program (EQIP) and the Wildlife Habitat Incentive Program (WHIP). EQIP offers contracts that provide incentive payments and cost share payments for implementing eligible conservation practices. The Wildlife Habitat Incentive Program is a voluntary conservation program that provides technical and financial assistance to landowners for developing, improving or managing wildlife habitat or for restoring natural ecosystems on eligible land.

[see Wildlife, Native Plants and Natural Communities section, p. 64]



4.3 FOREST RESOURCES

A. SUMMARY

Vermont's forests are dynamic. Native American influences to the landscape of Vermont were minimal, and early European settlers found nearly all of the state covered by forests. Forest clearing became widespread around 1800 as Vermont's farmers began supplying wood products, food and wool to a rapidly growing nation. By 1860, less than one-half of the state remained forested and Vermonter George Perkins Marsh, arguably the nation's first environmentalist, warned of the impacts of soil erosion from clearing forests. The migration of people to the western United States led to a decline in agriculture allowing forest succession to reclaim Vermont's landscape⁷

Today, nearly 75-80% of the Vermont landscape is forested. In Addison County forestland comprises about 50 - 60% of the landscape due to the large agricultural land base. The region's forests and the resources and services they provide are essential to the high quality of life enjoyed by residents of the area. They must be appropriately managed and preserved to ensure the future vitality of the region and its inhabitants.

Addison County's forests provide a wide range of services that support the region economically, environmentally, and socially. Our forests are a source of raw materials that support traditional forest products industries, such as hardwood veneer, lumber, pulpwood, fuelwood, chipwood and maple syrup. Our forests provide clean water, clean air, and plant and wildlife habitat as well as carbon storage. Our forests are renowned for the recreational opportunities, artistic inspiration, and pleasing views they offer. These natural resources should be used and maintained in ways that will not compromise their future integrity, or that of the region, its residents, and visitors.

Many of the services the forest provides, such as wildlife habitat, air quality protection, water quality protection, and flood storage and protection, are not as easily seen, understood, or quantified as the economic and social benefits provided by forests. However, these "ecosystem services" are vitally important. Forest management and planning initiatives should strive to conserve native biological diversity and maintain ecological functions while providing economic benefits.

While many forest resources are managed at the local or individual parcel scale, increasing emphasis is being placed on landscape scale management. Maintenance of large forest blocks is viewed as beneficial to timber management as well as wildlife habitat and the other ecosystem services.

⁷ 2010 Vermont Forest Resource Plan, Division of Forests, VT Agency of Natural Resources, June 2010 page 9.



On the scale of individual trees, Addison County has twelve trees that are the largest for the species in Vermont. These include a bur oak in New Haven, an eastern white pine, a Scotch pine, and a yellow-poplar in Middlebury, and an English walnut in Weybridge⁸.

Table 11: Vermont's Largest Trees in Addison County

TREE	DIAMETER	CIRC .	HEIGHT	CROWN SPREAD	TOWN
Black Gum or Tupelo	28	90	66	40	Ferrisburgh
Boxelder	75	236	55	75	Ferrisburgh
Cedar, Atlantic White	14	45	27	26	Middlebury
Elm, Camperdown	35	112	24	25	West Cornwall
Linden, Littleleaf	34	109	53	52	Middlebury
Oak, Bur	71	224	76	93	New Haven
Oak, Dwarf Chinkapin	8	27	18	15	Bridport
Oak, Swamp white	0	209	78	106	Orwell
Osage-Orange	12	40	38	20	Middlebury
Pear, Common	0	90	36	24	Middlebury
Poplar, Lombardy	22	72	92	17	Salisbury
Walnut, English	49	156	45	61	Weybridge

⁸ http://www.vtfpr.org/urban/vt_big_trees.cfm last accessed October, 2010.



B. FOREST RESOURCES GOALS AND OBJECTIVES

GOALS

A. To manage, maintain, and improve the health and viability of forest areas in the region.

To meet this Goal it is our Objective to:

- a) Encourage planning strategies that promote ecological health and sustainability at local and regional scales.
- b) Encourage research and education to enhance economic viability of individual forest enterprises and the conservation of natural resources.
- c) Encourage the conservation and maintenance/restoration of contiguous forests to conserve native biodiversity.
- d) Support community efforts to develop and manage their forest sustainably.
- e) Encourage ecosystem-oriented management on National Forest Lands, State Forest and Parks, and State Fish and Wildlife lands.

B. To manage, maintain, and improve the resources and services forest areas provide.

To meet this Goal it is our Objective to:

- a) Recognize and maintain the diverse benefits provided to the public by forestland, including:
 - resources to support forest economies and rural culture;
 - habitat for native biodiversity;
 - recreational opportunities;
 - higher quality water supplies;
 - higher quality air supplies and carbon sequestration;
 - scenic working landscapes;
- b) Encourage the efficient use of the forest's resources and services to ensure economic viability of forest enterprises, and a wide range of environmental and social benefits.
- c) Encourage local processing and marketing of the forest's diversity of products.
- d) Encourage use of Acceptable Management Practices (AMPs).
- e) Promote the equitable taxation of forest land through, but not limited to, local assessments that reflect current use, zoning, and land capabilities.
- f) Encourage amicable relations between forestland owners and those seeking permission to use the land for recreational purposes.



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- g) Encourage and cooperate with private landowners and conservation organizations to conserve large tracks of productive forestland for sustainable harvest.
- h) Encourage landowners to refrain from posting their land, allowing the open hunting tradition Vermont has enjoyed.
- i) Encourage the sustainable use of forests for local energy and heat production.



C. FOREST RESOURCES RECOMMENDED ACTIONS

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plans, as issues or opportunities arise, to move towards accomplishing the objectives and meeting the goals outlined above.

1. Provide research and education, to enhance both the economic viability of individual forest enterprises and the conservation of natural resources.
2. Assist in creating and maintaining forest inventories to aid local planning efforts.
3. Work with towns to minimize conversion of high value forest areas to non-forest land uses.
4. Encourage use of local level incentives such as density bonuses to create forest set aside areas as part of new developments (clustered development).
5. Support landowners and towns to work together to provide viable incentives for conservation of private forest land and the ecosystem services they provide.
6. Encourage certification of managed forests through organizations such as Vermont Family Forests, Forest Stewardship Council (FSC), or Sustainable Forest Initiative (SFI).
7. Support access to affordable sources of independent evaluation and certification of forestry practices, such as Vermont Family Forests.
8. Encourage and support the use of governmental, non-profit, or private easement programs to manage and conserve forest resources.
9. Where appropriate, support measures to protect rare, threatened and endangered species and their habitats (e.g., nesting and feeding areas).
10. Support efforts to manage invasive species.
11. Support wise and sustainable use of forests for fuel wood and other energy products, as well as post-harvest efficiency, to minimize emissions and maximize energy production and utilization, particularly as fossil fuel prices increase.
12. Support efforts to maintain the remaining examples of Clay Plain forest in the region through education and by encouraging landowners to seek assistance from a forester in managing their clay plain woodlots.
13. Support Vermont Coverts and similar efforts that work to enhance wildlife benefits through sustainable timber management practices.
14. Work with and support the County Forester.
15. Encourage understanding, connection to, and use of local forest products.
16. Support and assist towns to establish a town forest for conservation and education.



D. DOCUMENTATION/ANALYSIS

ECONOMIC BENEFITS AND SERVICES

The forests of Addison County provide significant economic services to the area. Residents can find employment in forest planning and management, logging, production of wood energy (cord wood, pellets, pellet stoves, and boilers), lumber, flooring, construction materials, pulp and paper, and furniture. There are numerous industries based on non-wood forest products as well, such as maple syrup, edible plants (mushrooms, seeds, ferns, transplants of shrubs, fiddleheads, berries), game, and fibers. In addition, forests serve as the setting for appropriate small businesses such as guiding services, larger businesses such as ski areas, and as working landscapes valuable to the tourism industry. The cultivation and management of local supplies of raw materials to these industries is important, as is continued work to maintain these productive areas and to develop and support local markets.

Changing Patterns of Land Ownership

Public ownership in Addison County totals about 103,100 acres or 20.8 percent of the county. The vast majority of these publicly-owned lands are forested. Of the county's public lands, the USDA Forest Service owns approximately 84%, Vermont Agency of Natural Resources owns about 12 %, and municipalities own about 3% percent. While some land has changed hands from private to public or vice versa in recent years, and the GMNF does occasionally purchase land offered by willing sellers that will benefit National Forest System purposes, patterns of public ownership in the region are relatively stable.

In contrast, private land ownership patterns are changing on a national scale, particularly in the Eastern United States. Vermont and Addison County are not exempt from these changes. According to the US Forest Service, approximately one sixth of the country's privately owned acres of forest are expected to change hands in the next five years.⁹ As land taxes increase in the state, many private landowners find it difficult to pay property taxes on large tracts of forest land and are forced to consider subdividing their land for development. This process results in parcelization, the fragmentation of large parcels of forest land into smaller pieces and multiple ownerships. While growth and development is beneficial in many ways, gradual parcelization can displace or destroy plant and wildlife habitat, reduce forestland's ability to provide clean air and water, and compromise the viability of large tracts of land that support the forest economy (Vermont Coverts May 2008). In a region where 80% of the total land area is privately owned, family forest owners are the key to maintaining the services and benefits forests provide. As forestland owners divest their forestland holdings to their heirs, they must also pass along values and knowledge of the forests so that new owners view their forest land as part of a working landscape, rather than simply as an investment (Vermont Coverts May 2008).

⁹ (USDA Forest Service, Northeastern Areas State and Private Forestry Release No. DF0-12-06, revised 05/21/07 by Glenn Rosenholm).



Figure 2 and Figure 3 below illustrate open land conversion trends in Addison County between 1987 and 2005 based on Vermont Property Transfer Tax data. The total number of acres converted from open space to residential each year used in these charts is the sum of 4 unique categories detailed in the Vermont Property Transfer Tax data. The 4 categories of conversion used to compute the total are *open space to residential*, *farm to residential*, *open space to single family residential*, and *open space to development lots*. Between 1987 and 2005, a total of 20956.2 acres of open space were converted to residential use in the county. Just over 12% (2,575.6 acres) of that total was farm land. The other 88% is field, forest, or other land classified described as open.

Figure 2 shows an average increase in the number of acres converted from open space to residential each year from 1987 to 2005. Figure 3 shows annual conversion from open space to residential as a portion of the cumulative conversion during the time period from 1987 to 2005.

Figure 2: Conversion of Open Land to Residential Use in Addison County

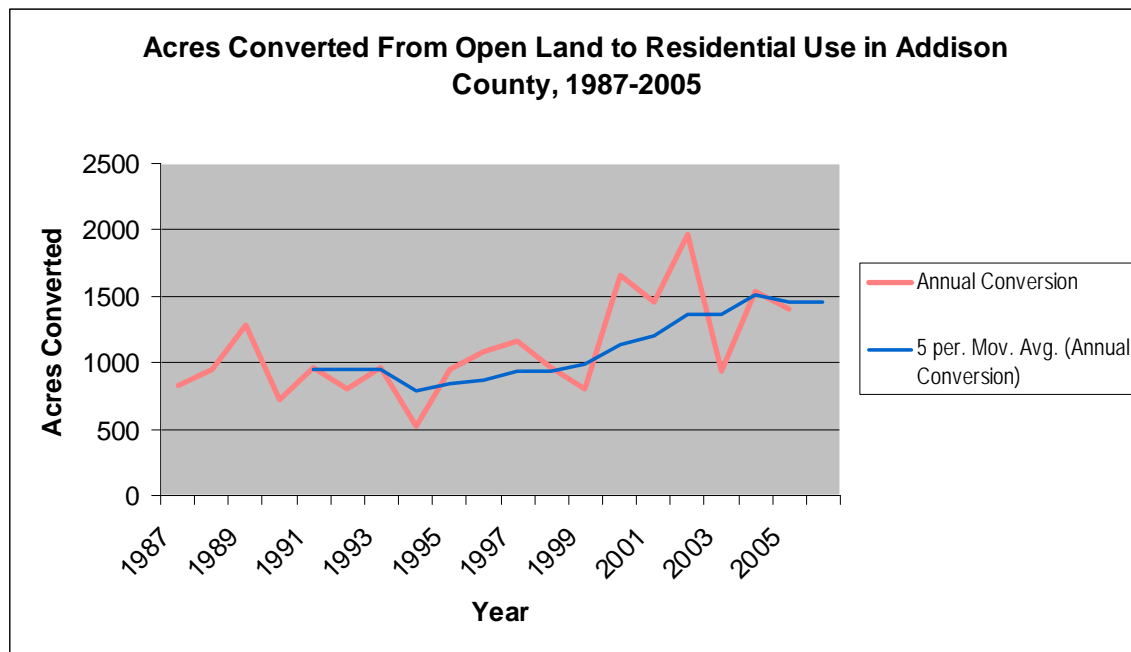


Figure 2: Acres converted from open space to residential each year from 1987 to 2005 with trend line. (Trend line represents a moving average calculated in 5 year increments.)



Figure 3: Open Space Conversion to Residential, Cumulative 1987-2005

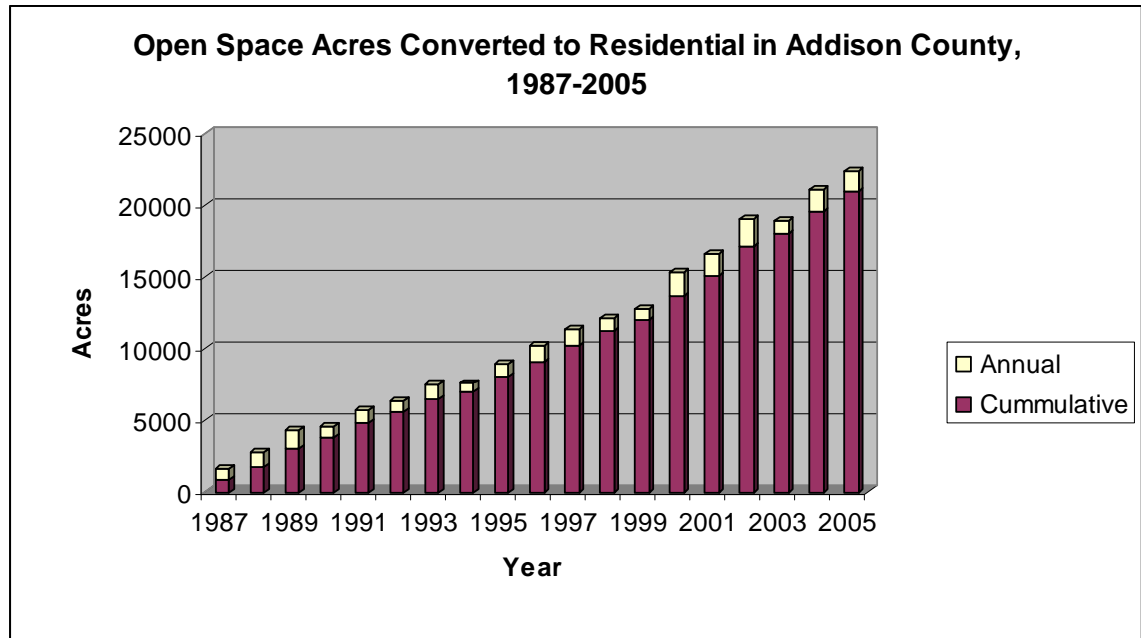


Figure 3: Annual conversion form open space to residential as a portion of Cummulative conversion during the time period from 1987 to 2005.

Private landowners are finding alternative ways to manage these financial challenges and keep their land and these resources and services intact. The Use Value Appraisal (Current Use) program¹⁰, sale of easements, creation of cooperatives, and sustainability certifications are all strategies that can help. Municipalities can also work, through their planning and zoning processes, to balance growth in some areas with conservation and management of larger tracts of the working landscape in other locations. The Regional Planning Commission supports ownership patterns that promote a working forest while protecting unbroken forest tracts.

Forest Management

In many situations, forest products and values can be improved through careful management. The County Forester, employed by the Vermont Department of Forests, Parks, and Recreation, provides technical assistance to non-industrial private woodland owners and municipalities.

¹⁰ The primary goals of the Use Value Appraisal program are to maintain the State's productive agricultural and forest land; to encourage and assist in conservation and preservation, to prevent accelerated conversion of these lands to more intensive use, and to achieve more equitable taxation for undeveloped lands. (32 V.S.A 3751). See the Agriculture Section of this plan for additional information. and 63,000 agricultural land in Addison County are enrolled in Current Use



The County Forester administers the forestland component of the Use Value Assessment Program (UVA). Enrolled parcels, managed according to approved management standards, are appraised at their use value. Towns are reimbursed for local shortfalls in tax revenues by the State. There are currently 46,000 acres of Addison County forestland enrolled in UVA (63,000 acres of agricultural land).

Consulting foresters and several industrial foresters work regularly in Addison county providing assistance to private woodland owners. Their services can include forest inventory, mapping, appraisals, timber sale marking and administration, road construction, and surveying. They may also assist with questions and planning related to Stand Establishment, Stand Improvement, Harvest, Wildlife Enhancement, Watershed/Fishery Protection, and Recreation and Archeological Enhancement.

ECOSYSTEM BENEFITS AND SERVICES

Forests are more than just trees: they are an integrated community of plants, animals, soils, and water. Recently, forests are being recognized more than ever for the essential ecosystem functions they perform. Forests protect soil, air and water quality, reduce run-off and flooding, provide plant and wildlife habitat, and regulate climate, all at little or no cost to people, assuming the forests are maintained intact.

Forests and Water Quality

Forests produce higher quality water than most other land uses. Forests adjacent to streams and rivers are particularly important in that they shade streams, provide important woody debris, and act as a filter to capture pollutants before they reach the stream.

Timber management activities can have an impact on surface waters. *Acceptable Management Practices (AMPs) For Maintaining Water Quality On Logging Jobs In Vermont* were developed and adopted as rules to Vermont's water quality statutes and became effective in 1987. The AMPs are intended and designed to prevent mud, petroleum products and woody debris (logging slash) from entering waters of the state. They are scientifically proven methods for loggers and landowners to follow for maintaining water quality and minimizing erosion. The AMP program (VTFP&R) provides educational workshops and technical assistance, and is responsible for enforcement.

[see the Water section for additional information. p. 3]



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Forests and Air Quality

Trees, plants, and other organisms that use photosynthesis naturally remove carbon dioxide from the air. Plants hold onto this carbon as they grow and decay, thereby “sequestering carbon”. As tree and plant life increase, so does the potential for carbon sequestration, which may help mitigate global warming. The process of photosynthesis can remove other chemicals as well, such as nitrogen oxides, airborne ammonia, some sulfur dioxide, and ozone. Maintaining healthy and productive forests ensures the provisions of these important services.

[see the *Air Quality* section for additional information, p. 64]

Forests and Soil Quality

Soil erosion can decrease forest health and productivity and also compromise downstream water quality. Soil is most susceptible to erosion after the removal of plants, surface litter, and duff which protect it from wind and water. Roots hold the soil together and anchor it in place. If plants are removed temporarily (i.e. trees being harvested) and the surface duff and organic layers remain intact, there may be little or no erosion. In well managed forests, roads and roadsides can be engineered to minimize erosion and sedimentation. Winter harvest can also help minimize erosion.¹¹

[see *Agriculture* section for additional information, p. 25]

Forests and Wildlife Habitat: Contiguous Forest and Corridors

As a result of the parcelization described above, blocks of contiguous forestland are broken into smaller and smaller units. Contiguous Forests are areas of forested land with either no roads or a very low density of roads, and little or no human development. Contiguous forest areas may have various age classes of forest cover and may be composed of other habitat types such as wetlands or old meadows. Ideally, these areas are connected with other similar areas so that the animals that use them can move freely to other forest areas and habitats. Contiguous forest habitat supports native plants and animals, including species like bobcats and black bears that require large areas to survive. Contiguous forest habitat also supports natural ecological processes such as predator/prey interactions and natural disturbance. Additionally, contiguous forest can buffer species against the negative consequences of fragmentation. (*Conserving Vermont's Natural Heritage*, VT Fish and Wildlife, 2004)

The availability of large blocks of contiguous forestland varies by biophysical region within the state. The Champlain Valley, which makes up much of Addison County, is generally comprised of the smaller, fragmented forests. (*F&W Planning Doc Chapter 4*, pages 35)

¹¹ <http://www.forestinfo.org/discover/soil.htm> accessed 07/03/08



Corridors are connecting habitat areas that link larger patches of habitat within a landscape, allowing the movement, migration, and dispersal of animals and plants. Riparian habitat along streams and rivers, strips of forest cover between developed areas, and hedgerows represent potential connecting habitat. In conjunction with the conservation of large areas of undeveloped land with diverse habitat conditions, and the maintenance of a sustainable working landscape, vegetative corridors assist in supporting ecosystem functions and related public benefits. *(from Conserving Vermont's Natural Heritage VT Fish and Wildlife, 2004)*

Clay Plain Forest

Clay plain forest is a critically important natural community that has been fragmented in many places. It hosts a huge diversity of species. Clay in these forests has lots of calcium and host a unique plant community that doesn't grow in other soil types: white oak, shag bark hickory, ash, and basswood. Working to restore these areas would benefit the unique species and diverse communities that depend on this type of habitat. [see *Wildlife, Native Plants and Natural Communities*, p. 52]

SOCIAL BENEFITS AND SERVICES

Inspiration, recreational opportunities, and a sense of place are also provided by the region's forested areas.

Recreation

Addison county forests are a destination for residents and visitors seeking a variety of recreation opportunities including alpine and cross country ski areas, trails for hiking, cross country skiing, snowmobiling, horseback riding, and bicycling, as well as opportunities for fishing, hunting, birding, and camping. A rich variety of plants and animals are part of the attraction. Numerous businesses and organizations are involved in supporting and managing these activities, which enhance the local economy, and depend upon the areas ecological integrity.

There are differing opinions about the appropriate mix of recreation opportunities and forest settings that should be emphasized on public forest land, and differing opinions about public access to private lands. Some people prefer developed settings while others prefer more primitive settings. Some people would prefer motorized travel, while others prefer non-motorized travel. Some landowners allow the public to use their land while others do not. The Regional Planning Commission can serve as a forum for region-wide discussion of these values and opinions.

Trail system planning is needed to identify the right mix of trail types in order to meet the needs of forest users. Some resource management actions such as timber management and



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recreation management can have impacts on each other as well as impacts to other resources such as wildlife and plants, and these must be carefully considered and managed.

Education for user groups is also imperative, to ensure responsible, respectful and appropriate use of private lands.

Municipal Forests

Municipal Forests provide opportunities for engaging communities in activities that demonstrate high-quality stewardship of forestland resources. The state of Vermont defines a municipal forest as “a tract of land primarily devoted to producing wood products, maintaining wildlife habitat, protecting water supplies, providing forest recreation and conservation education.” 140 of the 251 Towns in Vermont have Municipal Forests. Municipalities can create new town forests or expand existing town forests, assuming there are landowners who are willing to sell or donate their land. Recognizing and promoting town forests as community assets can strengthen cultural and educational connections to our town forests, reminding citizens and visitors of the common bonds shared through these lands.



4.4 WILDLIFE, NATIVE PLANTS, AND NATURAL COMMUNITIES

A. SUMMARY

*Wildlife and wildlife habitat are essential to the ecological and biological processes that sustain life. The functioning of the planet, and therefore the maintenance and enhancement of human life, depends on countless interactions among plants, animals, and microorganisms. These ecological processes are essential for agriculture, forestry, fisheries, and other endeavors that sustain our economy. They also help maintain environmental quality by degrading and removing some pollutants and by preventing waste accumulation. Some of the biological processes in which wild species play a key role are pollenization, germination, seed dispersal, soil generation, nutrient cycling, predation, habitat maintenance, waste breakdown, and pest control.*¹²

Much of the Addison County Regional Plan discusses planning for human populations and the infrastructure we create and rely on to function as a society. This section does not contradict those elements. However, it recognizes that our society is built upon and interacts with a number of essential non-human elements. The Vermont Fish and Wildlife Department refers to these as “Natural Heritage Elements,” and they range from individual species and their habitat needs, to interacting groups of organisms, their physical environment, and the processes that affect them, (referred to as “natural communities”) to large undeveloped landscapes and the many species and ecological functions they support.

Conservation biologists estimate that if we properly steward multiple examples of all natural communities, we will retain a high percentage of native species. To ensure the proper functioning of these communities and to provide habitat for wide-ranging and reclusive species, we must also conserve and foster the stewardship of large landscapes with all their component species, habitats, and natural communities. Focusing on these elements also addresses many of the public interests associated with the natural environment, such as hunting, hiking, fishing, and bird-watching.¹³

The Regional Plan recognizes that areas important to native plants, wildlife, and other natural communities provide much more than wildlife habitat. They provide the foundation of agricultural and forestry industries, recreational opportunities and cleaner air and water. This plan addresses these resources at the Landscape Level, Natural Communities Level, and Species Level. These varying levels of assessment allow us to see the impacts of human development at a variety of scales. The various levels also provide focus for managing undeveloped areas across the region as inter-dependent parts. By prioritizing areas to manage, conserve, and connect, we can maintain the healthy plant and wildlife populations that sustain us and other species.

¹² From <http://www.hww.ca/hww2.asp?id=221> accessed 07/15/08

¹³ Conserving Vermont’s Natural Heritage p. 36



B. GOALS AND OBJECTIVES

GOALS

A. To manage and improve the quality of plant and wildlife habitat in the region, including natural and fragile areas and threatened and endangered species

To meet this Goal it is our Objective to:

- a) Support a landscape level approach to the conservation and enhancement of species diversity and natural community types.
- b) Identify significant natural and fragile areas in the region, and support efforts to protect and conserve these areas.
- c) Identify species that are threatened, endangered or rare, and protect and conserve these species in a form commensurate to both their significance and the degree to which protection and conservation is necessary.
- d) Encourage a rate of harvest of plants and wildlife that is commensurate with the capacity of the area to replenish and support the species.
- e) Recognize that generally accepted farm and forest management practices have helped create and maintain some species' habitats.
- f) Encourage the wise management of game and non-game species.

B. To manage and enhance functions and values of plant and wildlife habitat by understanding and maintaining contiguous habitat blocks, corridors, and unique areas, and by preventing the proliferation of nuisance species.

To meet this Goal it is our Objective to:

- a) Identify significant contiguous blocks of habitat within the region and support efforts to maintain these blocks.
- b) Support conservation and stewardship of riparian forests and riparian buffer zones as key wildlife corridors.
- c) Support efforts to establish and maintain interconnecting wildlife corridors.
- d) Assist municipalities, both internally and with adjacent communities, to identify and maintain viable habitat blocks, corridors and buffers.
- e) Encourage conservation of contiguous habitat blocks and wildlife corridors across public and private boundaries, particularly where there are large tracts of open or undeveloped land.
- f) Where development occurs in close proximity to important natural communities, encourage development techniques that preserve the functions of the natural communities. (PUDs, clustered development, buffer areas, conservation easements, siting considerations, etc.)



C. RECOMMENDED ACTIONS

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual workplans, as issues or opportunities arise, to move towards accomplishing objectives and meeting the goals outlined above.

1. Provide educational opportunities and materials to inform community members of the importance of large contiguous blocks of undeveloped habitat and the connecting corridors between these areas in the preservation of wildlife, native plants and natural communities.
2. Provide data and maps to help towns recognize and address significant plant, wildlife, and natural community habitat areas in town plans and other planning proceedings.
3. Support continued efforts to designate and maintain natural and fragile areas of regional significance as depicted on this plan's Regional Significance Map.
4. Encourage timely notification to landowners and access to local planning boards regarding the location of significant plant and wildlife habitat and rare, threatened, or endangered species.
5. Encourage municipalities to consider all species on the Federal & State threatened and endangered lists as regionally significant resources.
6. Assist municipalities in developing priority systems for the protection of wildlife and wildlife habitat areas, native plants, and important natural communities.
7. Support landowners and towns to work together to provide viable incentives for conserving significant plant and wildlife habitat areas and the ecosystem services they provide.
8. Work with Municipalities, the State, Resource Conservation Districts, land trusts, and other appropriate organizations to conserve key habitat areas through purchase, easement, or other similar mechanisms.
9. Encourage municipalities and landowners to consider VT Agency of Natural Resources riparian guidelines for habitat and flood protection.
10. Support towns in creating zoning and site design standards that provide incentives to property owners who safeguard plant and wildlife habitat areas in their development plans (PUD, overlay district, etc.).
11. Work with Town Highway departments and VTRANS to identify and protect important wildlife crossings in order to reduce automobile-wildlife collisions and to provide a means of safe crossing for amphibian populations such as salamanders and frogs through tunnels/culvert and /or road closures.
12. Support programs such as Vermont Coverts that educate landowners about wildlife-friendly forest management.
13. Undertake a contiguous habitat study to determine priority habitat areas regionwide.



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D. DOCUMENTATION & ANALYSIS

This section of the plan discusses managing our plant and wildlife resources at the Landscape Level, Community Level, and Species Level. These varying levels of assessment allow us to see the impacts of human development at a variety of scales. The various levels also provide focus for managing undeveloped areas across the region as inter-dependent parts.

Landscape Level conservation is about recognizing and properly stewarding large areas of undeveloped land. This helps maintain a diversity of landscapes throughout the region. Stewardship at the landscape level aids species that have large ranges, that need large forest areas, or that need specific kinds of physical settings. Managing at the landscape level requires recognizing and maintaining large contiguous habitat blocks as well as connecting lands between the contiguous blocks.

Community Level conservation is about recognizing and properly stewarding individual natural communities. A natural community is “an interacting assemblage of organisms, their physical environment, and the natural processes that affect them.”¹⁴ By recognizing and managing the natural communities in the region, we can sustain the diversity of organisms that depend on these varied habitats. Simultaneously, seeing how these communities link or might link with one another at a landscape scale described above helps maintain the variety of communities and the species within and between them.

Species Level conservation means paying special attention to certain species that might not be captured through landscape or community-level approaches. Examples of these rare, threatened and endangered species, deer winter habitat, mast stands, important bat habitats, important amphibian habitats, grassland bird habitat, bear habitat, and early successional forest and shrub habitats.¹⁵

¹⁴ Thompson, E.H., and Sorenson, E.R., *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*, Vermont Department of Fish and Wildlife and The Nature Conservancy, 2005, p.2.

¹⁵ Conserving Vermont’s Natural Heritage p.37.



LANDSCAPE LEVEL

Conservation at the Landscape Level means managing and conserving large areas of undeveloped land to maintain a diversity of landscapes throughout the region. Stewardship at this level aids species that have large ranges, that need large forest areas, or that need specific kinds of physical settings. Managing at the landscape level requires recognizing and maintaining contiguous forests and connecting lands between large contiguous blocks.

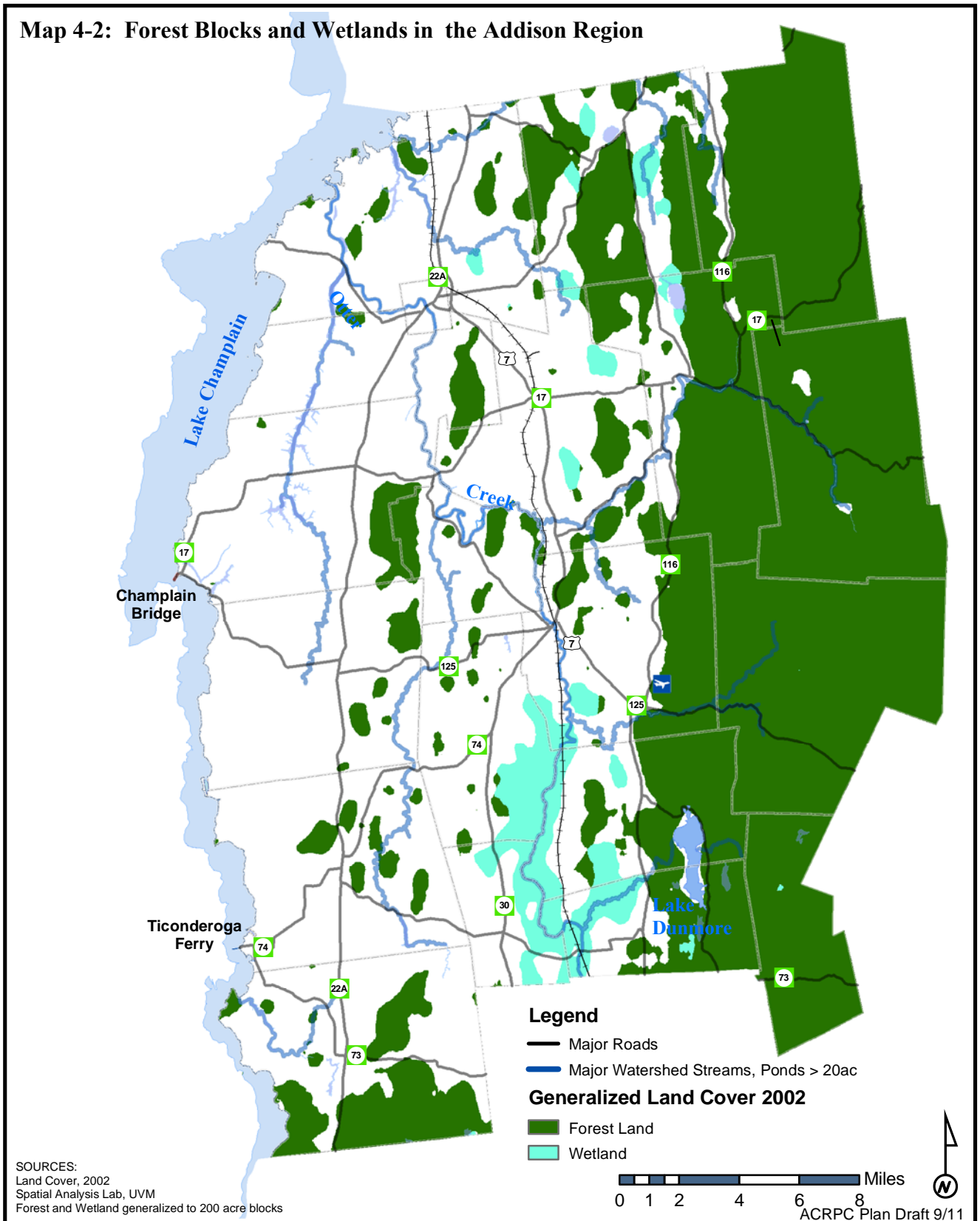
At the landscape level, consideration of connecting habitat is also of primary importance. Also, natural communities and plant and wildlife species are likely to cross political boundaries. Municipalities should consider working with adjacent towns to manage and maintain appropriate habitat blocks and corridors for plant and wildlife species. Riparian Buffers and Riparian Forests are particularly helpful in building connectivity, and the conservation of these buffers and forests also enhances water quality. Lands used to connect larger contiguous blocks may not be as high quality as the larger blocks, but could prove to be more important because the need for connectivity is so great.

Identification and protection of key riparian corridors and buffers that connect habitat patches and allow successful travel between them is important in maintaining or even increasing the diversity of species. Wide-ranging animals such as bobcats as well as animals with relatively small ranges such as salamanders utilize these corridors in order to find seasonal sources of food, to breed, or to hibernate.

When a town wishes to preserve significant habitat blocks, riparian corridors and natural communities, it is important to identify the boundaries of these areas and to document the plants and types of wildlife that currently live there. A town wishing to engage in landscape level conservation may be supported in their goals by working with state and national agencies and programs as well as nonprofit organizations that share their objectives.



Map 4-2: Forest Blocks and Wetlands in the Addison Region



Wildlife Management Areas in Addison County

One way that large blocks of habitat are conserved in the region is through The Vermont Fish and Wildlife Department's Wildlife Management Areas (WMAs). Fish and Wildlife owns over 80 WMAs, totaling over 118,000 acres throughout Vermont. Addison County is fortunate to host 8 WMAs, totaling 10,495 acres. Management of these areas emphasizes the conservation of fish, wildlife and their habitat, and provides people with opportunities to enjoy these resources through outdoor activities. The WMAs in Addison County and the towns in which they are located are listed in the table below.

Table 12: Wildlife Management Areas in Addison

WMA	Location
Cornwall Swamp	Cornwall, Whiting
Dead Creek	Bridport, Addison, Panton
East Creek	Orwell, Benson*
Lemon Fair	Bridport, Cornwall
Lewis Creek	Starksboro
Little Otter Creek	Ferrisburgh
Lower Otter Creek	Ferrisburgh
Pond Woods	Benson*,Orwell
Snake Mountain	Addison, Weybridge

*Rutland County

These WMA's are shown on the Regionally Significant Resource map (MAP 8-2).

NATURAL COMMUNITY LEVEL

Community Level conservation is about recognizing and properly stewarding individual natural communities. A natural community is "an interacting assemblage of organisms, their physical environment, and the natural processes that affect them."¹⁶ By recognizing and managing significant natural communities in the region, we can sustain the diversity of organisms that depend on these varied habitats.

Addison County Significant Habitat Areas/Natural Communities

¹⁶ Thompson, E.H., and Sorenson, E.R., *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*, Vermont Department of Fish and Wildlife and The Nature Conservancy, 2005, p.2.



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Cornwall Swamp

The Cornwall Swamp is a vast swamp in the Flatlands of the Otter Creek Valley. It is part of the largest interior wetland complex in Vermont, and is considered a National Natural Landmark by the National Park Service. Cornwall swamp is a seasonally flooded area of woodland and field and hosts a variety of natural communities including: red or silver maple-green ash forest, silver maple-ostrich fern riverine forest, red maple-northern white cedar swamp, and northern white-cedar swamp. The area supports numerous tree, shrub, and fern species, as well as a number of wetland plants, mammals, birds, fish, reptiles, and amphibians. Cornwall swamp is home to some rare plants such as ram's head, showy and yellow lady's slipper, thin-flowered sedge, lily -leaved twayblade, green adder's mouth, eastern Jacobs ladder, swamp fly-honeysuckle, cuckoo flower, and false cyperus.¹⁷ Cornwall Swamp and other swamps on Otter Creek provide continuous habitat blocks, extensive riparian forests, and accommodate the areas natural flooding cycles. Cornwall Swamp is also a very important deer wintering area.

Snake Mountain

Snake Mountain is a prominent feature in the Champlain Valley, jutting up from the surrounding level countryside, and reaching an elevation of 1,287 feet. It is also a popular recreational/hiking destination. Most of the mountain is covered by northern hardwoods. However, there are several other forest communities which result in a great diversity of plants and wildlife. From the summit there are excellent views of the Champlain Valley and the Adirondack Mountains. Peregrine falcons, migrating raptors, and other rare plants and animals find habitat on Snake Mountain. Snake Mountain is also a very important deer wintering area.

Dead Creek

Dead Creek Wildlife Management Area is a State managed wetlands complex and associated forests and agricultural fields (3000 acres). Dead Creek is identified by Vermont Audubon as one of 17 "Important Bird Areas" (IBAs) in the State. It is a breeding location for state endangered species and a migratory stopover. Important species found at Dead Creek include; the endangered Osprey and Upland Sandpiper, the threatened Black Tern, Snow and Canada Goose, Grasshopper Sparrow and numerous shorebirds.

Little Otter Creek

Little Otter Creek Wildlife Management Area in Ferrisburgh is primarily a wetland with associated riparian (river) and lacustrine (lake) habitats. The creek itself is a lowland river with three major branches. Near the mouth, the river's water level is naturally regulated by Lake Champlain, creating a rich diversity of aquatic plants. There is also Clay plain forest found in the Little Otter Creek WMA. Little Otter Creek is identified by Vermont Audubon

¹⁷ *Cornwall Swamp Wildlife Management Area*, VT Fish and Wildlife, accessed online



as one of 17 “Important Bird Areas” (IBAs) in the State. It is a breeding location for state endangered and threatened species and marshbirds. Important species include; endangered Osprey, American and Least Bittern and American Coot.

Grasslands

Vermont's grassland habitats occur primarily in the Champlain Valley, with many in Addison County. Most of these grasslands are associated with current or past agricultural practices. The majority of Vermont's grasslands are in private ownership, although the state and federal government own small areas of this habitat.

Since a probable historic high during the agricultural boom of the 1800s, populations of grassland birds have declined substantially in Vermont, primarily as a result of habitat loss. Habitat loss has resulted from forest succession after farm abandonment, changes in current agriculture practices, and residential, commercial, and industrial development. Other potential threats include the extensive use of agricultural pesticides and changes in wintering habitats outside of Vermont.

A number of bird species rely on grassland habitat for their survival. Other mammal, and invertebrate species use grasslands as well. These species vary in their habitat requirements, but in general, they require open lands dominated by grasses, sedges, and broadleaf herbs with little or no woody vegetation.

Actively managed landscapes play a critical role in the persistence of these species in light of the loss of natural grasslands. Maintaining managed grasslands, where possible and appropriate, in a manner compatible with grassland bird nesting is currently considered the most effective strategy for grassland bird conservation in the Northeast.

Source: <http://www.vtfishandwildlife.com/>

Wetlands

Wetland functions are defined as a process or series of processes that take place within a wetland. These include the storage of water, transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have value for the wetland itself, for surrounding ecosystems, and for people. Not all wetlands perform all functions nor do they perform all functions equally well. The location and size of a wetland may determine what functions it will perform. The Cornwall Swamp Wildlife Management Area itself is over 1,566 acres.

Perhaps wetlands are best known for their habitat functions, which are the functions that benefit wildlife. They provide food, water, and shelter for fish, birds, and mammals, and they serve as a breeding ground and nursery for numerous species. Many endangered plant and animal species are dependent on wetland habitats for their survival. Hydrologic functions are those related to the quantity of water that enters, is stored in, or leaves a wetland. These



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functions include such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions include the trapping of sediment, pollution control, and the biochemical processes that take place as water enters, is stored in, or leaves a wetland. Wetlands in Addison County provide habitat for a wide variety of vertebrate and invertebrate species. Dead Creek Waterfowl Area is an example of the important stopover sites for migrating shorebirds, ducks and geese. Wetlands along streams provide good habitat linkage between large forested blocks.

If something has "value," then it is worthwhile, beneficial, or desirable. The value of a wetland lies in the benefits that it provides to the environment or to people, something that is not easily measured. Wetlands can have ecological, social, or economic values. Wetland products that have an economic value, such as commercial fish or timber, can be assigned a monetary value. Wetland value, however, goes beyond money.

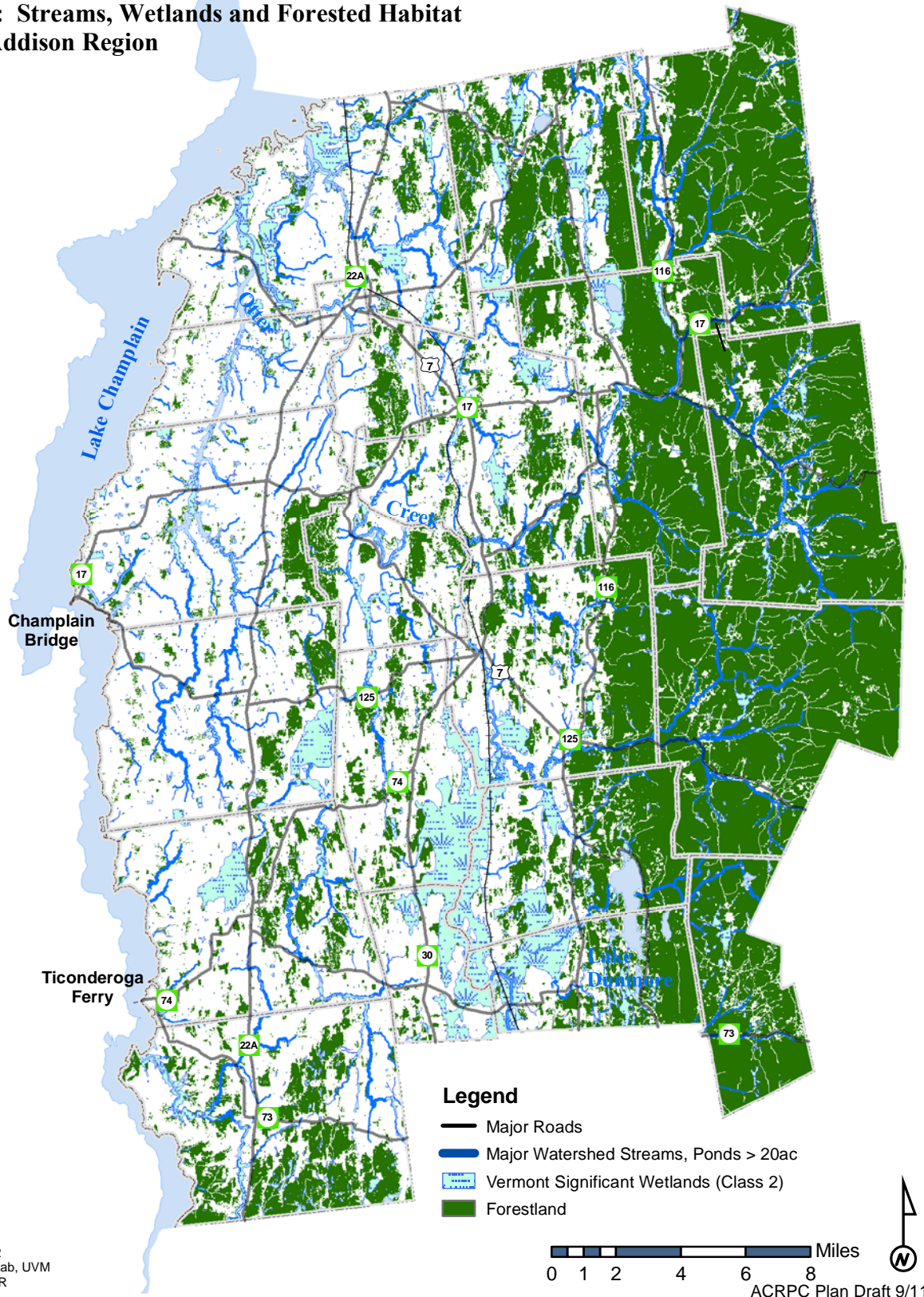
Many wetland areas in Addison County have been altered to support land development or agriculture. This is a concern because wetlands serve an array of critical environmental functions. Protecting existing wetlands and restoring the functions of altered wetlands will maintain habitat for species that depend on these areas to live and enhance the other wetland functions as well. Several existing USDA/NRCS programs (WHIP, EQIP) provide funding to restore wetlands. Landowners may be compensated for some of their production loss.

Source: <http://water.usgs.gov/nwsum/WSP2425/functions.html>

[see Surface and Groundwater Resources for additional information. p.12]



**Map 4-3: Streams, Wetlands and Forested Habitat
in the Addison Region**



SOURCES:
Land Cover, 2002
Spatial Analysis Lab, UVM
Wetlands, VT ANR



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Clay Plain Forest

Addison County is home to the majority of clayplain forest in the state. The word "clayplain" is shortened from clay-soil lake plain—the landform on which the forest grows. Since so much of the valley was cleared for agriculture, very little clay plain forest remains.

Although it has at times been called oak-hickory forest, many species of trees grow in the clayplain forest—more species than in any other forest type in northern New England. Plant species in the forest are adapted to grow in the fertile, but poorly drained, calcium rich clay soils that are common in the Champlain Valley. The forest contains a long list of forest tree species, including shagbark hickory; white, bur, swamp, white and red oaks; sugar, red and silver maples, and all three of the local ashes (white, black and green), as well as American elm, basswood and beech.

The clayplain forest is also home to a great diversity of shrubs and herbs, a number of which are rare or uncommon and some that occur in Vermont only in the clayplain forest. The great diversity is due to high fertility, a moderate climate and a patchy mosaic of wet depressions—small and large—scattered within the forest.

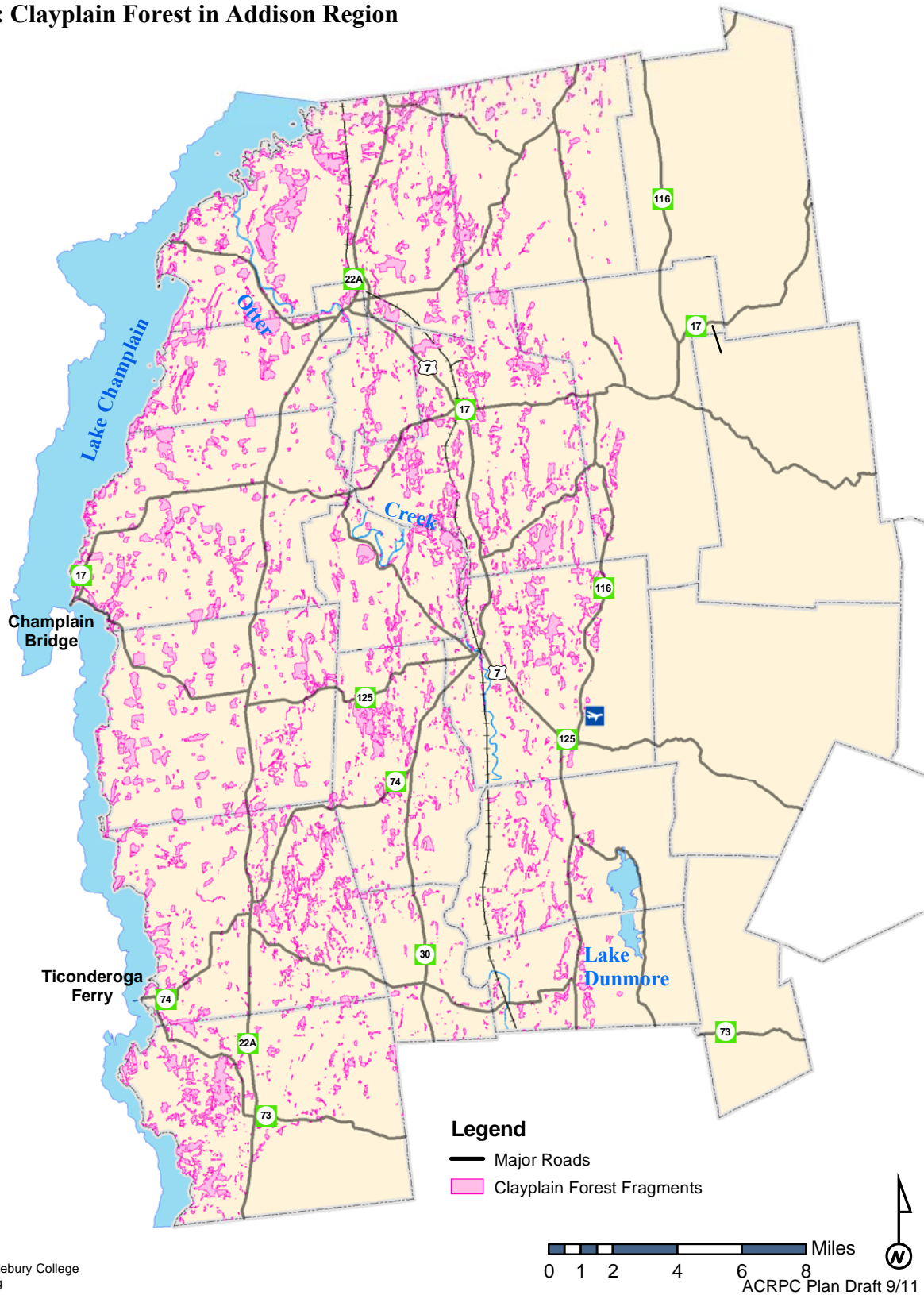
Clayplain forest is great wildlife habitat too. The plentiful food, including large nut crops, the proximity to water and wetlands, the moderate climate, and the landscape diversity featuring rocky hills such as Snake and Buck mountains, provide abundance for mammals, amphibians, reptiles, birds and insects. While many animals do spend all or part of their annual cycles on the clayplain, because of the small size of the remaining forest fragments many species that likely once thrived are rare visitors or breed unsuccessfully.

Due to the fragmented condition of the forest, restoration efforts are focused on encouraging buffers to existing forest cores, enhancing connections between forest tracts, and revegetating riparian zones. Restoration encompasses many activities including planting native trees and shrubs, stopping mowing and patiently allowing natural succession to occur, fencing, and controlling invasive exotics.

Source: <http://www.clayplain.org/>



Map 4-4: Clayplain Forest in Addison Region



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Fisheries

Fisheries include lakes, ponds, rivers, streams and wetlands. Colder, faster moving or deeper waters provide habitat for brown and brook trout, while warmer waters are home to small and large mouth bass, pike, pickerel, and yellow perch. Natural erosion often causes bank over-hangs with fallen trees which create cool, deep pools for fish. Temperature increases caused by sustained low water flows and/or by removal of shade from over hanging vegetation over a significant portion of stream bank or shoreline can have long-term effects on the species living in the streams or ponds. Vegetation with its associated insect life also provides food sources.

Another enemy of fisheries habitat is silt. Silt covers spawning beds, impeding or eliminating the oxygen exchange to the eggs from free flowing water. Silt also interferes with the oxygen exchange through the gills of adult fish.

Eutrophication, the aging of water bodies, can be artificially accelerated by siltation and by nutrient enrichment from runoff. Water characteristics changed by eutrophication may no longer sustain fish species that were once present. Toxic contaminants entering watercourses may also reduce the ability of fish to survive.

Acceptable Management Practices (AMP's) for maintaining water quality in agricultural and forestry in Vermont were written as one technique to reduce siltation in water bodies.

INDIVIDUAL SPECIES LEVEL

Certain species that might not be captured through landscape or community-level approaches require special attention. Individual species deserving special attention within the region are detailed below.

Deer

Vermont deer live near the northern limit of the white-tailed deer range for the eastern United States. The animals require specific winter habitat and severe winter weather threatens their survival. Deer wintering areas consist of two habitat components. The core area is frequently made up of softwood tree species. Cover from these softwoods provides reduced snow depths, reduced wind, and higher average daily temperatures. The second habitat component consists of mixed hardwood and softwood trees near the core areas, which provide browse for the deer. Biologists consider the physical evidence of over-wintering animals, such as trails, browsing or bark scarring, and droppings, the most reliable indicator of deer wintering areas. Stem damage and bark scarring are particularly important signs because they can be visible to the trained eye for twenty years. The goals of the VT Fish and Wildlife Department are to perpetuate shelter for deer, maintain the mobility of and access of animals throughout all non-regenerating sections of wintering area, and provide preferred,



accessible browse for the deer. Snake Mountain and Cornwall Swamp are two very important deer wintering areas for Addison County and are critical to the survival of deer.

Coyote

The Eastern coyote is not a Vermont native but moved eastward from west of the Mississippi and first appeared in Vermont in the late 1940's. It is generally larger than its western ancestor because it gained size by breeding with Eastern wolves in southern Canada before it moved into our area. Our resulting Eastern coyote has evolved with the coyote's adaptability in being able to live close to people and eat a variety of foods while its larger size enables it to survive in our deep-snow winters. The coyote diet consists of fruits and berries as well as many species of small mammals and birds. Today, the coyote is well established in Vermont, playing an important role in Vermont's ecosystems. Coyotes are density dependent breeders. As the number of coyotes in an area decreases, their reproductive rates increase. It has also populated states to the east and south as well as eastern Canadian provinces. Conservation of the coyote is important to maintaining ecosystem integrity because of the vital role they play as predators. Coyotes are also a renewable natural resource and the utilization of these animals is appropriate as long as their population remains viable.

Bobcat and Lynx

Two "wildcats" are found in Vermont, the Eastern Bobcat and the Canada Lynx. These cats are different species and each has a very different population status in Vermont. The eastern bobcat is still common throughout most of the state, even though it is rarely seen. The main reasons for the lack of bobcat sightings are twofold; it is solitary by nature and it is crepuscular, or mostly active at dawn and dusk. The Canada lynx on the other hand, is nearly extinct in Vermont, if it occurs at all, and is on Vermont's Endangered Species list. It requires large tracts of deep, fluffy snow with abundant snowshoe hare populations in order to compete with the more adaptable bobcat.

The eastern bobcat can be found in a variety of habitats including coniferous forests, bogs or swamps, and partially forested mountain areas. Particularly in the northeast, rocky ledges are important features to its habitat, as courtship rituals and denning often occur around them. For foraging, the preferred habitat is semi open areas to forested swamps. Recently logged areas and farms often provide food and cover for the bobcat's prey species. The bobcat frequently chooses rock features for a den site but may also use a stump or thicket.

It is difficult to estimate the current size of the bobcat population in Vermont. However, recent work is being done through a cooperative effort between the Vermont Fish &

Wildlife Department and the University of Vermont to further ascertain information on Vermont's bobcat population.



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To enhance the quality of this habitat, a range of cover types should be available and should include rocky cliffs, optimum habitat for common prey species, and preferably with early to mid successional species. Emphasis is placed on providing connections or corridors between areas of core habitat with feeding areas.

Bear

Bear production areas in Addison Region are located in the Green Mountains in the towns of Starksboro, Lincoln, Bristol, Middlebury, Ripton, Salisbury, Goshen and Leicester. In Addison County seasonal habitat is located abutting and to the west of bear production habitat areas in the towns of Starksboro, Monkton, Bristol, Lincoln, Salisbury, and Middlebury. Within the bear production areas are located "critical habitat" areas. Critical habitat for black bear can include bear scarred beech stands, wetlands and travel corridors within the broader mapped categories of production, or seasonal habitat. Efforts should be made to work with landowners when critical habitat areas are identified. Positive incentives could then be provided to encourage landowners to include these areas in their land management plans.

Indiana Bat

Vermont is at the edge of the Indiana Bat's normal range, but because the bat's normal range is being converted to other uses, Vermont area's provide some of the best quality habitat available, despite the fact that it's at the edge of the species' natural range. The Indiana Bat is not doing well elsewhere and the citizens of Addison County have the opportunity to maintain the species and its habitat. Leaving shagbark hickory, where the bats like to roost, and prohibiting cutting in the surrounding areas, will benefit the species. Restoration of the clayplain forest would also benefit the Indiana Bat.

Amphibians

Salisbury and Monkton are well aware of their salamander populations, which are likely greater in density here in Addison County than elsewhere in the state. Addison County has the potential to positively impact the population with improvements to road crossings, such as tunnels or culverts. "Culverts can help animals to move across roads by providing passage under the road. But when they are too small and have no dry ground to travel on, few animals will use them. In addition, improperly sized or placed culverts can prevent the movement of fish and other aquatic organisms that were able to move freely before."¹⁸ The Vermont Fish and Wildlife Department continues to work with VTRANS on these crossing issues.

¹⁸ *Conserving Vermont's Natural Heritage*, Vermont Fish and Wildlife Department, Waterbury, VT 2004. p.20.



Birds

Vermont hosts a wide variety of bird species that depend on an array of habitats. Forest, wetland, grassland, and cliff areas are some of the habitats essential to maintaining healthy bird populations. The large wetland complexes of the Otter Creek watershed, particularly Dead Creek, provide habitat for migratory bird populations. Over 200 species of birds have been sighted on Dead Creek WMA. Our forests also provide important habitat and breeding ground for birds.

Breeding bird surveys have shown that the forests of Vermont and Northern New England are a globally important resource for birds throughout the hemisphere. The presence of neo-tropical migratory birds is evidence of the fact that our forests are home to the highest concentration of bird species breeding in the continental United States.

The Atlantic Northern Forest of Vermont, New Hampshire, Maine and New York provide breeding habitat to dozens of bird species like the Black-throated Blue Warbler, Canada Warbler, Wood Thrush and the Bicknell's Thrush. These species and dozens more have in some cases 90% of their global population breeding in this region. Many of these birds are seeing long-term declines that may be indicating larger ecosystem problems.

Action should be taken to conserve birds in the core of their population range. The advantage to this approach is that low-cost stewardship activities, education and monitoring can help maintain or increase the populations of these birds. It is also important to remember that Vermont's Forests don't end at our border and the birds they support migrate thousands of miles each year.

Grassland birds in Vermont include Henslow's Sparrow and Sedge Wren, both endangered species; Upland Sandpiper and Grasshopper Sparrow, both state-threatened species; Vesper Sparrow, an uncommon breeder in Vermont; and Savannah Sparrow, Bobolink, and Eastern Meadowlark, considered common but with declining populations.

Hawks and Peregrine falcons also find homes in Addison County. Bristol Cliffs, Snake Mountain, and Rattlesnake Cliffs above Lake Dunmore all serve as peregrine nesting areas.

Source: <http://vt.audubon.org/>



LANDOWNER AND MUNICIPAL RESOURCES

Municipal Conservation Commissions and Private Organizations

Municipal Conservation Commissions are often charged with identifying and assessing important species and habitat areas in town plans. The Vermont Fish and Wildlife Department and the Planning Commission can assist in this work. In addition, private organizations such as the Lewis Creek Association work to identify large contiguous blocks and potential corridors for connectivity on a regional basis. While there is disagreement as to how to best model and identify priority habitat areas, there is general consensus that managing large blocks of undeveloped land will be beneficial to our native plants and wildlife. Regional habitat information and prioritization strategies should be disseminated to and considered by towns in their town planning and zoning activities. Such information can help municipalities target areas for conservation through purchase or other conservation arrangements.

Vermont Natural Heritage Program

The Vermont Nongame and Natural Heritage Program (NNHP), is part of the Vermont Fish and Wildlife Department's Wildlife Division. The focus of NNHP is to inventory, manage, and conserve Vermont's nongame wildlife (vertebrates and invertebrates), native plants, and natural communities. This includes collection, management and dissemination of up-to-date information about rare species and significant natural communities in support of planning, management and protection efforts. Staff frequently work with landowners, government agencies and the public to provide technical assistance on a wide range of natural resource questions. The Natural Heritage Program maintains a database of the observed locations of rare, threatened, and endangered species and fragile areas.¹⁹ Specific species and parcel information is available upon request.

Landowner Incentive Program

The Landowner Incentive Program (LIP) helps landowners by providing funding to protect and restore habitats on private lands to benefit at-risk species and natural communities. Species-at-risk includes any wildlife or plant identified by the State as in need of conservation. In Vermont, these include rare, threatened and endangered plants and animals. Eligible natural communities include all exemplary natural communities tracked by the Vermont Fish and Wildlife Department's Nongame and Natural Heritage Program. LIP offers a variety of tools to landowners for conservation, which includes funds to purchase conservation easements. Working in coordination with landowners, conservations commissions, land trusts and other partners, state biologists can design each project to best suit the needs of individual landowners, their land, and the biodiversity present.

¹⁹ http://www.vtfishandwildlife.com/wildlife_nongame.cfm Last accessed October, 2010



Vermont Coverts

Vermont Coverts was established to demonstrate that well-planned forest management could enhance wildlife habitat and provide timber benefits as well. The two can go hand in hand. The goal of Vermont Coverts is to help woodland owners become aware that sound forest management includes much more than timber, pulp, and firewood production.

Initiated by the University of Vermont Extension Forester in 1985 and originally funded by the [Ruffed Grouse Society](#), Vermont Coverts has grown since then as an organization of forestland owners and others committed to sound forest management that enhances and protects wildlife habitat. Over the years, Coverts management practices may have benefited over 157,000 acres of Vermont forests.

Source: <http://www.vtcoverts.org/>

Wetland Restoration Program

The goal of the Wetlands Protection and Restoration Program (WPRP) is to help protect the water quality of Lake Champlain through the restoration and protection of wetlands. The WPRP is a voluntary program designed to provide financial and technical assistance to landowners for restoring and protecting wetlands. Landowner benefits of the WPRP include financial incentives, such as payment for the purchase of the wetland portion of a property, payment for wetland easements, payment for incorporating the wetland into an existing easement, and fully funded wetland design and implementation. Some additional landowner benefits are the creation of wildlife habitat and enhanced recreational opportunities.

Wildlife Habitat Incentive Program (WHIP)

Through WHIP, the USDA-Natural Resource Conservation Service and the Vermont Fish and Wildlife Department can provide technical and financial assistance to private landowners interested in enhancing wildlife habitat in Vermont. WHIP priorities include restoration of riparian corridors, wetland enhancement, grassland management, early successional & “old field” habitat improvement, targeted essential habitats, and threatened and endangered species habitat improvement.

Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program (EQIP) was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill) to provide a voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land.



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EQIP activities are carried out according to an environmental quality incentives program plan of operations developed in conjunction with the producer that identifies the appropriate conservation practice or practices to address the resource concerns. The practices are subject to NRCS technical standards adapted for local conditions.

In Vermont, EQIP is offering incentives for grassland bird conservation.



4.5 SCENIC RESOURCES

A. SUMMARY

For over 200 years, family farms have shaped the Addison Region's landscape into distinctive patterns. The agricultural landscape, checkered by open meadows and forests, characterizes the Region. Panoramas of open fields interspersed with wooded areas and glimpses of the lake, rising to a middle ground of hill land against the backdrop of the Green Mountains, are common in the Region.

The changes in the landscape which occur seasonally as the result of both the productive use of the land and the natural progression of seasons add to the beauty and variety of the landscape.

The rural pattern of villages and small industrial towns within an agricultural or forest setting established in the late 18th century has remained mostly intact to this day. The scale of structures and the size of settlements are part of the composite picture. Development, both historic and modern, is generally small-scale and fits into, rather than dominating, the landscape. The scale is human and comfortable, even welcoming, especially when compared to the scale of development in the larger cities located in close proximity to the Region and the State.

Visitors come to the Region because of its welcoming atmosphere, its sense of community, its retention of a nostalgic charm from an earlier era, and the beauty of the mix of the natural and man-made environment.

This landscape has been maintained by long-term family ownership and stewardship of the land, profitable agriculture and forestry, and frugality. However, the land use pattern is changing with the growth of the small communities and the loss of many family farms. Residential subdivisions housing commuters to Burlington and Rutland are becoming more common. The traditional land use pattern is being pressured by economic forces which can alter the landscape. Telecommunication towers and alternative energy facilities are new elements of the landscape that don't have a historic context. Evaluating the visual and scenic changes that result from potential development is difficult and complex. The landscape changes in mostly a slow cumulative way and land owners are hesitant to judge other resident's endeavors.

This section will describe the goals and policies of the Region as they pertain to evaluating scenic resources and recommending actions to ensure the comfortable working landscape of the present is maintained into the future.



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B. SCENIC RESOURCE GOALS

- A) Maintain the existing character of the region by encouraging agriculture and forestry activities as a part of the working landscape and similarly encourage commercial and industrial activities to locate within existing business centers.**

To meet this Goal it is our Objective to:

- a) Keep agricultural land and forested lands in profitable and productive use to maintain a critical part of the Region's scenic resources.
- b) Discourage strip development along regionally significant roadways due to its conflicts with traditional settlement patterns and safety issues associated with ingress and egress. Encourage development within or adjacent to existing mixed-use areas which utilize land efficiently and preserves existing visual resources.

- B) Development in areas of high scenic value due to scenic views or historic significance should minimize adverse impact on views and areas of historic significance.**

To meet this Goal it is our Objective to:

- a) Encourage the use of materials, architectural styles, color schemes, lighting fixture, building mass, scale and other design elements to promote aesthetic compatibility with surrounding uses to avoid adverse visual impacts.
- b) Encourage PUD's and clustered development to preserve views.
- c) Encourage siting of new buildings in settings which preserve the scenic quality of lakeshores and ridgelines.



C) Support the development of alternative energy sources and an efficient telecommunication network when such facilities do not have adverse environmental or aesthetic impacts.

To meet this Goal it is our Objective to:

- a) To support full regional coverage of telecommunication and broadband coverage in the region.
- b) Minimize the impacts of alternative energy producing plants through careful siting based on a thorough analysis.
- c) Address potential impacts at an appropriate scale and with significant public input.

D) Preserve the nighttime ambiance and aesthetic qualities of downtowns and villages by illuminating them for safety and convenience while enhancing the best qualities of streets, architecture, and public spaces. Minimize the undesirable impacts of excessive lighting in rural as well as village settings.

To meet this Goal it is our Objective to:

- a) Encourage outdoor lighting installations that use only the amount of lighting necessary for a given task.
- b) Reduce reflected light or sky-glow from surfaces into the nighttime sky.
- c) Minimize the use of electricity to achieve desired illumination.



C. SCENIC RESOURCES RECOMMENDED ACTIONS

- 1) Encourage participation in a program with serious withdrawal penalties that reduces the tax burden on agricultural and forest land owners who follow sustainable land use practices and are not holding their land for speculation to reduce costs related to maintaining a working landscape (i.e. such as the Use Value Appraisal Program).
- 2) Recommend siting roads and buildings along hedgerows where possible to keep meadows, agricultural land and views open.
- 3) Encourage the use of plantings to soften building edges, direct views and reduce run-off in parking lots.
- 4) Support village and downtown designation efforts designed to provide financial incentives that support historic preservation and mixed use including affordable housing.
- 5) Encourage communities to identify areas of high scenic value through an inclusive public process.
- 6) Arrange workshops on identification of scenic landscapes and the siting of telecommunication and alternative energy facilities with company representatives, towns and other interested parties.
- 7) Ensure that new telecommunication or wind energy towers conduct proper siting analyses that address wildlife habitat, soil conditions and impacts on agricultural and forestry resources
- 8) Encourage co-location of communication equipment on existing poles and towers to minimize additional sites.
- 9) Locate utility poles and lines in areas lower than the principle view, require plantings to shield properties from visual impact. Line burial should be considered when feasible.
- 10) Encourage lighting plans and designers to address sky-glow and energy efficiency in all development proposals.
- 11) Encourage municipalities to consider the lighting guidelines set forth in “*Outdoor Lighting Manual for Vermont Municipalities*” in their zoning bylaws.



D. SCENIC RESOURCES DOCUMENTATION & ANALYSIS

It is easy to wax poetic about the Region's scenic values. It is not so easy to understand the particular forces which have worked and continue to work to maintain scenic resources. Major factors in past maintenance of the landscape seem to be long-term family ownership and stewardship of the land, continuing profitable agricultural and forestry production and a basic orientation towards frugality. The public commitment to the value of the scenic resource can be traced to the late 1960s with the passage of Vermont's anti-billboard legislation. This legislation was strongly endorsed by the Vermont Hotel and Motel Association which recognized the direct economic relationship between visual resources inherent in the landscape and a growing tourism sector. A past Governor's Commission on the Economic Future of Vermont summarized; "we consider Vermont's environment to be the goose that lays golden eggs" More recently, in 2004, The National Trust for Historic Preservation listed Vermont as an 'endangered' place in part due to the impact of development on the scenic quality.

Much has been written about preserving scenic vistas. Viewsheds and rating systems are set forth in great detail, but very few scenic protection programs are actually implemented. Part of the reason for lack of implementation is the complexity of many of these systems. Another major reason is the inherent subjectivity and the arbitrariness of any process that attempts to define for the general public what is and what is not scenic beauty. Many residents of the Region also feel that protection of scenic resources is not necessary at this time since the Region has abundant scenic resources and limited development pressures. Small town planning commissions look at the time and work required to set up a system, shake their heads, and say, "later, maybe". The advent of computer programs, which can visually simulate potential effects on viewsheds, may make viewshed models more usable and understandable to citizens, landowners and commissioners. While few town plans have established specific scenic overlay districts, all town plans have reinforced the desire to maintain the rural character of the landscape.

Next we need to decide exactly what creates the landscape, which parts are the most important to maintain, and methods which we can use to do this. Many of the following concepts are taken from a publication of the Vermont Agency of Natural Resources titled "*Vermont's Scenic Landscapes: A Guide for Growth and Protection*". The book recommends the following steps: Describe the resource, Identify the sensitivities, and Prescribe the Protections as a clear community standard.

Scenic landscape can be comprised of villages, urban centers, working landscapes or distant views. Their relative scenic value is dependent on characteristics which make some landscapes more scenic than others.

- (1) Landscape diversity and spatial contrast - a combination of scenic elements which together enhances visual quality, including:
- (a) topographic variation;
 - (b) mixture of open meadows and woodlands;



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- (c) water;
- (d) distant views; and
- (e) mixture of vegetative types.

- (2) Extent of Order or Harmony in the Manmade Landscape - Landscapes that contain a sense of order or logic are visually pleasing. The cultural landscape that is represented by haphazard development becomes indistinguishable and often chaotic. Order is influenced by the following:
 - (a) scale of building;
 - (b) pattern of buildings; and
 - (c) architectural similarities in form, size, or other factors.
- (3) Focal Dominance – A natural focal point may be a distant mountain, or a church steeple in a village. They can also disrupt a landscape as well.
- (4) Intactness/Uniqueness - Landscapes that have retained traditional patterns or forms or have absorbed modern development with minimal disruption are unique and are more likely to contribute to the scenic quality of an area.

The following is a list of considerations for review:

Unique or Prominent Landscapes

Such areas are generally accepted as areas of scenic significance and should be addressed in any review.:

- (1) shore lands immediate to public lakes, rivers, or ponds;
- (2) areas immediately adjacent to scenic corridors;
- (3) prominent ridgelines, mountain tops, or excessively steep slopes that can be readily viewed from public corridors;
- (4) exceptional agricultural and historic areas, recognized as outstanding resource values;
- (5) areas within or immediately adjacent to natural areas (i.e. wetlands) designated by the State; and
- (6) areas of high scenic quality which are publicly recognized as exceptionally.

Ridgelines or Mountain Tops

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



Highly Scenic Areas with Distant Views

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

Scenic Working Agricultural Land

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

Scenic Areas Highly Visible from a Public Corridor

Where land development or subdivision is proposed in scenic areas highly visible from a public corridor, design plans should work toward the goal of minimizing the adverse visual impacts often associated with large-scale box-like buildings and/or large lot parking areas. To accomplish this, structures, buildings and other site improvements should be planned so that building form, massing, and other features are compatible with dominant patterns of the area or site and in ways that reduce the apparent scale of the project on the site. Design planners are requested to break large parking areas into smaller lots with ample landscaping or screening from off-site views, and to locate the project on the less scenic areas of the site. Prominent grade changes that starkly contrast with existing or surrounding contours should be discouraged.

Built Environments with Scenic Value

Where land development or subdivision is proposed within or adjacent to a built environment noted for its exceptional scenic value, including historic sites or areas



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recognized by the State of Vermont or municipalities, design plans should work toward the goal of minimizing contrast with the exceptional resource and to enhance visual quality. To accomplish this, project planners are encouraged to site buildings and structures that are compatible with the scale, massing, texture, or otherwise respect the pattern of nearby structures. Plans that promote large box-like structures which sharply contrast with existing scenic resource values are not recommended, particularly where the composition of the overall project is highly visible from public viewpoints.

Industrial or Commercial Developments in Areas of Scenic Value

Where single purpose developments such as industrial or office parks, or shopping centers are proposed in areas of exceptional scenic value, design plans should work toward a goal which reflects the traditional settlement pattern and characteristics of the area. To accomplish this, project planners must design the site so the development does not appear to be grossly out of scale with its surroundings. It must not extend or enlarge existing patterns of development that are deemed unacceptable (e.g. strip development). Design solutions should respect location and design of the project to minimize visual intrusion on the most valuable scenic attributes of the site. They should respect the natural contours of the land, utilize, where necessary, landscaping which harmonizes with existing vegetation to create project buffers and screening of buildings, and to encourage pedestrian access and internal circulation.

ACT 250 Review

Review of Act 250 projects includes a review of protection of scenic resources under Criterion 8. Criterion 8 reads (before granting a permit, the board or district commission shall find that the subdivision or development):

(8) will not have an undue adverse effect on the scenic or natural beauty of the area, aesthetics, historic sites or rare and irreplaceable natural areas (24 VSA § 6086(a)(8).

Prior to 1985 the meaning of this statute had been interpreted in various ways. In 1985 the Environmental Board issued a decision on a Quechee Lakes project that has become the standard for review of Criterion 8 decisions. There are two stages to the process:

- (1) Are the impacts of a proposed development adverse?
- (2) If adverse, are they undue?

Meaning that any one of the following is true:

- (a) The project violates a clear written community standard intended to preserve the scenic or natural beauty of an area.
- (b) The projects impacts are shocking and offensive to the average person.



(c) The applicant has failed to take generally available mitigating steps to improve the compatibility of the project with its surroundings.

There are many project reviews that have involved the use of the Quechee analysis. These reviews become quite detailed with several experts testifying on the quality of visual resources. Generally, a good practice is to follow the recommendation noted earlier: Describe the resource, Identify the sensitivities, and Prescribe the Protections as a clear community standard.



4.6 AIR QUALITY

A. SUMMARY

The climate change crisis may represent the most important and comprehensive global challenge of our lifetime. At the same time, however, it is a wake-up call and can serve as an opportunity to rethink and redesign our practices, technologies, businesses, and services in a manner that can simultaneously be viable, sustainable, and inspirational. Indeed, Vermont can make an enormous difference and serve as a model for the region, nation, and the world. Vermont is well-positioned to be at the leading edge of identifying and designing solutions to a pressing and complex array of local and global challenges, while at the same time building a new “green economy” that will serve the best interests of our state and its citizens. Because of our commitment to innovation, entrepreneurship, and the value of Vermont’s natural resources and working landscape, the Governor’s Commission on Climate Change is convinced that Vermont can lead the way. However, we must devise mechanisms to deploy our passion for innovation and our collective intellectual resources to advance the common good”.²⁰

There is no question that the air quality in Vermont and the Addison Region is better than many places. It is a major component of the quality of life and health in the area. The low population density and lack of pollution causing industry has a lot to do with the excellent air quality. However, regional haze and pollutants are transported from western and mid-western coal fired electricity generating power plants. Most locally generated air pollution and greenhouse gas emissions are a result of automobile traffic, point source industrial emissions and wood burning activities.

Discussions about transportation, energy production, incineration, and other issues should consider the effect upon the production of such gases and the incremental impact upon the region’s air quality. Increases in carbon dioxide (CO₂) emissions, primarily as a result of combustion of fossil fuels, are considered by many to be a leading cause of the buildup of greenhouse gases in the atmosphere. Greenhouse gases are believed to warm the atmosphere by allowing sunlight to reach the surface of the earth, but acting as an insulator that prevents some heat from escaping the earth’s atmosphere. Forest growth naturally stores, or “sequesters”, carbon and the carbon remains in the wood after it is processed into a product. Activities that increase the biomass accumulation in a forest or in forest products increase carbon sequestration. As climate change and potential regulations to curb its impact grow in importance to policy makers, business leaders are considering forest growth as an inexpensive way to mitigate atmospheric carbon. Forest managers may be able to receive financial benefit, in effect selling another product off of their land, and thus increasing the economic viability of sustainable forest management in the Northeast.

²⁰ *Report of the Governor’s Commission on Climate Change*, Montpelier, Vermont, October, 2007.



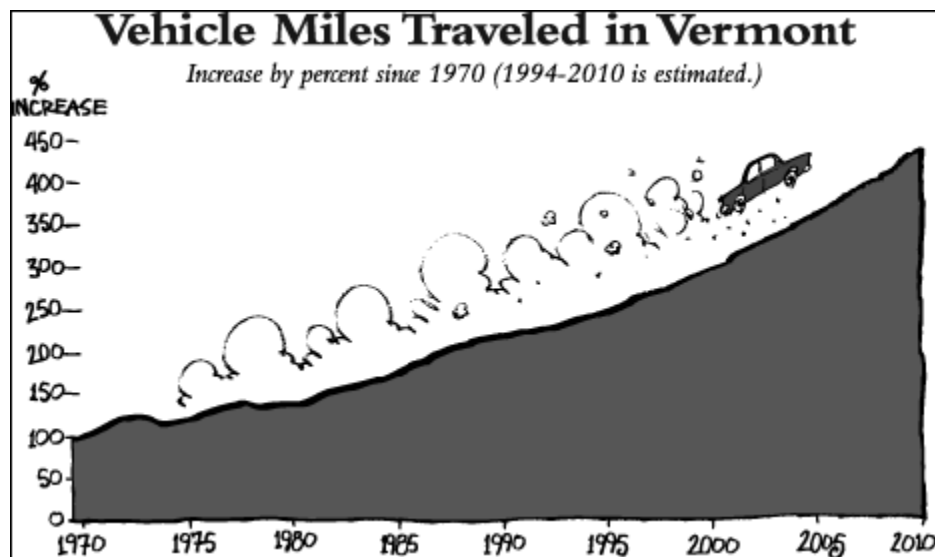
Motor vehicles are the largest source of toxic and carcinogenic air pollutants in Vermont. Each year, motor vehicles emit about 2 million pounds of toxic and carcinogenic compounds like benzene, formaldehyde, and 1,3-Butadiene. In addition, annually motor vehicles emit approximately

234 million pounds of carbon monoxide,
20 million pounds of hydro-carbons,
and 28 million pounds of nitrogen oxides.

Motor vehicles are the largest source (about 65%) of ozone-forming pollutants in Vermont. Transportation also represents the largest source of Vermont's greenhouse gas emissions (57 percent) and is the largest user of energy by sector (33 percent). As industries have reduced their emissions, motor vehicles have become an increasing portion of the air pollution created in Vermont.²¹

Motor vehicles now travel over 6 billion miles annually in Vermont, double the amount traveled in 1972. Vehicles miles traveled dipped in 2008 due to the recession, but the first half of 2009 shows a return to historic trends.

Figure 4: VMT Miles in Vermont



The average Vermont driver puts 17,000 miles a year on his/her car. This equals 935 pounds of carbon monoxide, 13,600 pounds of carbon dioxide, 114 pounds of hydrocarbons, and 68 pounds of nitrogen oxides emitted every year. That's nearly 7.5 tons of air pollution each year, from just one vehicle!²²

²¹ The Vermont Transportation Energy Report, VT Clean Cities Coalition, Aug, 2009

²² Air Pollution from Motor Vehicles in Vermont [brochure], VT Agency of Natural Resources, Sept 1998



Understanding Vermont's transportation energy use is critical to tackling the challenges presented by global climate change, dependence on foreign oil, future energy demands, public health and the implications for accessibility and mobility.

Limiting CO₂ through various regulations and initiatives was the subject of the Governor's Commission on Climate Change in 2007. Subsequent to the Commission's report state agencies adopted action/implementation items and policies to reduce CO₂ emissions.

As the lead agency for transportation issues the Agency of Transportation has established policies in three general categories.

- a) identify ways to reduce the number of vehicles miles traveled (VMT) and
- b) encourage the use of more efficient vehicles and
- c) increase the efficiency of the transportation system.



B. GOALS AND OBJECTIVES

GOALS

- A. Maintain and improve the existing air quality characteristics of the Addison Region airshed and encourage the improvement of air quality in up-wind regions.**

To meet this Goal it is our Objective to:

- d) Encourage the use of best-available technology for all emission sources within the airshed, including residential emission sources.
- e) Encourage energy efficiency, resource conservation and possible conversions to cleaner fuels.
- f) Encourage consideration of particulate matter and ozone-depleting substance risk in the permitting and siting of new industrial facilities.
- g) Reduce Greenhouse Gas (GHG) emissions from transportation and residential/commercial fuel use.

- B. Clean air is essential to a healthy population and a high quality of life. The tourism portion of Vermont's economy depends in large part on the visibility of scenic vistas. The region supports local and regional land use planning efforts that are directed towards maintaining or exceeding EPA and State air quality standards.**

To meet this Goal it is our Objective to:

- h) Encourage the integration of transportation and land use planning by local and regional planners.
- i) Support improvements in public transit systems and transit-oriented development.
- j) Encourage developments in downtowns and villages that is bicycle and pedestrian friendly.
- k) Encourage developments and commercial endeavors that reduce vehicle-miles-travelled (VMT) through employer based incentive programs.



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E) Air emissions should be considered in an integrated, multi-pollutant approach and collaboration with in-state entities is essential.

To meet this Goal it is our Objective to:

- a) Educate and provide public awareness of air quality issues.
- b) Work with state and regional entities to identify localized air quality impacts.
- c) Support the maintenance and expansion of the regional air quality monitoring network.

F) Emission reduction programs or activities should be optimized to ensure that they are made in a fair, just and cost-effective manner and are based on the best available science.

To meet this Goal it is our Objective to:

- a) Include public health as a element in cost/benefit analyses when considering best available technology for pollution reductions.
- b) Ensure that Greenhouse gas (GHG) emissions and other pollutant models allow open review and revisions when new data is available.



C. RECOMMENDED ACTIONS

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plan, as issues or opportunities arise, to move towards accomplishing objectives and meeting the goals outlined above.

1) Air quality should be monitored in the region as part of broader statewide effort so as to determine current and potential threats to air quality. Potential impact areas include village centers or other areas of traffic congestion and high elevations, where pollutants and acidic levels are potentially greater and more harmful to fragile vegetation.

2) Haze in Vermont is primarily caused by manmade pollutants but may be exacerbated by wood heating combustion. The plan encourages residents to replace or retrofit heating appliances that do not meet current State certification. The regions visibility goals must be designed both to improve visibility on the haziest days and to ensure that no degradation occurs on the clearest days.

3) Encourage woody debris from site clearing or forestry operations to be chipped, land-filled in acceptable areas, or left on site instead of being burned in order to reduce pollution and to enable this material to contribute to soil formation.

4) The Regional Commission should be prepared to comment upon projects outside the region which may potentially impact upon air quality within the Addison Region.

5) Encourage efficient and 'green' technology to reduce particulate emissions from combustion sources. This includes alternative energy sources such as solar, wind and farm methane.

6) Support Addison County Transit Resources by undertaking a Park & Ride Study to determine the most effective locations for future Park & Ride lots.

7) Consider the relative locations of jobs and households when reviewing development proposals. Encourage mixed-use developments incorporating commercial and residential uses in village centers and downtowns.

8) Encourage Act 250 applicants to consider public transit stops and workforce scheduling in development proposals with sufficient employees.



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D. DOCUMENTATION & ANALYSIS

There are three drivers to air quality regulation and monitoring; the Federal Clean Air Act, Vermont's Air Pollution Control Act, and climate change regulations addressing greenhouse gases. Greenhouse gas (GHG) emissions have recently been recognized as a hazard and the Environmental Protection Administration has new authority to regulate these emissions.

Clean Air Act

Under the Clean Air Act of 1970, EPA implements a variety of programs under the Clean Air Act that focus on:

- reducing outdoor, or ambient, concentrations of air pollutants that cause smog, haze, acid rain, and other problems;
- reducing emissions of toxic air pollutants that are known to, or are suspected of, causing cancer or other serious health effects; and
- phasing out production and use of chemicals that destroy stratospheric ozone.

EPA developed primary and secondary National Ambient Air Quality Standards (NAAQS) for each of the seven criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, fine particulate matter, and sulfur dioxide. These standards establish pollution levels in the United States that cannot legally be exceeded during a specified time period. EPA referenced monitoring devices, placed at suspected locations of high concentrations, measure specific airborne pollutants to determine if a standard will be exceeded.

Primary standards are designed to protect human health, including "sensitive" populations, such as people with asthma and emphysema, children, and senior citizens. Primary standards were designed for the immediate protection of public health, with an adequate margin of safety, regardless of cost.

Secondary standards are designed to protect public welfare, including soils, water, crops, vegetation, buildings, property, animals, wildlife, weather, visibility, and other economic, aesthetic, and ecological values, as well as personal comfort and well-being. Secondary standards were established to protect the public from known or anticipated effects of air pollution.

EPA has also published regulations covering toxic emissions from a wide range of industrial categories, including chemical plants, incinerators, dry cleaners, and manufacturers of wood furniture. These regulations mostly apply to large, so-called "major" sources and also to some smaller sources known as "area" sources. In most cases, EPA does not prescribe a specific control technology, but sets a performance level based on a technology or other practices already used by the better-controlled and lower emitting sources in an industry. EPA works to develop regulations that give companies as much flexibility as possible in deciding how they reduce their toxic air emissions-as long as the companies meet the levels required in the regulations.



Vermont has adopted state air quality regulations. These Vermont Air Pollution Control Regulations were established to achieve and maintain such levels of air quality as will protect human health and safety, and to the greatest degree practicable, prevent injury to plant and animal life and property, foster the comfort and convenience of the people, promote the economic and social development of this state and facilitate the enjoyment of the natural attractions of this state. Hazardous air contaminants are regulated through Vermont's hazardous ambient air standards (HAAS)

Criteria Pollutants

Criteria air pollutants were selected by EPA based on extensive scientific research showing the direct relationship between exposure to pollutants and their short- and long-term effects on human health and the environment.

Between 1900 and 1970, national emissions of these criteria air pollutants increased with rapid industrial development and population growth. With careful monitoring, control strategies, and increased public awareness, total combined emissions of these criteria pollutants decreased between 1970 and 1995, even though America's gross domestic product, population, and total vehicle miles traveled increased significantly. Despite these improvements in air quality, nearly 80 million people still live in areas where air quality levels exceed the national standards for at least one of the criteria pollutants.

a. Carbon Monoxide(CO)

Nature and Sources of the Pollutant:

Carbon monoxide is a colorless, odorless, poisonous gas that is released into the air when carbon in fuels doesn't burn completely. It comes from vehicle emissions, factories, industrial boilers, house furnaces, and almost anywhere petroleum, wood or coal fuel is consumed. Nationally, highway exhaust from cars contributes almost 60 percent of all carbon monoxide emissions. In major cities, where more people drive more often, cars account for 95 percent of all carbon monoxide emissions. Concentrations of carbon monoxide in the air are highest in winter when automobile "cold starts" contribute to incomplete combustion and winter inversions keep carbon monoxide closer to the ground. Carbon monoxide is very stable, remaining in the atmosphere for two to four months.

Health and Environmental Effects:

Carbon monoxide becomes dangerous when people inhale excessive amounts in the air. Carbon monoxide enters the bloodstream and reduces the amount of oxygen that reaches vital tissues and organs, creating a number of possible health problems. The health threat from exposure to carbon monoxide is most serious for people who suffer from cardiovascular disease. Healthy people are also affected, but it takes more carbon monoxide to affect them. Exposure to high carbon monoxide levels can cause loss of eyesight, poor reflexes, diminished learning ability, difficulty in performing complex tasks, and all-around



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sluggishness. High enough concentrations of carbon monoxide absorbed into the bloodstream can also lead to death.

b. Lead(Pb)

Nature and Sources of the Pollutant:

Naturally occurring lead in our atmosphere is basically harmless. However, in some areas of the country, there are unnaturally high concentrations of lead in the air, soil, and water from human-induced sources. The highest concentrations of lead are found near metal smelters (other than iron smelters) and battery plants. Vehicle exhaust was also a major source of lead before federal regulations reduced the amount of lead allowed in fuels by 90 percent in 1986. In 1995, federal regulations eliminated lead from fuel completely. As a direct result of using unleaded gasoline in vehicles, average lead concentrations in urban air nationally decreased 78 percent between 1986 and 1995, while total lead emissions decreased 32 percent.

Health and Environmental Effects:

People become exposed to lead by breathing air with high lead concentrations or by ingesting food, water, paint, soil, or dust containing lead. Children are especially susceptible to lead poisoning because it takes smaller amounts to damage their bodies than it does for adults, and children are more likely to put dirt, paint chips, and other lead-based materials in their mouths. Once lead is in the body, it accumulates in the blood, bones, and soft tissue, causing damage to the kidneys, liver, and central nervous system. Low doses of lead in children can cause central nervous system damage and slowed growth. Excessive exposure can result in anemia, kidney disease, reproductive disorders, and neurological problems such as seizures, mental retardation, and/or behavioral disorders. Recent studies have also indicated that lead may contribute to high blood pressure and heart disease in middle-aged white males and osteoporosis in post-menopausal women.

c. Nitrogen Dioxide

Nature and Sources of the Pollutant:

Nitrogen dioxide belongs to a family of gases called nitrogen oxides(NO_x). Burning fuel at high temperatures in motor vehicles, electric utilities, and industrial boilers releases nitrogen dioxide into the air. Average nitrogen dioxide concentrations across the country in 1995 were 14 percent lower than in 1986, and 1995 was the fourth year in a row that all monitoring stations across the country met the federal nitrogen dioxide air quality standard.

Health and Environmental Effects:

Prolonged exposure to nitrogen dioxide can irritate the lungs and lower a person's resistance to respiratory infections such as influenza. Continued exposure to high concentrations of nitrogen dioxide may result in a greater number of acute respiratory illnesses in children.

The brownish gas reacts with moisture in the air to form nitric acid, which can corrode buildings and monuments, and toxic organic nitrates, which contribute to acid rain and the



acidification of lakes, rivers, and streams. Nitrogen dioxide also plays a major role in producing ground-level ozone, or smog.

d. Ozone(O₃)

Nature and Sources of the Pollutant:

Ground-level ozone (the primary ingredient in smog) is unique among the criteria pollutants because it is not released directly into the atmosphere. Nitrogen oxides and volatile organic compounds (VOC) are gases that are released into the air through gasoline vapors; chemical solvents; fossil fuel combustion; consumer products such as paint and coatings, solvents and degreasers, and glues or adhesives; and industrial facilities. Forest ecosystems also release significant quantities of VOCs. Once in the air, these gases react with sunlight to form ozone.

These photochemical reactions often occur hundreds of miles from where the VOCs and nitrogen oxides are released, making ozone a very difficult pollutant to control. Peak ozone concentrations generally occur during hot, stagnant conditions in the summer during late afternoon.

Health and Environmental Effects:

High concentrations of ground-level ozone are a major human and environmental health concern. Scientific evidence indicates that ground-level ozone affects not only people with impaired respiratory systems (such as asthmatics), but also healthy adults and children. Ozone causes irritation, congestion, and swelling in the lungs, along with symptoms such as coughing and chest pain. Experiments have shown that repeated exposure to high levels of ozone for several months or more can produce permanent structural damage in the lungs. High ozone concentrations also cause damage to the leaves of plants, resulting in the loss of agricultural crop yields and forest ecosystems. Many of the chemicals that cause ground-level ozone also contribute to other health effects, including cancer, and tissue and organ damage.

Ozone has the same chemical structure whether it occurs high above the earth or at ground level and can be good or bad depending on its location in the atmosphere. The earth's atmosphere is composed of several layers--ozone occurs in two of them: the troposphere and the stratosphere.

The layer surrounding the earth's surface, and extending about 7-10 miles up, is the troposphere. Here, ground-level or "bad" ozone damages health, vegetation, and many common materials.

Above the troposphere, the stratosphere extends up to 30 miles above the earth's surface. This layer contains "good" ozone that protects life on earth from the harmful ultraviolet rays emitted by the sun. When the ozone layer thins, more ultraviolet light reaches earth, causing cancer, cataracts, impaired immune systems, and destruction of plants.



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Ozone occurs naturally in the stratosphere and is produced and destroyed at a constant rate. This "good" ozone is gradually being destroyed by chemicals such as chlorofluorocarbons (CFCs), halons and other ozone-depleting agents used in coolants, foaming agents, fire extinguishers, solvents, and aerosols.

These materials break down in the stratosphere to form chlorine and bromine molecules. One chlorine or bromine molecule can destroy 100,000 ozone molecules, so ozone is currently being destroyed much more quickly than nature can replace it. It sometimes takes these ozone-depleting chemicals years to reach the stratosphere. Substances released into the air today will contribute to ozone destruction well into the future.

Preserve the Ozone Layer

- Make sure that technicians working on your car air conditioner, home air conditioner, or refrigerator are certified by an EPA-approved program to recover the refrigerant (this is required by law).
- Have your car and home air conditioner units and refrigerator checked for leaks. Repair leaky air conditioning units before refilling them.
- Contact local authorities to properly dispose of refrigeration or air conditioning equipment.

e. Particulate Matter(PM-10 and PM-2.5)

The size of particulate matter suspended in the air ranges from less than 0.1 micron (micrometer) in diameter up to 50 microns. Each micron measures approximately 0.0004 inch, or one-seventh the width of a human hair. Particles larger than 50 microns in diameter are too heavy to stay suspended in the air for long periods—they fall very close to their source before people can inhale dangerous amounts. Particles less than 2.5 microns in diameter, which are easily inhaled deep within the lung system, have the greatest effect on human health. Burning processes are the most common sources of particulate matter—fly ash (from power plants), carbon black (from automobiles and diesel engines), and soot (from slash burning, forest fires, fireplaces, and wood stoves). Particles between 2.5 and 10 microns are usually associated with fugitive dust from wind-blown sand and dirt from roadways, fields, and construction sites.

Health and Environmental Effects:

In 1987, EPA tightened the earlier, more general particulate standard with a new standard to target smaller, more harmful particles with a diameter of 10 microns or less (PM-10). In 1997, EPA added an air quality standard for particles with a diameter of 2.5 microns or less (PM-2.5). The smaller PM-2.5 particles, often referred to as "fine particulates," are easily inhaled and can cause tissue damage, emphysema, bronchitis, and cardiovascular complications. Children, seniors, and individuals with pre-existing respiratory diseases are most susceptible to these health risks. Any secondary particulate formation is a major cause of reduced visibility and can produce acid rain.



f. Sulfur Dioxide(SO₂)

Nature and Sources of the Pollutant:

Sulfur dioxide, a colorless, non-flammable, non-explosive gas, belongs to a family of gases called sulfur oxides (SO_x). High-temperature burning processes like smelting, oil refining, and power generation create sulfur dioxide when they burn sulfur-containing fuels, such as coals, natural gases, and oils.

Health and Environmental Effects:

Illnesses associated with exposure to high concentrations of sulfur dioxide include chronic lung diseases such as bronchitis and emphysema. Children, seniors, and people with asthma are most susceptible to adverse health effects associated with exposure to sulfur dioxide. Sulfur oxides also contribute to acid rain, acidification of lakes and streams, accelerated corrosion of buildings and monuments, and reduced visibility.

Regional Ambient Air Quality Concerns

Air pollution that lingers in the atmosphere for long periods of time can be transported great distances. As a result, many pollutants cause regional problems far from their emission sources. These regional problems include impaired visibility, acid rain, and smoke from open and prescribed burning.

Visibility

Nature and Sources of the Pollutant:

Airborne particulate matter, which includes solid particles as well as liquids and gases, is the main ingredient in haze. Haze impairs visibility because the fine particles within the airborne particulate matter scatter and absorb light, limiting the ability to see distant objects. Some particles, such as sulfates and nitrates, become larger as humidity in the air increases, resulting in even more haze and reduced visibility. Weather conditions can also cause chemical reactions between air pollutants, creating fine particles that remain in the air for several days. As a result, particles transported from urban and industrial areas may contribute to poor visibility in national parks and other wilderness regions.

The eastern United States has poorer visibility than the western part of the country due to generally higher humidity levels and a greater number of independent sources that emit particulate matter. Visibility in the eastern United States should be approximately 90 miles, but regional haze has reduced it to between 15 and 25 miles. In the western United States, visibility should be about 140 miles, but is currently closer to 35 to 90 miles due to regional haze.²³ Visibility varies seasonally and is generally worse during the summer months, when humidity is higher and the air is stagnant.

²³ *Introduction to Visibility* William C. Malm, Air Resources Division, National Park Service May, 1999. <http://www.epa.gov/visibility/what.html> Last accessed March 22, 2011.



Health and Environmental Effects:

Particulate matter in haze the size of PM-10 or PM-2.5 is small enough to easily be inhaled by humans. Once inhaled, the particles lodge in the lungs, where they can cause severe health problems. Poor visibility may also damper people's enjoyment of national parks, wilderness areas, and the spectacular vistas these places offer.

Vermont has recently submitted a revised State Implementation Plan (SIP) concerning Regional Haze to the EPA²⁴

Open Burning

Nature and Sources of the Pollutant:

Prescribed burning is often used as a tool in forest and range management to increase habitat for wildlife, improve cattle range, dispose of crop residue, control pests and disease, and reduce wildfire hazards. Both open and prescribed burning release numerous air pollutants into the atmosphere, including particulate matter in the form of smoke.

Residential wood burning devices (wood stoves, fireplaces, pellet stoves, outdoor wood-fired boilers) are also major contributors to particulate emissions. Outdoor Wood –Fired Boilers (OWB) are regulated in Vermont under the Air Pollution Control Regulations. Outdoor Wood-fired Boilers are controversial because they tend to cause dense smoke that impacts neighbors. OWB tend to operate with frequent on/off oxygen cycles which produce poor combustion and heavy smoke. Green or cold wood is also frequently used which also produces poorer combustion. Manufacturers must submit their boilers for Vermont state certification. A list of certified Outdoor Wood-fired Boilers is available at <http://www.vtwoodsmoke.org/certified.html>.

Health and Environmental Effects:

The major health effects from burning are similar to the effects of particulate matter emissions. Particulate matter that is generated by open and prescribed burning is predominantly PM-2.5, which people can easily inhale. A study by the New York State Attorney General's office found that the average emissions from Outdoor Wood-fired Boilers's during laboratory testing was approximately 10 times the particulate emission rate of indoor woodstoves.²⁵

²⁴ Vermont State Implementation Plan (SIP) Revision, Regional Haze, VT DEC, January , 2009)

²⁵ Outdoor Wood-fired Boilers Factsheet, VT ANR Air Pollution Control Division, Feb, 2006.



Prevention of Significant Deterioration/New Source Review

The Clean Air Act requires that all new and modified stationary sources of air pollution obtain a preconstruction permit. This New Source Review permitting process is required in both nonattainment areas, where national ambient air standards have been exceeded, as well as attainment and unclassified areas, where air quality is currently acceptable. In nonattainment areas, these permits are called Nonattainment Area Permits. Permits in attainment or unclassified areas are called Prevention of Significant Deterioration (PSD) permits. EPA has identified three basic goals of the PSD regulations:

- to ensure that economic growth will occur in harmony with the preservation of existing clean air resources;
- to protect the public health and welfare from any adverse effects that might occur, even when air pollution levels are better than state and national standards; and
- to preserve, protect, and enhance the air quality in areas of natural, recreational, scenic, or historic value, such as national parks and wilderness areas.

New and modified pollution sources under PSD review must show that they have the Best Available Control Technology (BACT). These sources must also conduct an ambient air quality analysis to show that they will meet all air quality standards. The permitting process further requires a review of air quality effects on soils, vegetation, and visibility. New and modified sources may not adversely affect any area designated as Class I that include national parks, some tribal reservations, and wilderness areas. Public participation is also required as a part of the permitting process.

Regulations for new or modified sources in nonattainment areas are designed to ensure emissions are controlled to the greatest degree possible to keep their impacts below significant levels and to proceed toward achieving state and national standards. Sources in nonattainment areas must demonstrate that the Lowest Achievable Emission Rates (LAER) of the violating pollutants will be achieved without economic considerations. Sources must also show that these emissions will be offset by reductions of the same pollutant from other sources in the nonattainment area.

Nonattainment Areas

States have to develop State Implementation Plans (SIPs) that outline how each state will control air pollution under the Clean Air Act. Areas are classed as being 'in-attainment' or 'non-attainment' with the standards. Areas that violate federal air quality standards are designated nonattainment areas. EPA declares each area nonattainment for a specific pollutant such as carbon monoxide, particulate matter, etc. Nonattainment areas for different pollutants may overlap each other or share common boundaries. SIP's must address how 'non-attainment' areas are to be brought into conformity.

Vermont is close to non-attainment concerning the hazardous chemical benzene (primarily from automotive exhaust) ozone and particulate matter (PM). If Vermont were to



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reach non-attainment status a comprehensive plan would need to be developed to address these pollutants.

Vermont Air Pollution Control Act

The Vermont Air Pollution Control Division (APCD) regulates air quality to protect public health and the environment. Air monitoring data is required by regulation and is used to determine compliance with the Environmental Protection Agency's (EPA) national ambient air quality standards (NAAQS)⁽¹⁾, and Vermont's hazardous ambient air standards (HAAS)⁽²⁾. Other important uses of the of air monitoring data includes, the production of a daily Air Quality Index (AQI) report, daily air quality forecast report, support of short and long-term health risk assessments, and tracking long-term trends in air quality.

Air pollution is created by many anthropogenic sources, such as cars, trucks, buses, factories, power plants, as well as, natural sources such as forest fires, volcanoes, and wind storms. The pollution emanating from these sources can be local or transported from great distances. Control strategies and equipment applied to industry greatly reduced the particulate, CO, SO₂, and NO₂ emitted into the ambient air. The phase-out of leaded gasoline produced reductions in ambient air lead concentrations. New automobiles are now equipped with emission controls and catalytic converters which greatly reduced ambient air concentrations of nitrogen dioxide (NO₂), carbon monoxide (CO) and volatile organic compounds (VOC's). Through other regional, national, and global control strategies, pollutants such as ozone and particulate matter concentrations in Vermont are continuing to be reduced. New air pollution control technologies and strategies are expected to provide further reductions of air pollutants in the future. Ambient air monitoring is valuable activity, which is essential for state environmental planning, enforcement efforts, trends analysis, and more recently providing timely air quality health particulate (TSP).

At the current time, the Vermont APCD operates and maintains five permanent air monitoring stations. Vermont established a monitoring network for criteria pollutants in the 1970's and a network for toxic air pollutants in 1985. Currently, the APCD monitors for 6 criteria pollutants and 94 toxic pollutants. All current air monitoring sites meet the federal requirements for siting. The criteria pollutant monitoring methods are established with EPA compliant instruments.



HISTORY OF TDF TRIALS AT TICONDEROGA:

INTERNATIONAL PAPER IN

In September of 1997 IP conducted a very limited trial burn of crumb rubber in the Power boiler at the Ticonderoga mill. A total of 4 tons of tire crumb rubber was burned over a period of two days. Other than the continuous emission monitors for carbon monoxide, nitrogen oxides and sulfur dioxide no stack emission testing was conducted. Ash samples from the bottom ash and multiclone (prior to the wet scrubber) were collected and analyzed.

In September of 2003 International Paper Company (IP) submitted a request to the State of New York Department of Environmental Conservation (NYDEC) for approval to conduct a test burn of tire-derived-fuel in their Power Boiler. The Power Boiler is an 855 million BTU per hour boiler that burns predominantly No.6 fuel oil but also has solid fuel burning capability for burning wood/bark waste generated at the mill. IP proposed to burn shredded tires (95% of the metal wire removed) up to a maximum rate of 3 tons per hour which is approximately 10% of the total capacity of the Power Boiler. The test burn was to take place over a period of up to 30 days and would include stack emission testing both during burning with tire-derived-fuel and without in order to obtain comparative emission data that would be used in support of a potential future permit application for permanent approval. The tire-derived-fuel is intended to displace No.6 fuel oil usage and lower the mill's energy costs.

On January 26, 2004 the NYDEC determined that a formal application to amend the existing Title V Air Permit was required. One year later on February 1, 2005 IP filed the Title V amendment application with the NYDEC. The NYDEC determined the application to be incomplete on March 10, 2005. IP subsequently addressed the deficiencies in the initial application and resubmitted it July 6, 2005. On August 18, 2005 the Agency hosted a public informational meeting to enable the public to hear from and ask question of International Paper and opposition groups regarding the tire burning issue. On October 12, 2005 the NYDEC issued a "Draft" Title V Air Permit to the International Paper Company approving the test burn of tire-derived-fuel at their Ticonderoga, NY mill. The NYDEC held their official public hearings to take comments on the draft permit on November 9, 2005 and November 30, 2005 at the Ticonderoga Armory Community Center located at 123 Champlain Avenue in Ticonderoga, N.Y. In order to facilitate public input on the draft permit from Vermont citizens, the Vermont Agency of Natural Resources (Agency) also held a public meeting to take comment on the draft permit from those unable to attend the NYDEC meeting or who preferred to make their comments at this meeting instead. The meeting was held on Tuesday November 15, 2005 at the Middlebury Union Middle School located at 48 Deerfield Lane in Middlebury, Vermont. The Agency transcribed the proceedings of the meeting and submitted it to the NYDEC as part of the public record. The State of Vermont also submitted its own comments on the "Draft" permit to the NYDEC on December 23, 2005.

On July 27, 2006 the NYDEC issued the "Proposed" permit to the US EPA Region II for their 45 day review period. The US EPA did not object to the permit. The NYDEC then issued a final permit to IP on September 20, 2006 approving the trial burn. A copy of the



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final permit can be found below as well as on the NYDEC website at:
www.dec.state.ny.us/website/dardata/boss/afs/issued_atv.htm

International Paper subsequently conducted the trial burn November 6, 2006 through November 14, 2006. International Paper decided to end the trial prior to conducting the extensive stack emission testing that was scheduled for the second week of the trial due to higher than expected particulate emissions observed during the first week.



4.7 MINERAL & EARTH RESOURCES

A. SUMMARY

*Vermont does not give up its geology easily. The once lofty and grandiose Appalachians have been modified by millions of years of erosion and extensive reshaping by great mile-thick ice sheets over the last tens of thousands of years. Therefore, glimpses of Vermont's early geologic history come from the scattered outcrops on mountain tops, in stream valleys, and in hummock pasture lands that offer insights to a remarkable geologic history and a rich diversity of geologic settings and landscapes.*²⁶

The Vermont landscape varies along elongated north-south belts following the general trend of the Appalachian Mountains, which extend from Newfoundland to Georgia. On the northwestern edge of Vermont is the low-lying Champlain Valley, which is characterized by the rolling hills and gently tilted strata on the Vermont side of Lake Champlain. The Champlain Valley is interrupted to the south by a large mass of older rocks comprising the Taconic Mountains, an important part of Vermont geologic history and host to quarries producing some of the world's highest quality slate. A central spine of rocks defines the Green Mountains which are underlain by metamorphosed sediments. These rocks host Vermont's high quality talc and asbestos deposits.

Marine deposits on the Vermont landscape are beach or tidal-flat sandstones which are exposed occasionally as in the Monkton Quartzite. Kaolinite was mined in Monkton from these deposits. Chronologically, these deposits were followed by carbonate limestones developed from shallow warm seas. Quarries produce dimensional stone as well as crushed rock from these limestone deposits. White marble limestone deposits are present in Middlebury. The OMYA quarry in Middlebury uses finely-crushed marble for many products including anti-acids, toothpaste and acid-free paper from these rocks. Shales and slate rocks formed from deeper marine mud sediments in more recent geologic time when Vermont was overlain with deep marine sediments.

More recent geologic history developed the sand and gravel deposits. Advancing and retreating ice sheets over a mile-high scoured the rocky landscape. Erosional debris from glacial melting left gravel deposits that are now being used for road building and construction material. These deposits are mainly at the base of the Green Mountains in the mountain communities of the Addison Region.

²⁶ *The Geology of Vermont*, Barry Doolan, in Rocks and Minerals, Vermont Issue, 1996.



Granite, marble, slate, talc, verde antique, soapstone, schist, sand and gravel, crushed limestone, dolomite and quartzite are all products of Vermont. In 2003, the estimated non-fuel mineral production for Vermont was \$73 million ([USGS Mineral Industry Survey](#)) as compared with nearly \$53 million in 1993. In 2001, Vermont ranked nationally 4th in dimension stone production by tonnage, third in production of granite, second in production of marble and first in production of slate ([USGS Mineral Industry Surveys, Dimension Stone, 2001](#)). In 2003, Vermont remained ranked nationally 4th in dimension stone production by tonnage (98,000 metric tons).

Vermont quarries produce some of the best dimensional stone, but the products require a high price to manufacturer and overall costs are higher than in other parts of the world. Dimensional stone quarrying has been declining, however crushed stone quarries have increased.

While earth resource extraction is a significant industry in Vermont, the Addison Region resource industry is primarily the OMYA marble quarry and natural aggregates such as sand, gravel and crushed stone. Even with limited earth resources, several issues are prominent with regard to their development.

LOCATION OF RESOURCES/CONFLICTING USES Mineral resources are not evenly distributed in the region. The majority of sand and gravel resources are located in the western foothills of the Green Mountains. This is also where the most plentiful groundwater resources are located. While these are conflicting uses, extraction can occur as long as the water resource is protected.

UNEVEN DISTRIBUTION OF RESOURCES The uneven distribution of sand & gravel resources leads to truck traffic impacts in some communities. The need for transport also increases the cost of the sand or gravel. Encouragement of local access to sand and gravel resources is desirable. The protection of good deposits for future use is also recommended.

DIFFICULT TO SITE As the county becomes more developed it becomes increasingly difficult to approve new or expanded sand and gravel operations. The main issues raised during land use hearings are mentioned.

SAND, GRAVEL & ZONING Sand & gravel operations are generally reviewed under zoning at the local level as conditional uses. Towns who wish to encourage sand and/or gravel operations should carefully draft their conditional use criteria, and administer them fairly.



B. GOALS AND OBJECTIVES

GOALS

- A) To enable wise utilization of mineral resources with minimum impacts to the environment.**

To meet this Goal it is our Objective to:

- a) Encourage towns which wish to promote sand and gravel operations to make sure that their conditional use standards are clearly written, are administered fairly, and that they balance the interests of the town, the facility owner/operator and of the neighboring landowners.
- b) Encourage any oil or gas exploration activities to disclose chemical composition of any water additives and to model potential impacts on ground water resources and surface water watersheds.

- B) To assure extraction and processing of the mineral resources are appropriately managed.**

To meet this Goal it is our Objective to:

- a) Encourage the development of local sand and gravel resources which might reasonably serve the needs of the region.
- b) Acknowledge there will continue to be a need for sand and gravel in the foreseeable future, which further supports the need to protect good deposits for future use, and to develop any that would decrease transport costs, and wear and tear on the road network.
- c) Encourage appropriate land use that does not limit the future use of mineral resources.
- d) Encourage of progressive reclamation in gravel pit operations.



C. MINERAL & EARTH RESOURCE RECOMMENDED ACTIONS

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plan, as issues or opportunities arise, to move towards accomplishing objectives and meeting the goals outlined above.

- 1) Document and map the existing and potential sand and gravel resources in the region.
- 2) Encourage municipal plans and zoning bylaws to consider future needs for mineral resources.
- 3) Review town plans and zoning bylaws to insure the municipal intent regarding gravel extraction and mineral resources is clear and specific.
- 4) Develop a groundwater resource map layer to overlay on existing and proposed mineral resources and extraction sites.
- 5) To advocate for the consideration of the regional impacts of earth extraction on the local and regional transportation system, particularly when resources are in one community and impacts may be in another.



D. DOCUMENTATION & ANALYSIS

Natural aggregates including sand, gravel and crushed stone are among the most important earth resources. These resources are essential for infrastructure development and maintenance. Sand and gravel are needed by the construction industry for many uses including street and road construction, bricks, tiles concrete and other building materials. Sand and gravel resources are accessed through surface mining activities including the creation of pits and quarries with large earth moving machinery. Mining facilities rely on large trucks to transport their material within their local market, which can add to the potential land use conflicts associated with the quarrying activity itself. Despite the relative abundance of these materials access is complicated due to prevailing settlement patterns and municipal land use regulations. Planning for extraction activities should allow communities to direct operations to less sensitive areas in the community. Aggregate resource areas should be identified and planned for extraction, not conflicting land uses. This forethought will be instrumental in minimizing impacts within the community. Although the Regional Plan recognizes the value of natural aggregates to the future development of the area the Plan also understands the need to minimize the impacts of associated extraction activity. Impacts such as dust, noise, and visual degradation of the landscape are not well received in local communities. Increased cost for road maintenance and construction are an indirect cost of restrictions on extraction activity.

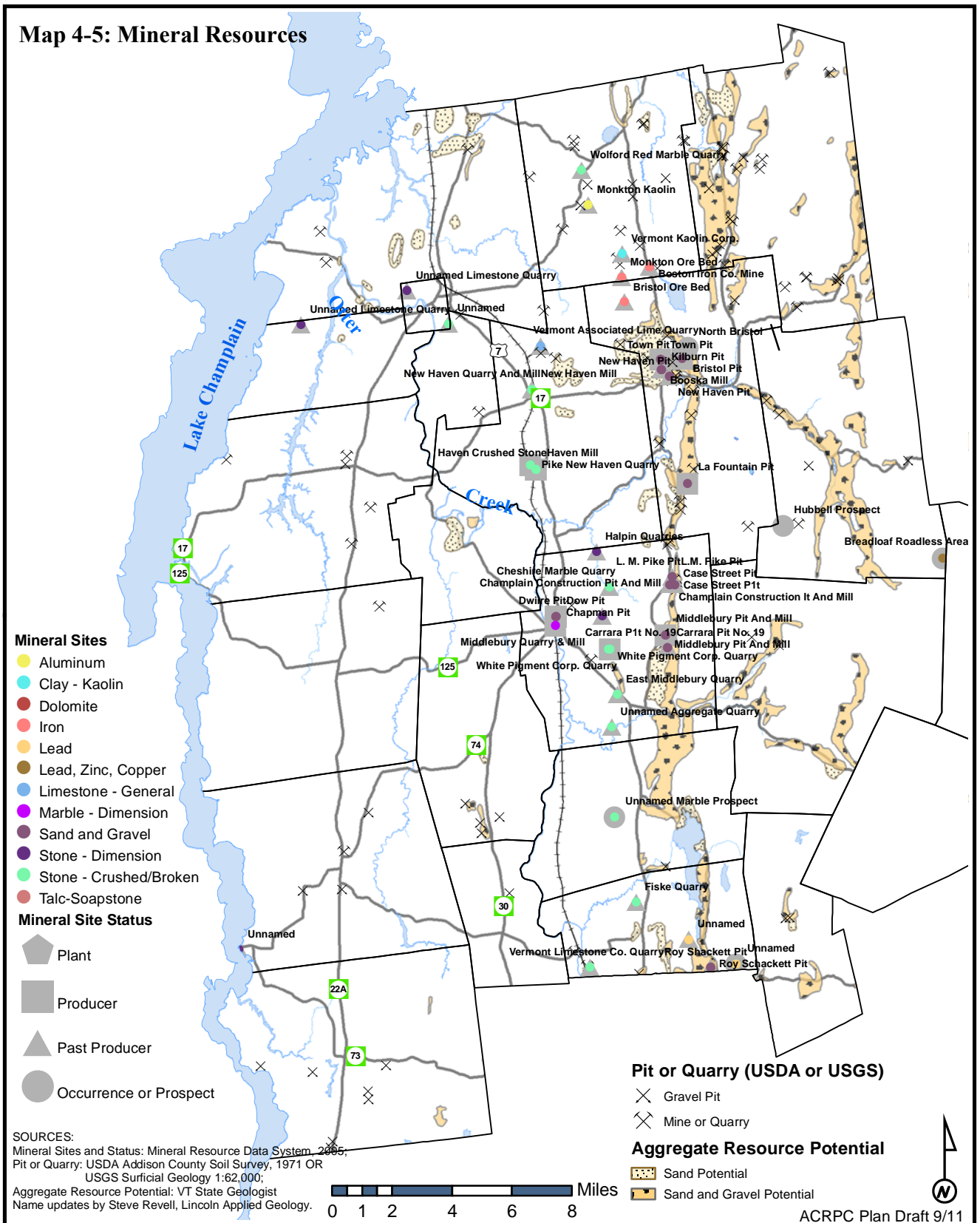
Mineral resources are not particularly plentiful in the Addison Region, nor are they very evenly distributed among towns. The majority of sand and gravel deposits are located east of Route 7 along the foothills of the Green Mountains. The State Geologist has identified potential areas which are good for sand and gravel extraction. Those soils are shown on Map 4-4. That map also indicates existing pits, whether active or inactive. The Mineral Resources Map also shows mineral deposits and extraction sites listed in the federal Mineral Resource Data System (2005). Site names have been updated where information is available.



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Map 4-5: Mineral Resources



A cross-reference of this map with a map depicting potential groundwater resources in the Region (this map is under development, see *Surface and Groundwater Resources* section) would show that the most plentiful groundwater resources in many instances are located under the sand and gravel deposits. This is another example of conflicts in use between two necessary resources. Sand and gravel extraction can occur and still provide protection of the aquifer, provided care is taken with drainage, disposal of gas, oil and other vehicular wastes, and with siltation.

Because of the uneven distribution of sand and gravel resources, there is considerable east-west traffic between towns and the resources, both for town highway use and by private contractors. Middlebury, and to a lesser degree Vergennes, are impacted by gravel truck (as well as other through truck) traffic, since they maintain sections of Route 7 or Route 22-A located within their municipal boundaries. The costs of gravel and sand are higher also because of the transport cost. Therefore, towns are encouraged to develop, or to support development of local sand and gravel resources which might reasonably serve the needs of the town and perhaps a few of its neighbors. In recognition of the unequal distribution of the earth resource and the multi-town transportation impacts, potential areas of significant earth resources have been added to the Regional Significant Resources Map (Map 8-2, *Future Land Use* section).

In addition, recently, the Regional Commission and the Agency of Transportation has collected information on the capacity and available products of sand and gravel quarries region-wide.

Technology changes may decrease the need for sand and gravel in the future. Currently, reclamation of existing pavement and recycled tire chips reduce demand for sand and gravel as a component of construction. However, it seems unlikely that road building and repair will change significantly during this five year planning period, or even in the 10 year planning cycle. Therefore, there will continue to be a need for sand and gravel in the foreseeable future. This further supports the need to protect good deposits for future use and to develop any that would decrease transport costs and wear and tear on the road network. Recent increase in the cost of asphalt and other petroleum products has several towns considering returning to gravel roads. This could increase the need for sand and gravel resources.

Unfortunately, the approval of sand and gravel operations has become increasingly confrontational as more houses are built nearer to operating or potential extraction sites and areas become more urban in orientation.

Noise, dust, drainage, vibration, traffic, groundwater protection (wells, springs), hours of operation and aesthetic concerns are usually the main issues raised in review of a sand and gravel application, either during review at the local level or under Act 250 review.



Vermont's Act 250 includes a project review criterion (9D Earth Resources) that protects land with high potential for the extraction of earth resources. Criterion 9(E), Extraction of Earth Resources, requires an applicant to demonstrate that the extraction or processing operation will not have an unduly harmful impact upon the environment or surrounding land uses. Criterion 9(E) also requires an approved site rehabilitation plan for the future rehabilitation of the site.

Typically an Act 250 application for resource extraction will include the following exhibits and discussion:

- Operational Plan
- Air Pollution Control Permit
- Wetlands Plan
- Refueling Procedures
- Noise Analysis – Blasting and Vibration
- Erosion and Sediment Control – Aquifer Protection and Water Quality
- Stormwater Discharge
- Wildlife Management Plan
- Visual Impact Analysis
- Archeological Review (Phase I)
- Grading and Phasing Plan
- Traffic Analysis
- Statement of Conformance with the Town Plan
- Statement of Conformance with the Regional Plan

While this is an extensive list, it is mostly geared to the protection of other valued resources and doesn't necessarily address several items of importance to the host community. Earth resources in one community may be in a relatively isolated location whereas in another town they may be located adjacent to existing neighborhoods. Towns have a responsibility to require conditions that protect a community's health , safety, and welfare.

Towns usually review sand and gravel applications as conditional uses. Conditional uses allow for review of traffic, the character of the area, the capacity of community facilities and also allow towns to adopt specific standards which include performance standards, parking, landscaping, fencing and other factors. Towns may want to stipulate progressive reclamation and phased extraction with limited acreage open/unvegetated at any time. The object of progressive reclamation is to reclaim an area in stages as soon as the gravel is removed. It is a process that includes final site grading, reapplication of reserved topsoil and the establishment of a vegetative cover after each stage. Towns may also require an escrow account to hold financial guarantee funds until reclamation phases are complete. In addition, Town permits may be issued for a limited time until the community is satisfied that conditional use stipulations are adhered to.



Towns may also require an applicant to address the same issues the State expects; thereby ensuring local concerns are addressed through local control. The same exhibits can be required/shared for each application procedure.

Towns that wish to encourage sand and gravel operations in specific locations should make sure that their conditional use standards are clearly written, are administered fairly, and that they balance the interests of the town, the facility owner/operator and the neighboring landowners.

Recently, in 2010, several towns have had extensive discussion of quarry impacts. The Regional Commission encourages communities to review the agreements, documentation and court cases of proposed earth extraction activities in Bristol and Middlebury.

The USDA Soil Conservation Service has a guidance document, "Vegetating Vermont Sand and Gravel Pits", (1988, revised 2003) which may be helpful to towns when reviewing reclamation plans.

OMYA is noted for its "progressive reclamation" techniques, wherein as the quarries are extended into the countryside, new and sometimes improved farmland replaces the areas that have been quarried. At the Middlebury quarry, approximately 11 acres of agricultural land have been developed, some in areas previously not farmed due to exposed bedrock and poor quality soil. In essence, as quarrying proceeds, waste rock, overburden glacial till and topsoil are stockpiled for use in reclamation. A layer of waste rock is placed over the site followed by a layer of glacial till. Finally topsoil is placed over the site; areas with less than 3:1 slopes are then cultivated, while steeper areas are seeded with conservation mix, limed, fertilized and mulched.²⁷

Sand and Gravel in River/Stream Beds

Under 10 VSA § 1021 gravel extraction of stream beds is generally prohibited. Riparian owners, however, have special rights which allow limited removal, for limited purposes. Gravel removal for flood protection and erosion control are sometimes permitted if approved by the Agency of Natural Resources.

The removal of sand and gravel resources from river and stream beds (water courses) for use primarily for construction or for sale is prohibited by 10 VSA 1021. However, riparian owners are allowed to remove up to 50 cubic yards of gravel annually from above the water line of water courses running through or bordering their property if the gravel is to be used by the riparian owner on his own land. The Agency of Natural Resources must be notified at least 72 hours prior to the removal. ANR guidelines state that gravel removal shall be performed only in a manner which will contribute to long term river system stability.

²⁷ Vermont Geological Survey web page <http://www.anr.state.vt.us/dec/geo/marbleindustry.htm>
Last accessed 5/21/2010



Stability is defined as the morphological condition in which the stream, over time, is able to transport the flow and sediment produced by its watershed in such a manner as to maintain its dimensions, pattern and profile without aggrading or degrading. Recent studies have shown that small watersheds (38.6 mi² or 100 km²) are more sensitive to gravel extraction. Regarding stream type, braided channel systems were found to be the least sensitive while meander and straight channel systems were progressively more sensitive respectively.²⁸

Gravel removal is also permitted for flood protection or erosion control where no reasonable alternative exists if the Agency has reviewed and approved a permit application.

Accepted Agricultural Practices are exempted from permit requirements. However, the in-stream removal of silt build-up from field drain tile outlets is not easily an allowable practice under the current extraction policy. Permits must be requested and stream stability must not be compromised.

Marble in the Addison Region

The Marbleworks in Middlebury is testimony to the historic importance of marble as a mineral resource in the Addison Region. Because of the waterpower from the Otter Creek Falls, marble processing was an important industry in Middlebury. Today, the Foote Street quarry, owned by OMYA, Inc., provides crushed marble for feedstock to the OMYA plant in Rutland County. According to OMYA's 1988 application to amend their quarry land use permit (Permit #9A0107), "exploration has determined ore resources to a depth of 600' below the surface." Trucks haul the crushed material via Foote Street, Schoolhouse Street and Route 7 to the Florence plant in Rutland County.

An Act 250 permit in 1999 limited OMYA to 115 truck trips a day, which is less than the 170 trips the company requested. The limitation was due to concerns over heavy truck traffic through the town of Brandon. Subsequently the Vermont Legislature authorized a study of alternatives to help reduce the truck traffic. An Environmental Impact Statement (EIS) was recently accepted by the Federal Highway Administration (Jan, 2010) that selected a 3.3 mile rail spur route south and west from OMYA's Middlebury quarry to the Vermont Railway main line. The spur would cross under Lower Foote Street and Route 7 using new bridges, then cross at grade level over Halladay Road before connecting to the main rail line. The project also includes a 2,050 ft trestle that would bridge over the Otter Creek and Creek Road

²⁸ *Final Draft Report: Impact Assessment of Instream Management Practices on Channel Morphology*, The Center for Watershed Protection, Aquafor Beech Ltd., & Step by Step, September, 1999 Last accessed from <http://www.anr.state.vt.us/dec/geo/watheda.htm>



and a 2.2 acre loading facility allowing the potential for other area rail shippers to access the main rail line.

Oil and Gas

There are no other large scale economically marketable mineral deposits in the Addison Region at present. There was, in the mid-1980's, considerable interest in oil and gas leases in Vermont, but no producing wells were developed and no wells were drilled in the Addison Region. Natural gas shale development is widespread in New York and in the event that gas or oil shale is proposed for development in the Addison Region, careful consideration of potential adverse impacts including water quality will be undertaken during the permit process. Most concerns are related to water use and management and the composition of the fluids used for fracturing the shale. Hydraulic fracturing consists of pumping a fluid and a propping material such as sand down a well under high pressure to create fractures in gas-bearing rock. The propping material (usually referred to as a "proppant") holds the fractures open, allowing more gas to flow into the well than would naturally. Hydraulic fracturing requires large volumes of water to fracture the rocks and produce the desired amount of gas. Each well may use more than one million gallons of water.

The hydraulic fracturing fluid typically contains compounds added to the water to make the hydraulic fracturing process more effective. These may include a friction reducer, a biocide to prevent the growth of bacteria that would damage the well piping or clog the fractures, a gel to carry the proppant into the fractures, and various other agents to make sure the proppant stays in the fractures and to prevent corrosion of the pipes in the well. The Regional Commission will work with the State to ensure that all necessary safeguards and best practices are followed.²⁹

²⁹New York State Dept of Environmental Conservation,
<http://www.dec.ny.gov/energy/46288.html#Protection> Last Accessed 8/20/2010.



5. ECONOMY

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1.1. Summary

The region's workforce continues to grow with more people commuting out of the region to work, mainly into Chittenden County. Over the next several decades, a significant proportion of the region's workforce will reach retirement age. The education level of the region's workforce has increased over the past 20 years. During the past several decades, social and economic changes have reshaped work and family life in the region with two-income households becoming the norm.

Education, manufacturing, retail trade, agriculture, forestry and construction are the main employment sectors for the region's residents. The region's employment centers – Middlebury, Vergennes and Bristol – are still employing about 70 percent of the region's residents. A growing number of small businesses are starting in the region and the number of self-employed continues to rise.

The region's large employers include Middlebury College, Goodrich Corporation, Porter Medical, Addison County Home Health, Addison County Counseling Service and the public school system. The service sector including jobs in education and health services is now the largest sector of the region's economy. Tourism is another growing sector of the region's economy.

Agriculture and forestry have played a central role in defining the character of the Addison Region and have historically been, and continue to be, significant parts of the region's economy. Current trends in agriculture are leading to fewer, larger dairy farms in the region. There is also a trend towards small operations focused on non-dairy or specialty-food products.



1.2. Goals and Objectives

The Addison County Regional Planning Commission establishes the following goals and objectives for the Addison Region through this plan.

Goal A.

The Addison Region will be an attractive place to live, work, vacation and conduct business.

To meet this goal, it is our objective:

1. To stimulate and support economic security, opportunity, growth and a high quality of life in the region's communities.
2. To create an environment that encourages business expansion, creation and relocation employing all Addison Region residents in jobs that pay good wages and benefits.
3. To fully utilize the region's tourism potential through the development and support of tourism activities and facilities tailored to the Addison Region.
4. That the potential of the Addison Region's creative, artistic, cultural and historic resources will be fully realized to enliven the local economy and enhance the character of the region's communities.
5. That the Addison Region's education, health and non-profit institutions will continue to be vital components of the local economy and improve the quality of life for the region's residents.

Goal B.

The economy of the Addison Region is and should continue to be primarily comprised of small- to medium-sized, locally-owned businesses, which can be created and grow without placing undue strain on local services, schools and property taxes.

To meet this goal, it is our objective:

1. To actively support the development of new small- and medium-sized businesses in order to spread both job opportunities and impacts on communities throughout the region.
2. To ensure that industrial, commercial and tourism facilities are developed in a manner that is consistent with local and regional land use plans.
3. That municipalities will allow for development of home occupations and cottage industries in their zoning regulations, while developing standards for their review that will ensure compatibility with surrounding land uses.
4. That existing vacant or under-utilized structures or former industrial sites will be considered for reuse whenever possible.



5. That municipalities will be encouraged to undertake capital planning and budgeting so that future expansion or maintenance of infrastructure will not place undue hardship on taxpayers.

Goal C.

The economy of the Addison Region should continue to be significantly tied to agriculture and forest products in order to ensure the continuation of sustainable farming and forestry in the region and the maintenance of the region's rural character.

To meet this goal, it is our objective:

1. That locally-owned enterprises will make use of the region's natural resources to produce value-added products, including services that rely on and benefit from our rural character.
2. That communities should encourage at all levels the purchase of goods and services that are produced locally.
3. That local businesses should be assisted in expanding the markets for their products and services.
4. To support diversity in the region's agricultural enterprises in order to insulate the local economy from the impacts of volatile commodity prices and changing markets.

Goal D.

The Addison Region will provide adequate infrastructure and services to support a strong and diverse economy.

To meet this goal, it is our objective:

1. To steer professional and commercial development toward locally designated village centers in order to support existing businesses, attract new businesses to the region and stimulate village revitalization and development.
2. To develop and maintain a state-of-the-art information infrastructure required to attract and retain high-tech jobs in the region.
3. To fully utilize and grow the region's industrial parks and facilities.
4. That transportation facilities – including pedestrian, bike, rail, air, public transit and vehicular transportation facilities – will be maintained and improved for the service of commercial, recreational and industrial activities.
5. That a full range of reasonably priced housing opportunities will be available to house the Addison Region's current and future workforce.



6. That there will be high-quality, affordable childcare available throughout the Addison Region to meet the needs of working parents and provide an enriching environment for the region's children.
7. That a range of services such as adult daycare and continuing education will be available in the Addison Region to support a productive, employable workforce in the region.



1.3. Recommended Actions

1. Continue to actively work with the Addison County Economic Development Corporation and the Addison County Chamber of Commerce to plan and implement economic development strategies for the region.
2. Maintain the commercial and industrial property database in cooperation with the Addison County Economic Development Corporation.
3. Seek funding to assist with the identification, remediation and redevelopment of brownfield sites in the Addison Region.
4. Develop educational materials for owners of underutilized former agricultural buildings on converting such structures for industrial, commercial or residential use.
5. Support improvements to and expansion of the rail system in Addison County including upgrading the Vermont Rail line from Middlebury to Charlotte and development of the OMYA rail spur.
6. Assist communities seeking downtown or village center designations.
7. Continue to work with programs and organizations, such as Celebration Champlain, to promote the region, strengthen our tourism infrastructure and improve recreation opportunities for residents and visitors.
8. Utilize ACRPC's mapping resources to promote and publicize the region's historic, cultural, artistic, recreational and natural resources and tourism-based businesses.



1.4. Documentation and Analysis

A. Workforce, Employment and Income

Workforce

a. Size of the Workforce

Over the past 20 years, the Addison Region's working-age population, people age 16 and up, has grown at a faster rate than the population as a whole. The number of people in the workforce rose at a rate nearly double the rate of population growth. In 1980, the working-age population was over 21,000 people and the total workforce was about 13,500. In 1990, the region had a working-age population of nearly 25,000 people and the Census counted approximately 17,000 people in the workforce. In 2000, the working-age population was approaching 28,000 of which approximately 19,500 were in the workforce. (See Table 5-1, page 20).

The percentage of the working-age population in the workforce has risen over the past two decades from just below 63 percent to over 70 percent. A significant portion of the working-age population not in the workforce is likely retired. In 2000, there were approximately 4,000 people age 65 and over in the region.

b. Age of the Workforce

In 2000, the median age in Addison County was just over 36 years, an increase of nearly 10 years since 1980. The increase in median age is the result of several factors. As discussed in the Population Section of this plan, in 2000 the largest segment, 24 percent, of the region's population was in the 45 to 64 age group. During the next decade, that segment of the region's workforce will be at or approaching retirement age.

There have not been a significant number of younger people moving into the region as a whole. However, the increase in median age over the past 20 years has been highly variable between municipalities in the region, ranging from a low of 5.6 years in the Town of Addison to a high of 15.1 years in Goshen. There appears to be a trend beginning in a few communities of people moving into the region after retirement, while others are attracting younger people.

c. Education Level of the Workforce

The education level of the workforce has risen considerably over the past two decades. The percentage of the population over age 25 with some type of college degree has nearly doubled and in 2000 it was over 37 percent. The percentage of the population without a high school diploma has dropped from close to 30 percent to around 13 percent. (See Table 5-3, starting on page 23).



The availability of quality education for the region's young people and of continuing education for the working-age population are vitally important to the region's economy. A high school diploma is now a requirement for virtually all types of employment and the entry bar to employment continues to rise with many employers requiring some level of college education. (See discussion of education facilities and opportunities in the Utilities, Facilities and Services section of this plan).

d. Work and Family

During the past several decades, social and economic changes have reshaped our work and family lives. Women now comprise nearly 50 percent of the workforce. Two-income households have become the norm and for many an economic necessity. However, many occupations remain predominately single gender. Out of 46 occupation categories listed by the 2000 Census, 26 had a workforce that was 70 percent or more single gender. For example in the Addison Region in 2000, 85 to 90 percent of healthcare support workers and technicians were women, while over 95 percent of workers in the construction trades were men.

Finding quality, affordable childcare has become an increasing concern for working parents. In 2000, nearly 75 percent of children living in two-parent families had both parents working. Almost 80 percent of children in single-parent families had their primary caregiving parent in the workforce. Surveys have indicated that parents believe the quality of childcare in the region is good, but there is not sufficient quantity especially for infants. There are waiting lists at most childcare centers and some home-based daycares in the region. While there is a general shortage of childcare in the Addison Region, for those parents at lower wage levels or working non-standard hours the challenge to find safe and affordable childcare is much greater. Many of the region's childcare facilities are closed during school holidays and most will not care for sick children, requiring parents to make other arrangements or miss work. (See discussion of childcare in the Utilities, Facilities and Services section.)

e. Commuting

Over the past 20 years, the percentage of Addison Region residents who work in the community in which they live has declined from nearly 50 percent in 1980 to around 35 percent in 2000. More people are working outside the region and commuting longer distances. In 2000, 30 percent of the workforce worked outside the county and the average commute was just over 23 minutes long. (See Table 5-4, starting on page 25).

Of the region's 18,000 workers, approximately 15,000 traveled to work in a private vehicle in 2000. Of those people nearly 90 percent drove alone and ten percent carpoolled. Of the around 3,000 workers not commuting in a private vehicle, half worked at home and the other half walked to work. The percentage of people carpooling or walking to work declined noticeably in the 1980s and continued to decline somewhat during the 1990s. (See Transportation section for more information on commuting).



According to the 2000 Census, virtually no one in the Addison Region took public transportation to work. Due to the rural nature of the region, public transportation is not widely available. However, Addison County Transit Resources is currently improving its service providing regular bus routes in the region and is considering expanding its routes to serve more of the region's communities. As the service has become more reliable, ridership has increased. (See the Transportation and the Utilities, Facilities and Services sections for further information on public transportation).

Additionally, if commuter rail service linked Chittenden County and the Addison Region, some of the region's commuters would likely choose to travel to work by train. In 2000, nearly 4,000 Addison County residents traveled north into Chittenden County to work. (See Table 5-2, page 21).

Employment

a. Employment Rates

According to the 1980 Census, 94 percent of the region's workforce reported having been employed at some point during the previous year. In 1990, that figure was 96 percent and in 2000 it was 95.5 percent.¹ Over the past two decades there has been a noticeable increase in the percentage of the workforce working part-time. About one-third of the region's workforce worked part-time according to the 2000 Census. The percentage of people with full-time, but seasonal employment has declined. (See Table 5-5, page 27 and Table 5-10, starting on page 32).

Over the past decade, unemployment in the Addison Region ranged from a high of 7.4 percent in 1992 to a low of 2.7 percent in 2000 as reported by the Department of Employment and Training (DET). Employment trends in the region generally followed state averages, although peaks and valleys were slightly more extreme in the Addison Region than in the state as a whole. The DET's figures are based only on employment that is covered by unemployment insurance. So rates in the region's more rural towns may be less accurate due to significant amounts of farm or self-employed workers who are not included. (See Table 5-6, page 28).

There is a fair amount of variability in employment rates between municipalities in the region. Bristol, Vergennes and Whiting have employment rates that are consistently lower than the regional average. Cornwall, Lincoln, Middlebury, Monkton, New Haven, Waltham and Weybridge have rates that are generally above average.

b. Employment by Industry

According to the 2000 Census, the largest employment sectors for Addison Region residents were education and manufacturing, which together employed around 6,000 people. About 2,000 people worked in retail trade, while agriculture/forestry and construction together employed around 2,700 people.



Over the past two decades there have been shifts in the employment sectors. The percentage of the region's workforce employed in agriculture or forestry has declined by nearly half and the percentage employed in manufacturing has decreased by a third. The number of people working in the health and human services sector has more than tripled and the number working in construction has nearly doubled.² (See Table 5-7, page 29).

c. Employment by Occupation

According to the 2000 Census, service, administrative or office, and management, business or financial occupations employed approximately 2,500 Addison Region workers each. Over the past 20 years, management and professional occupations have seen the largest percent increases, while farming and forestry have seen the most significant decreases.³ (See Table 5-8, page 29).

d. Self-Employment

Due to its rural nature and agricultural economy, the Addison Region has consistently had a greater percentage of self-employed workers than the state as a whole. In 2000, the percentage of the workforce self-employed ranged from a high of greater than 21 percent in Waltham to around nine percent in Vergennes. The total number of self-employed people in the region has increased from around 1,700 in 1980 to about 2,400 in 2000.

e. Non-Profit and Government Employment

In 2000, approximately 25 percent of the region's residents worked in the non-profit or government sectors. The percentage of people employed by the state or federal government has declined over the past 20 years, while the percentage working for local government has remained fairly steady. In 2000, over 2,700 Addison Region residents worked for non-profits.

f. Employment Centers

According to the 2000 Census, just over 70 percent of, or around 13,000, Addison County residents worked in the county, a decrease of about 5 percent since 1990. Around half of those people, approximately 6,500 worked in Middlebury. Vergennes and Bristol are the other employment centers for the region's residents at around 1,500 and 1,000 workers respectively.

Another approximately 4,000 Addison Region residents, or over 20 percent, worked in Chittenden County. Burlington and South Burlington are the major employment centers for those workers. Around 750 Addison Region residents worked in Rutland County in 2000. The number of Addison Region residents working in Chittenden County increased during the 1990s by nearly 1,200 people, while the number of residents working in Rutland County held fairly steady. (See Table 5-2, page 21 and see further information on commuting in the Transportation Section).



Income and Wages

a. Income

Over the past 20 years, income levels of Addison Region residents as a whole have increased. After accounting for inflation, the median household income in Addison County has risen over \$9,000 or nearly 30 percent from 1980 to 2000 to around \$43,000 a year. However, not all communities in the region experienced growth at that rate. The towns of Goshen and Whiting actually saw decreases in median household income after adjusting for inflation and Middlebury was virtually flat. (See Table 5-9, starting on page 30).

Vermont tax records support the Census data. Comparisons of adjusted family median income levels over the past 15 years show decreases or flat growth in a number of communities including Bridport, Middlebury, Vergennes and Waltham. Other Addison Region towns showed significant growth including Addison, Cornwall, Ferrisburgh, Monkton and Weybridge. (See income tables in population section).

b. Wages and Benefits

In 2000, the median annual earnings figure for all working individuals in the Addison Region was around \$20,000. This figure is about half the region's median household income, reflecting that a significant number of the region's households are two-income. This low annual earnings figure is also influenced by the fact that 60 percent of the region's employed population does not work full-time year-round. The annual earnings figures do not take into account any benefits paid to workers. However, it is likely that the one-third of the region's workforce that was employed part-time in 2000 receives few or no benefits.

In 2000, the median wage for men in Addison County was nearly \$25,000, while for women that figure was close to \$16,000. Women are more likely than men to be working part-time, which accounts for some of the disparity in earnings. Additionally, some of the fields employing the highest percentage of women are lower paying than fields employing mostly men.

B. Employers and Economic Development

Employers in the Addison Region

The Addison Region has traditionally had very few large employers and many small employers. According to the Vermont Department of Employment and Training (DET) in 2000, there were approximately 1,100 private employers in the Addison Region.⁴ Nearly 80 percent of these employed fewer than ten people. There were ten employers that employed 100 or more people. The total number of private employers in the region has increased from around 800 in 1987 to over 1,100 in 2000. Most of this growth is due to increasing numbers of very small businesses employing fewer than five people. In 2000, 40 percent of people employed in the county worked in firms with less than 20 workers. Another 30 percent



worked for firms employing 20 to 99 workers and the final third worked for employers that employed over 100 people. (See Table 5-11 and Table 5-12, page 32).

The figures produced by the DET reflect only part of the economic picture of the region. The federal Bureau of Economic Analysis (BEA) estimated that in 2000 there were nearly 21,400 full-time and part-time jobs in Addison County.⁵ Of those, one-quarter or approximately 5,500 were proprietors working in their own farms, businesses or partnerships. These are jobs that may not be captured in the DET reports. (See Table 5-14, page 36).

In 2000, the Census Bureau reported that just under 6,500 people in the region worked in their municipality of residence. It is likely that many of these people are proprietors working in their own farms, businesses or partnerships, especially in the region's rural communities. Interestingly, the 2000 Census also indicated that around 15,900 people worked in Addison County. Comparing that figure to the 21,000 jobs in the county estimated by the BEA provides a rough idea of the number of people in the county working more than one job. (See Table 5-4, starting on page 25).

a. Large Employers

In 2000, there were ten private employers that employed 100 or more people in Addison County. Together these firms employed over 3,500 people. The region's largest employer is Middlebury College, followed by Goodrich Corporation. Together they employ approximately 1,900 people. The number of large employers in the region has remained fairly stable over the past 15 years. However, the percentage of people employed in the county who work for large private employers has declined by more than ten percent between 1987 and 2001. (See Table 5-12, page 34).

Additionally, there have been shifts in the types of large employers away from manufacturing towards the service sector. There has also been a shift in the focus of economic development in the region, which formerly was heavily focused on manufacturing, to include a wider range of sectors. In 1972, the ACRPC Regional Plan listed the region's major employers as Simmonds Precision, Van Raalte, Standard Register, Polymers and Drake, Smith and Company. Thirty years later Goodrich Corporation (formerly Simmonds Precision), Standard Register and Specialty Filaments (formerly Polymers) are still among the region's large employers. However, Middlebury College, the Counseling Service, Porter Medical Center, Addison County Home Health Care and the region's high schools are also listed among the large employers.

b. Small Businesses

Small, new businesses are the main source of economic development and job creation in the Addison Region. Over 90 percent of employers, over 1,000 firms, in the Addison Region in 2000 were small businesses that employed less than 20 people and over 60 percent, around 700 firms, employed fewer than five people. About 40 percent of people working in the region worked in a small business in 2000. In addition, approximately 5,500 people in Addison County were proprietors working in their own businesses or partnerships in 2000



according to the BEA. Around 2,400 people in the Addison Region reported themselves as self-employed in the 2000 Census.

During the 1990s, Vermont became a leader in small business creation. In the past 15 years, the number of firms in the Addison Region employing less than five people has grown by over 250, accounting for much of the growth in the region's economy. Even though initial employment gains may be small, start-up businesses have immediate impacts on the local economy. Small businesses tend to hire and buy locally, putting more money into the local economy than they send out.

According to the 2000 Census, approximately 1,500 people in the region worked at home. During the past 20 years, the amount and types of home-based employment has increased. In 1980, the Census reported just over 1,000 people working at home and the BEA estimated that there were more than 900 farm proprietors. In 2000 the Census reported just over 1,400 people working at home in the region and the BEA estimated just under 900 farm proprietors. So, agriculture as a percentage of home-based employment in the region is declining as the numbers of other types of home businesses are growing.

c. Employers by Sector

According to the Department of Employment and Training in 2000, manufacturing, trade, healthcare and education were the most significant sectors of the Addison County economy. Over 60 percent of people employed in the region worked in one of these sectors. (See Table 5-13, page 35).

Over the past 30 years, jobs in the manufacturing section have declined. The biggest increase has been in the service sector, which had about 2,100 jobs in 1970 and in 2000 had nearly 8,000, according to the BEA. The service sector, of which the biggest components are health and education services, is now the largest piece of the region's economy. (See Table 5-14, page 36).

According to the DET in 2000, the average wage in Addison County was approximately \$27,000. Average wages in the region's employment sectors ranged from a low of just under \$11,000 to high of over \$40,000. Those sectors at the upper end of the wage scale included private education, manufacturing, postal service and state employment. Education and manufacturing together represented around 35 percent of employment in the region. At the lower end of the wage scale were jobs in food service, rental and leasing services and local government administration.⁶ (See Table 5-13, page 35).

1. Agriculture and Forestry

Agriculture and forestry have played a central role in defining the character of the Addison Region and have historically been, and continue to be, significant parts of the region's economy. However, pressures from both inside and outside Vermont are changing the shape of agriculture and forestry in the region.



The amount of land devoted to farming has decreased steadily statewide over the past several decades. During the 15-year period from 1982 to 1997, the county lost 11 percent of its farmland while state average was 20 percent.⁷ The 1997 Census of Agriculture reported that Addison County had 683 farms with a total of nearly 205,000 acres in farm production. The first agricultural census in 1978 counted approximately 700 farms in the county with a total of around 240,000 acres in production. Interestingly according to the 1850 Decennial Census, one of the first to document detailed information about agriculture, there were around 2,300 farms in Addison County with a total of nearly 243,000 acres of improved farmland.

During the past 30 years, the numbers of farms and people employed in agriculture have fluctuated. The BEA estimated in 1970 that there were around 950 farm proprietors in Addison County and an additional 1,000 people employed on farms. There were also another 100 people employed in agricultural services and forestry. In 2000, there were just over 880 farm proprietors and 660 farm employees. The agriculture services and forestry sector had grown to over 520 workers. (See Table 5-14, page 36).

Farms in the Addison Region face issues relating to their workforce that are common to agriculture across the state and nationally. The median age of farmers is higher than the median age of workers in other economic sectors. Given the very high start-up costs, it is difficult for a young farmer to buy an operation from a farmer wanting to retire. Additionally, lower wages in the agricultural sector make attracting younger workers more challenging. Some of the larger farms in the region now employ foreign workers as farm labor, mainly from Mexico and Central America. Additionally in the region, the ability to provide housing for farm workers on the farm has been a concern.

Between 1982 and 1997, the market value of agricultural products sold in Addison County increased by 56 percent. When adjusted for inflation however, these figures indicate that the prices received for agricultural products have not kept pace with inflation. In 1998, the total economic impact of agriculture in the region was \$240 million.⁸

In the Addison Region, dairy farms comprise nearly 75 percent of the agricultural sector. While the number of dairy farms has declined, the size and production of those remaining has increased. Currently, dairy farms are facing serious economic challenges including volatility in the price paid to farmers for milk. Future predictions for dairy farming in the region point to fewer and larger operations. At the other end of the scale, the number of small or part-time agricultural operations that produce non-dairy products and specialty foods has grown.

2. Manufacturing

Around 16 percent of the jobs in Addison County were in the manufacturing sector in 2000. The DET reported 70 units and 2,223 employees in manufacturing with an average wage of about \$36,000. The BEA estimates indicate that over the past 30 years the manufacturing sector has employed a declining percentage of people working in the region.



In 1970, manufacturing represented nearly 18 percent of the region's jobs, while in 2000 that figure was just under 11 percent.

3. Education⁹

In 2001, Middlebury College employed over 1,250 faculty and staff, making it the largest employer in the Addison Region. (For further information on Middlebury College see the Utilities, Facilities and Services section of the plan). Of those employees approximately 85 percent live in the region; 94 percent of the college's full-time employees live in the region. Approximately half of the college's employees live in the towns of Cornwall, Middlebury and Weybridge. Addison Region residents employed by the college earn approximately \$45.6 million in wages and \$13.7 million in benefits.

The region's public education system, if it were considered a single entity, would be a larger employer than Middlebury College. There are 16 elementary schools, a middle school, three high schools and three supervisory unions located in the Addison Region. (See discussion of education in the Utilities, Facilities and Services section for further discussion of education). According to the Vermont Department of Education, the region's public education system employed the equivalent of about 1,130 full-time employees in 2002. In 2000, the Vermont Department of Employment and Training reported a total of nearly 1,360 people employed in the public education system in 2000. Over three-quarters of the people employed in the public education system are women. Teacher salaries vary between the region's schools; the state average was around \$39,000 in 2002. The state average teacher-aid salary was around \$12,000.

4. Healthcare

Approximately 10 percent of the jobs in Addison County are in the fields of healthcare and human services. Large employers in the healthcare and human services sector in the Addison Region include Porter Medical Center, Addison County Home Health and Addison County Counseling Service. This is a sector that is expected to grow in the future as the number of elderly in the region requiring care increases.

Porter Medical Center is the major institutional provider of healthcare in Addison County. (See the Utilities, Facilities and Services section for more information on Porter's healthcare services and facilities). Porter Medical Center is the third largest private employer in Addison County. Over two-thirds of Porter Medical Center's employees live in Addison County. Around 15 percent of the employees of Porter Medical Center live in Rutland County and five percent reside elsewhere in Vermont. Approximately 11 percent of Porter Medical Center's employees live in New York.¹⁰

Employment at Porter Medical Center is evenly split between full-time and part-time jobs. Full-time jobs equaled 42 percent of the total jobs, part-time jobs 40 percent and other contractual arrangements accounted for 18 percent of the total. Porter Medical Center is an important source of employment for women in Addison County. In 2001, just over 560 of the 670, or 84 percent, of the employees at Porter Medical Center were women.



Addison County Home Health is another large employer in the region providing in-home healthcare and hospice services. In 2000, Addison County Home Health made nearly 56,000 visits to over 1,200 patients. They employ a mix of full- and part-time employees and in 2000 had the full-time equivalent of 96 workers.¹¹

5. Tourism and Trade

The Addison Region attracts visitors with its wide array of recreational, cultural and shopping opportunities. Nearly every municipality in the region offers food, lodging or activities aimed at attracting visitors. In 2000, the Department of Employment and Training (DET) reported that there were over 80 units of employment in arts, entertainment, recreation, accommodation and food service in the county. Those units employed nearly 1,250 people.

Tourism activities provide significant income to the regional economy and residents also benefit from the variety of recreational activities available in the region. According to the Department of Taxes in 2001, Addison County had over \$37 million in taxable meals and rooms receipts. Most tourism-related businesses in the region are small and many are entirely owner-operated. The DET indicated that there were 23 lodging employers in the county in 2000, while the Addison County Chamber of Commerce lists nearly 40. So, the DET figures do not fully account for the number of units and employees in this sector. This sector of the region's economy is growing.

Addison Region and the Larger Economy

a. Addison Region and Neighboring Counties

Due to geography, history and economic conditions, the Addison Region is more closely linked to neighboring Chittenden and Rutland counties to the north and south than to neighbors over the Green Mountains or across Lake Champlain. Approximately 420 Addison County residents commuted to counties other than Rutland or Chittenden in Vermont in 2000 and around 320 people commuted in to work. Around 130 Addison County residents worked in New York in 2000 while about 630 New York residents worked in Addison County. (See Table 5-2, page 21).

Chittenden or Rutland counties have been and will likely continue to be employment centers for people living in the Addison Region. The profile of many of the Addison Region's economic sectors is fairly similar to Chittenden and Rutland counties. The manufacturing, retail trade and healthcare sectors are significant employers in all three counties. However the education and agriculture and forestry sectors are a larger part of the Addison Region's economy than they are in Chittenden or Rutland County. Wages in Addison and Rutland counties are generally at or below state averages, while in Chittenden County wages in most sectors are higher than state averages. (See Table 5-14 through Table 5-17, pages 36 to 39).



Economic Development

a. Downtown and Village Center Revitalization

During the 1990s, many municipalities in the region began to see a need to restart the economic heart of their communities, their downtowns and village centers. They have begun making improvements to attract businesses that will serve both residents and tourists. Throughout the region there are downtowns, villages and hamlets with existing buildings and infrastructure that could serve the needs of small businesses while maintaining the region's high quality of life. Maintaining historic development patterns of village centers surrounded rural countryside balances economic and environmental interests.

b. Industrial Sites and Infrastructure

Seven of the region's 21 municipalities have land zoned for industrial or light manufacturing use. In the early days of Addison County's history, water was the primary factor in siting industrial activities. Waterpower was harnessed in small mills in communities throughout the region. Lake Champlain allowed shipping of goods and the lakeshore towns flourished. After the Civil War, as railroad lines developed, their corridors became hubs for economic activity. As roadways replaced railways, industrial development shifted again. The vast majority of region's industrial activity is currently found in places with easy access to state highways, mainly in Bristol, Middlebury and Vergennes.

Telecommunications technology is becoming the economic infrastructure of the future. While it is difficult to document exact numbers, an increasing number of people in the Addison Region are telecommuting or operating a technology-based business from their home. Over the past 20 years the number of Addison Region residents that reported working at home has increased by 350 people. The Addison Region is an attractive location for telecommuters to settle, but access to technology is key to promoting this type of economic development.

c. Economic Development Organizations

There are number of organizations working to foster economic development in the Addison Region.

1. Addison County Economic Development Corporation

The Addison County Economic Development Corporation (ACEDC) is a private nonprofit, economic development corporation that promotes industrial and economic growth in the county. The primary goal is to foster, encourage and assist in the physical location of new business and the expansion of existing business enterprises within the area.

2. Addison County Chamber of Commerce

The Addison County Chamber of Commerce (ACCOC) is a voluntary partnership of business and professional people. ACCOC works to encourage and represent responsible business activity to make the region a better place for people to live and work.



3. *Addison County Business Education Partnership*

Addison County Business Education Partnership (ACBEP) is charged with working to continuously develop and promote a quality workforce preparation system to effectively meet the needs of both employers and employees in our community. Through this alliance, community leaders collaborate together for the purposes of identifying both the needs, and the strategies necessary to develop both new and improve upon workforce development strategies already in existence.

d. Comprehensive Economic Development Strategy

The Addison County Economic Development Corporation with the support of the Addison County Regional Planning Commission and the Addison County Chamber of Commerce began the process of developing a Comprehensive Economic Development Strategy (CEDS) for Addison County in 2000. The CEDS was adopted in 2003, making the region eligible to receive funds from the federal Economic Development Administration.



Table 5-1 Addison Region Working Age Population and Workforce 1980 to 2000

	Working Age Population			In the Workforce						Change					
				1980		1990		2000		1980 to 1990		1990 to 2000		1980 to 2000	
	1980	1990	2000	#	%	#	%	#	%	#	%	#	%	#	%
Addison	618	749	1,039	368	59.5%	533	71.2%	771	74.2%	165	44.8%	238	44.7%	403	109.5%
Bridport	713	812	943	473	66.3%	619	76.2%	683	72.4%	146	30.9%	64	10.3%	210	44.4%
Bristol	2,354	2,751	2,861	1,457	61.9%	2,116	76.9%	2,088	73.0%	659	45.2%	(28)	-1.3%	631	43.3%
Cornwall	730	822	909	499	68.4%	602	73.2%	641	70.5%	103	20.6%	39	6.5%	142	28.5%
Ferrisburgh	1,506	1,767	2,057	952	63.2%	1,330	75.3%	1,547	75.2%	378	39.7%	217	16.3%	595	62.5%
Goshen	118	167	148	93	78.8%	96	57.5%	106	71.6%	3	3.2%	10	10.4%	13	14.0%
Leicester	585	643	757	362	61.9%	441	68.6%	540	71.3%	79	21.8%	99	22.4%	178	49.2%
Lincoln	632	740	917	406	64.2%	515	69.6%	704	76.8%	109	26.8%	189	36.7%	298	73.4%
Middlebury	6,182	6,686	6,947	3,573	57.8%	4,242	63.4%	4,267	61.4%	669	18.7%	25	0.6%	694	19.4%
Monkton	834	1,071	1,318	605	72.5%	824	76.9%	1,043	79.1%	219	36.2%	219	26.6%	438	72.4%
New Haven	912	1,022	1,285	639	70.1%	750	73.4%	970	75.5%	111	17.4%	220	29.3%	331	51.8%
Orwell	652	819	910	424	65.0%	594	72.5%	631	69.3%	170	40.1%	37	6.2%	207	48.8%
Panton	379	448	526	238	62.8%	309	69.0%	365	69.4%	71	29.8%	56	18.1%	127	53.4%
Ripton	262	338	456	181	69.1%	251	74.3%	352	77.2%	70	38.7%	101	40.2%	171	94.5%
Salisbury	604	776	850	391	64.7%	591	76.2%	622	73.2%	200	51.2%	31	5.2%	231	59.1%
Shoreham	697	825	942	465	66.7%	599	72.6%	692	73.5%	134	28.8%	93	15.5%	227	48.8%
Starksboro	935	1,099	1,368	621	66.4%	808	73.5%	1,054	77.0%	187	30.1%	246	30.4%	433	69.7%
Vergennes	1,681	1,993	2,176	1,020	60.7%	1,193	59.9%	1,459	67.0%	173	17.0%	266	22.3%	439	43.0%
Waltham	282	334	372	192	68.1%	246	73.7%	265	71.2%	54	28.1%	19	7.7%	73	38.0%
Weybridge	490	590	643	323	65.9%	402	68.1%	424	65.9%	79	24.5%	22	5.5%	101	31.3%
Whiting	272	298	288	182	66.9%	227	76.2%	202	70.1%	45	24.7%	(25)	-11.0%	20	11.0%
Addison Region	21,438	24,750	27,712	13,464	62.8%	17,288	69.9%	19,426	70.1%	3,824	28.4%	2,138	12.4%	5,962	44.3%
Vermont	385,571	434,440	479,140	242,456	62.9%	300,746	69.2%	331,131	69.1%	58,290	24.0%	30,385	10.1%	88,675	36.6%

Source: U.S. Census Bureau



(May 12, 2004) **ACRPC**

Table 5-2 Commuting Patterns of Addison County Residents and Employees





Table 5-3 Education Level in the Addison Region 1980 to 2000

		Less than 9th Grade		Some High School		High School Graduate		Some College		Associate Degree		Bachelor's Degree		Graduate or Professional Degree	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%
Addison	1980	74	14.6%	66	13.0%	205	40.4%	90	17.7%	73		14.4%			
	1990	63	9.8%	52	8.1%	255	39.6%	92	14.3%	71	11.0%	88	13.7%	23	3.6%
	2000	21	2.3%	89	9.7%	329	35.9%	159	17.3%	77	8.4%	198	21.6%	44	4.8%
Bridport	1980	121	22.0%	66	12.0%	216	39.3%	81	14.8%	65		11.8%			
	1990	68	9.9%	64	9.3%	313	45.7%	108	15.8%	23	3.4%	83	12.1%	26	3.8%
	2000	53	6.6%	47	5.9%	294	36.7%	128	16.0%	82	10.2%	136	17.0%	61	7.6%
Bristol	1980	401	22.4%	253	14.1%	642	35.8%	229	12.8%	269		15.0%			
	1990	282	11.9%	240	10.1%	964	40.8%	293	12.4%	150	6.3%	247	10.4%	189	8.0%
	2000	178	7.2%	298	12.1%	989	40.0%	349	14.1%	130	5.3%	315	12.8%	211	8.5%
Cornwall	1980	105	17.8%	62	10.5%	159	27.0%	78	13.2%	185		31.4%			
	1990	40	5.5%	57	7.8%	218	29.9%	95	13.0%	39	5.4%	170	23.4%	109	15.0%
	2000	27	3.5%	57	7.4%	219	28.6%	109	14.2%	39	5.1%	148	19.3%	168	21.9%
Ferrisburgh	1980	220	17.9%	161	13.1%	431	35.0%	164	13.3%	255		20.7%			
	1990	201	13.1%	133	8.6%	524	34.1%	243	15.8%	87	5.7%	241	15.7%	109	7.1%
	2000	76	4.1%	145	7.9%	551	29.9%	312	17.0%	164	8.9%	373	20.3%	219	11.9%
Goshen	1980	12	10.5%	2	1.8%	32	28.1%	32	28.1%	36		31.6%			
	1990	8	6.1%	6	4.5%	45	34.1%	21	15.9%	5	3.8%	23	17.4%	24	18.2%
	2000	2	1.6%	7	5.4%	41	31.8%	29	22.5%	2	1.6%	30	23.3%	18	14.0%
Leicester	1980	112	24.2%	86	18.6%	143	31.0%	78	16.9%	43		9.3%			
	1990	76	14.3%	54	10.1%	216	40.5%	84	15.8%	32	6.0%	53	9.9%	18	3.4%
	2000	41	6.0%	90	13.1%	281	40.8%	113	16.4%	24	3.5%	95	13.8%	44	6.4%
Lincoln	1980	87	17.0%	64	12.5%	161	31.4%	96	18.8%	104		20.3%			
	1990	68	10.6%	72	11.2%	161	25.1%	109	17.0%	46	7.2%	110	17.2%	75	11.7%
	2000	53	6.6%	62	7.7%	193	24.0%	150	18.7%	46	5.7%	182	22.7%	117	14.6%
Middlebury	1980	401	11.6%	317	9.2%	1,206	35.0%	519	15.1%	1,003		29.1%			
	1990	213	5.1%	226	5.4%	1,465	34.9%	579	13.8%	279	6.7%	680	16.2%	750	17.9%
	2000	143	3.5%	264	6.4%	1,271	30.9%	630	15.3%	248	6.0%	761	18.5%	800	19.4%
Monkton	1980	120	17.7%	84	12.4%	258	38.0%	89	13.1%	128		18.9%			
	1990	70	7.3%	68	7.1%	334	34.9%	136	14.2%	54	5.6%	202	21.1%	93	9.7%
	2000	41	3.5%	83	7.1%	331	28.2%	197	16.8%	86	7.3%	260	22.2%	175	14.9%
New Haven	1980	115	16.3%	78	11.1%	261	37.1%	117	16.6%	133		18.9%			
	1990	75	8.5%	95	10.7%	296	33.4%	133	15.0%	61	6.9%	160	18.1%	66	7.4%
	2000	80	7.3%	65	5.9%	416	37.8%	142	12.9%	97	8.8%	179	16.3%	122	11.1%

Source: U.S. Census Bureau¹²



Table 5-3 Education Level in the Addison Region 1980 to 2000 (con't)

		Less than 9th Grade		Some High School		High School Graduate		Some College		Associate Degree		Bachelor's Degree		Graduate or Professional Degree	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%
Orwell	1980	99	18.8%	90	17.1%	181	34.4%	81	15.4%	75		14.3%			
	1990	67	9.5%	104	14.8%	276	39.3%	97	13.8%	57	8.1%	77	11.0%	25	3.6%
	2000	58	7.3%	89	11.2%	290	36.6%	113	14.2%	67	8.4%	121	15.3%	55	6.9%
Panton	1980	70	23.0%	38	12.5%	100	32.8%	49	16.1%	48		15.7%			
	1990	34	8.9%	48	12.5%	129	33.7%	41	10.7%	39	10.2%	64	16.7%	28	7.3%
	2000	28	6.2%	31	6.9%	145	32.1%	72	15.9%	43	9.5%	97	21.5%	36	8.0%
Ripton	1980	37	17.3%	12	5.6%	46	21.5%	26	12.1%	93		43.5%			
	1990	16	5.1%	27	8.6%	74	23.5%	38	12.1%	14	4.4%	77	24.4%	69	21.9%
	2000	3	0.7%	40	9.9%	103	25.5%	52	12.9%	21	5.2%	116	28.7%	69	17.1%
Salisbury	1980	101	20.1%	74	14.7%	175	34.8%	68	13.5%	85		16.9%			
	1990	70	10.7%	79	12.1%	225	34.4%	89	13.6%	53	8.1%	102	15.6%	37	5.6%
	2000	32	4.3%	80	10.6%	300	39.9%	127	16.9%	78	10.4%	82	10.9%	53	7.0%
Shoreham	1980	101	18.3%	70	12.7%	181	32.7%	72	13.0%	129		23.3%			
	1990	59	8.3%	51	7.2%	285	40.1%	113	15.9%	25	3.5%	115	16.2%	62	8.7%
	2000	52	6.4%	63	7.7%	298	36.6%	161	19.8%	50	6.1%	100	12.3%	91	11.2%
Starksboro	1980	150	20.2%	85	11.4%	241	32.4%	104	14.0%	163		21.9%			
	1990	112	11.9%	111	11.8%	289	30.7%	146	15.5%	67	7.1%	152	16.2%	64	6.8%
	2000	81	6.8%	96	8.1%	404	33.9%	182	15.3%	54	4.5%	260	21.8%	114	9.6%
Vergennes	1980	232	18.9%	135	11.0%	478	38.9%	205	16.7%	178		14.5%			
	1990	148	10.5%	177	12.6%	605	43.0%	144	10.2%	88	6.3%	131	9.3%	115	8.2%
	2000	101	6.3%	131	8.2%	595	37.0%	275	17.1%	167	10.4%	267	16.6%	70	4.4%
Waltham	1980	35	15.3%	24	10.5%	105	45.9%	27	11.8%	38		16.6%			
	1990	24	7.8%	11	3.6%	134	43.5%	25	8.1%	34	11.0%	56	18.2%	24	7.8%
	2000	16	4.8%	18	5.4%	109	32.9%	56	16.9%	29	8.8%	78	23.6%	25	7.6%
Weybridge	1980	64	14.0%	88	19.3%	124	27.2%	77	16.9%	103		22.6%			
	1990	40	8.1%	19	3.9%	130	26.5%	77	15.7%	48	9.8%	98	20.0%	79	16.1%
	2000	23	4.0%	20	3.4%	120	20.7%	87	15.0%	46	7.9%	140	24.1%	144	24.8%
Whiting	1980	56	29.5%	33	17.4%	60	31.6%	26	13.7%	15		7.9%			
	1990	17	7.1%	29	12.2%	121	50.8%	41	17.2%	4	1.7%	22	9.2%	4	1.7%
	2000	16	6.4%	25	10.0%	112	44.6%	48	19.1%	7	2.8%	24	9.6%	19	7.6%
Addison Region	1980	2,713	17.5%	1,888	12.2%	5,405	34.8%	2,308	14.9%	3,221		20.7%			
	1990	1,751	9.0%	1,723	8.9%	7,059	36.3%	2,704	13.9%	1,276	6.6%	2,951	15.2%	1,989	10.2%
	2000	1,125	5.1%	1,800	8.2%	7,391	33.6%	3,491	15.9%	1,557	7.1%	3,962	18.0%	2,655	12.1%
Vermont	1980	49,355	16.7%	36,154	12.3%	107,297	36.4%	46,061	15.6%	56,184		19.0%			
	1990	30,945	8.7%	37,692	10.6%	123,430	34.6%	52,594	14.7%	25,730	7.2%	55,120	15.4%	31,734	8.9%
	2000	20,769	5.1%	34,127	8.4%	130,804	32.4%	68,440	16.9%	31,058	7.7%	74,124	18.3%	44,901	11.1%

Source: U.S. Census Bureau



(May 12, 2004) **ACRPC**

Table 5-4 Place of Work for Addison Region Residents 1980 to 2000

		Municipality of Residence		Elsewhere in Addison Cty		Elsewhere in VT		Outside VT	
		#	%	#	%	#	%	#	%
Addison	1980	171	47.5%	153	42.5%	36	10.0%	-	0.0%
	1990	157	30.4%	278	53.8%	73	14.1%	9	1.7%
	2000	157	21.6%	360	49.6%	199	27.4%	10	1.4%
Bridport	1980	145	36.9%	224	57.0%	24	6.1%	-	0.0%
	1990	237	39.8%	306	51.3%	53	8.9%	-	0.0%
	2000	229	34.8%	313	47.6%	97	14.7%	19	2.9%
Bristol	1980	568	46.7%	418	34.3%	205	16.8%	26	2.1%
	1990	831	41.4%	683	34.0%	479	23.9%	13	0.6%
	2000	555	27.9%	797	40.1%	627	31.5%	9	0.5%
Cornwall	1980	111	25.5%	307	70.6%	17	3.9%	-	0.0%
	1990	124	22.6%	372	67.9%	45	8.2%	7	1.3%
	2000	120	19.0%	441	69.7%	56	8.8%	16	2.5%
Ferrisburgh	1980	338	38.2%	298	33.7%	240	27.1%	9	1.0%
	1990	336	26.7%	429	34.0%	485	38.5%	10	0.8%
	2000	329	22.4%	421	28.7%	686	46.7%	32	2.2%
Goshen	1980	21	27.6%	9	11.8%	46	60.5%	-	0.0%
	1990	21	27.3%	8	10.4%	48	62.3%	-	0.0%
	2000	16	15.2%	34	32.4%	43	41.0%	12	11.4%
Leicester	1980	43	15.2%	101	35.7%	135	47.7%	4	1.4%
	1990	50	12.2%	114	27.7%	239	58.2%	8	1.9%
	2000	63	12.3%	226	44.2%	210	41.1%	12	2.3%
Lincoln	1980	79	26.8%	171	58.0%	41	13.9%	4	1.4%
	1990	93	19.3%	270	56.0%	113	23.4%	6	1.2%
	2000	116	17.4%	321	48.1%	223	33.4%	8	1.2%
Middlebury	1980	2,540	79.3%	359	11.2%	185	5.8%	120	3.7%
	1990	3,149	80.5%	405	10.4%	283	7.2%	76	1.9%
	2000	2,967	78.7%	450	11.9%	293	7.8%	62	1.6%
Monkton	1980	95	17.7%	170	31.7%	271	50.6%	-	0.0%
	1990	147	19.4%	226	29.8%	381	50.2%	5	0.7%
	2000	147	14.9%	223	22.6%	600	60.9%	16	1.6%
New Haven	1980	220	39.0%	314	55.7%	30	5.3%	-	0.0%
	1990	205	28.0%	396	54.1%	116	15.8%	15	2.0%
	2000	203	22.4%	494	54.5%	202	22.3%	8	0.9%

Source: U.S. Census Bureau



Table 5-4 Place of Work for Addison Region Residents 1980 to 2000 (con't)

		Municipality of Residence		Elsewhere in Addison Cty		Elsewhere in VT		Outside VT	
		#	%	#	%	#	%	#	%
Orwell	1980	198	49.3%	115	28.6%	80	19.9%	9	2.2%
	1990	232	41.4%	168	30.0%	143	25.5%	17	3.0%
	2000	206	34.7%	252	42.4%	128	21.5%	8	1.3%
Panton	1980	49	25.8%	111	58.4%	30	15.8%	-	0.0%
	1990	52	18.0%	177	61.2%	53	18.3%	7	2.4%
	2000	65	18.4%	184	52.1%	104	29.5%	-	0.0%
Ripton	1980	22	15.7%	93	66.4%	25	17.9%	-	0.0%
	1990	32	14.3%	175	78.1%	11	4.9%	6	2.7%
	2000	63	20.0%	196	62.2%	52	16.5%	4	1.3%
Salisbury	1980	96	30.8%	170	54.5%	46	14.7%	-	0.0%
	1990	114	20.3%	356	63.5%	87	15.5%	4	0.7%
	2000	171	29.0%	341	57.8%	72	12.2%	6	1.0%
Shoreham	1980	180	41.9%	208	48.4%	38	8.8%	4	0.9%
	1990	239	41.7%	253	44.2%	76	13.3%	5	0.9%
	2000	212	31.6%	352	52.5%	95	14.2%	11	1.6%
Starksboro	1980	129	25.1%	97	18.9%	284	55.4%	3	0.6%
	1990	127	16.3%	114	14.6%	536	68.7%	3	0.4%
	2000	140	13.9%	177	17.6%	683	67.9%	6	0.6%
Vergennes	1980	540	62.5%	143	16.6%	174	20.1%	7	0.8%
	1990	559	50.5%	198	17.9%	346	31.2%	5	0.5%
	2000	526	39.0%	360	26.7%	449	33.3%	13	1.0%
Waltham	1980	44	24.7%	106	59.6%	28	15.7%	-	0.0%
	1990	21	8.8%	154	64.4%	59	24.7%	5	2.1%
	2000	45	17.4%	124	47.9%	89	34.4%	1	0.4%
Weybridge	1980	64	19.8%	213	65.9%	33	10.2%	13	4.0%
	1990	70	17.8%	292	74.1%	27	6.9%	5	1.3%
	2000	77	18.7%	275	66.9%	48	11.7%	11	2.7%
Whiting	1980	68	46.6%	64	43.8%	14	9.6%	-	0.0%
	1990	46	21.1%	125	57.3%	47	21.6%	-	0.0%
	2000	39	20.5%	97	51.1%	54	28.4%	-	0.0%
Addison Region	1980	5,721	48.7%	3,844	32.7%	1,982	16.9%	199	1.7%
	1990	6,842	42.1%	5,499	33.8%	3,700	22.8%	206	1.3%
	2000	6,446	35.5%	6,438	35.5%	5,010	27.6%	264	1.5%
Vermont	1980	100,476	48.1%	80,072	38.3%	17,992	8.6%	10,346	5.0%
	1990	113,706	41.1%	113,806	41.1%	32,641	11.8%	16,612	6.0%
	2000	109,132	35.0%	135,806	43.6%	45,555	14.6%	21,346	6.8%

Source: U.S. Census Bureau



Table 5-5 Addison Region Employment and Unemployment 1980 to 2000

	People in the Workforce			1980		Employed		1990		2000		1980		Unemployed		1990		2000	
	1980	1990	2000	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Addison	368	533	771	357	97.0%	521	97.7%	741	96.1%	11	3.0%	12	2.3%	30	3.9%				
Bridport	473	619	683	436	92.2%	600	96.9%	661	96.8%	37	7.8%	19	3.1%	22	3.2%				
Bristol	1,457	2,116	2,088	1,350	92.7%	2,040	96.4%	2,014	96.5%	107	7.3%	76	3.6%	74	3.5%				
Cornwall	499	602	641	482	96.6%	579	96.2%	634	98.9%	17	3.4%	23	3.8%	7	1.1%				
Ferrisburgh	952	1,330	1,547	879	92.3%	1,266	95.2%	1,514	97.9%	73	7.7%	64	4.8%	33	2.1%				
Goshen	93	96	106	86	92.5%	80	83.3%	105	99.1%	7	7.5%	16	16.7%	1	0.9%				
Leicester	362	441	540	320	88.4%	416	94.3%	515	95.4%	42	11.6%	25	5.7%	25	4.6%				
Lincoln	406	515	704	359	88.4%	486	94.4%	685	97.3%	47	11.6%	29	5.6%	19	2.7%				
Middlebury	3,573	4,242	4,267	3,469	97.1%	4,072	96.0%	3,882	91.0%	104	2.9%	170	4.0%	385	9.0%				
Monkton	605	824	1,043	560	92.6%	779	94.5%	1,008	96.6%	45	7.4%	45	5.5%	35	3.4%				
New Haven	639	750	970	593	92.8%	736	98.1%	942	97.1%	46	7.2%	14	1.9%	28	2.9%				
Orwell	424	594	631	401	94.6%	566	95.3%	610	96.7%	23	5.4%	28	4.7%	21	3.3%				
Panton	238	309	365	227	95.4%	293	94.8%	358	98.1%	11	4.6%	16	5.2%	7	1.9%				
Ripton	181	251	352	165	91.2%	234	93.2%	323	91.8%	16	8.8%	17	6.8%	29	8.2%				
Salisbury	391	591	622	353	90.3%	568	96.1%	596	95.8%	38	9.7%	23	3.9%	26	4.2%				
Shoreham	465	599	692	447	96.1%	587	98.0%	676	97.7%	18	3.9%	12	2.0%	16	2.3%				
Starksboro	621	808	1,054	561	90.3%	790	97.8%	1,026	97.3%	60	9.7%	18	2.2%	28	2.7%				
Vergennes	1,020	1,193	1,459	960	94.1%	1,133	95.0%	1,379	94.5%	60	5.9%	60	5.0%	80	5.5%				
Waltham	192	246	265	186	96.9%	240	97.6%	265	100.0%	6	3.1%	6	2.4%	-	0.0%				
Weybridge	323	402	424	294	91.0%	394	98.0%	417	98.3%	29	9.0%	8	2.0%	7	1.7%				
Whiting	182	227	202	171	94.0%	218	96.0%	194	96.0%	11	6.0%	9	4.0%	8	4.0%				
Addison Region	13,464	17,288	19,426	12,656	94.0%	16,598	96.0%	18,545	95.5%	808	6.0%	690	4.0%	881	4.5%				
Vermont	242,456	300,746	331,131	227,195	93.7%	283,146	94.1%	317,134	95.8%	15,261	6.3%	17,600	5.9%	13,997	4.2%				

Source: U.S. Census Bureau



Table 5-6 Addison Region Annual Unemployment Rate 1990 to 2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Addison	3.5%	5.6%	5.4%	6.8%	6.4%	4.0%	4.9%	3.0%	2.6%	3.1%	4.3%	5.7%
Bridport	2.5%	5.5%	6.4%	5.2%	3.9%	3.7%	4.6%	4.4%	3.2%	2.4%	1.4%	2.8%
Bristol	5.9%	8.2%	11.4%	10.1%	7.4%	6.2%	7.0%	5.2%	5.0%	4.1%	3.3%	4.5%
Cornwall	2.5%	3.7%	4.5%	3.9%	2.9%	2.1%	3.0%	2.2%	2.2%	1.9%	1.4%	1.4%
Ferrisburgh	4.1%	7.4%	7.6%	6.3%	6.4%	4.4%	5.0%	4.0%	3.0%	3.2%	2.8%	3.5%
Goshen	3.4%	8.8%	11.0%	10.4%	5.7%	4.9%	4.9%	3.7%	4.7%	2.3%	0.0%	0.0%
Leicester	4.4%	6.0%	5.7%	6.1%	5.4%	3.9%	4.9%	4.0%	5.4%	4.0%	2.2%	4.3%
Lincoln	3.1%	5.3%	8.3%	5.7%	6.4%	3.8%	4.3%	4.0%	4.5%	4.3%	1.9%	3.9%
Middlebury	4.4%	5.6%	5.8%	6.0%	4.7%	3.8%	4.0%	3.7%	3.3%	3.0%	2.6%	2.8%
Monkton	2.8%	4.0%	3.6%	3.0%	2.6%	2.5%	2.2%	1.6%	1.7%	1.3%	1.0%	2.0%
New Haven	3.2%	4.6%	5.5%	6.1%	4.4%	3.8%	3.9%	3.4%	3.8%	2.7%	2.2%	2.2%
Orwell	4.9%	7.9%	10.0%	6.5%	5.7%	4.8%	5.9%	3.8%	2.7%	2.3%	1.4%	2.9%
Panton	2.9%	5.1%	8.1%	8.0%	5.4%	3.8%	3.1%	4.5%	1.8%	2.5%	2.9%	2.9%
Ripton	3.6%	3.9%	5.0%	6.3%	6.1%	4.4%	5.4%	3.9%	3.4%	4.3%	10.7%	13.3%
Salisbury	3.4%	5.4%	7.3%	6.5%	5.1%	5.5%	4.6%	4.3%	4.2%	3.2%	2.8%	2.9%
Shoreham	3.5%	5.2%	7.6%	6.7%	5.4%	3.9%	4.6%	3.7%	2.9%	2.4%	2.8%	2.8%
Starksboro	4.4%	6.1%	7.7%	6.2%	5.0%	5.4%	5.0%	4.8%	3.8%	3.5%	3.2%	3.2%
Vergennes	6.4%	10.9%	11.9%	10.1%	8.6%	6.6%	6.7%	5.6%	5.5%	5.3%	3.4%	4.1%
Waltham	3.5%	3.6%	5.2%	3.3%	3.0%	1.1%	2.6%	1.1%	0.7%	2.0%	0.0%	3.1%
Weybridge	2.2%	3.7%	5.7%	4.1%	2.6%	2.9%	3.3%	1.4%	2.1%	2.0%	2.3%	2.4%
Whiting	5.4%	8.3%	9.4%	7.1%	7.8%	5.7%	7.6%	9.6%	5.8%	5.1%	3.8%	3.8%
Addison Region	4.3%	6.3%	7.4%	6.8%	5.6%	4.3%	4.7%	4.1%	3.5%	3.2%	2.7%	3.4%
Vermont	5.0%	6.4%	6.7%	5.5%	4.7%	4.2%	4.6%	4.0%	3.4%	3.0%	2.9%	3.6%

Source: VT Department of Employment and Training

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Table 5-7 Addison Region Employment by Industry 1980 to 2000¹³

	1980		1990		2000	
	#	%	#	%	#	%
Agriculture, Forestry, Fisheries, Mining	1,525	12.0%	1,580	9.5%	1,285	6.9%
Construction	791	6.3%	1,456	8.8%	1,407	7.6%
Manufacturing	2,768	21.9%	2,783	16.8%	2,622	14.1%
Transportation	335	2.6%	457	2.8%	503	2.7%
Communication, Information, Public Utilities	171	1.4%	235	1.4%	437	2.4%
Wholesale Trade	333	2.6%	572	3.4%	598	3.2%
Retail Trade	1,733	13.7%	2,290	13.8%	1,935	10.4%
Finance, Insurance, Real Estate	396	3.1%	485	2.9%	674	3.6%
Professional, Scientific, Administrative					1,144	6.2%
Health & Human Services	672	5.3%	948	5.7%	2,002	10.8%
Educational Services	2,291	18.1%	2,958	17.8%	3,324	17.9%
Arts, Entertainment, Recreation			149	0.9%	319	1.7%
Personal Services	488	3.9%	526	3.2%		
Food & Lodging					919	5.0%
Business & Repair Services	360	2.8%	569	3.4%		
Other Services	412	3.3%	1,064	6.4%	863	4.7%
Public Administration	381	3.0%	526	3.2%	513	2.8%
Total	12,656		16,598		18,545	

Source: U.S. Census Bureau

Table 5-8 Addison Region Employment by Occupation 1980 to 2000¹⁴

	1980		1990		2000	
	#	%	#	%	#	%
Executive, Administrative, Managerial	958	7.6%	1,745	10.5%		
Management, Business, Financial					2,603	14.0%
Professional	1,762	13.9%	2,673	16.1%	4,211	22.7%
Technical	320	2.5%	521	3.1%		
Sales	995	7.9%	1,333	8.0%	1,656	8.9%
Office and Administrative Support	1,583	12.5%	2,218	13.4%	2,393	12.9%
Protective Service	92	0.7%	111	0.7%	181	1.0%
Healthcare Support					266	1.4%
Food Service					981	5.3%
Cleaning and Maintenance					599	3.2%
Personal Care	1,726	13.6%	2,087	12.6%	710	3.8%
Farming, Forestry, Fishing	1,499	11.8%	1,427	8.6%	532	2.9%
Precision Production, Craft, Repair	1,624	12.8%	2,154	13.0%		
Operators, Fabricators, Laborers	2,097	16.6%	2,329	14.0%		
Construction, Extraction, Maintenance					1,925	10.4%
Production, Transportation, Material Moving					2,488	13.4%
Total	12,656		16,598		18,545	

Source: U.S. Census Bureau



Table 5-9 Addison Region Income 1980 to 2000¹⁵

		Unadjusted			Real			Change 1980 to 2000					
		Median Household Income	Median Family Income	Per Capita Income	Median Household Income	Median Family Income	Per Capita Income	Median Household Income #	Median Household Income %	Median Family Income #	Median Family Income %	Per Capita Income #	Per Capita Income %
Addison	1980	\$13,155	\$14,922	\$5,272	\$30,241	\$34,303	\$12,120						
	1990	\$32,500	\$36,131	\$13,481	\$43,742	\$48,629	\$18,144						
	2000	\$45,063	\$48,696	\$18,000	\$45,063	\$48,696	\$18,000	\$14,822	49.0%	\$14,393	42.0%	\$5,880	48.5%
Bridport	1980	\$14,597	\$15,625	\$5,215	\$33,556	\$35,920	\$11,989						
	1990	\$28,346	\$29,837	\$11,146	\$38,151	\$40,157	\$15,001						
	2000	\$44,531	\$48,542	\$19,720	\$44,531	\$48,542	\$19,720	\$10,975	32.7%	\$12,622	35.1%	\$7,731	64.5%
Bristol	1980	\$12,723	\$14,250	\$5,059	\$29,248	\$32,759	\$11,630						
	1990	\$27,425	\$31,360	\$11,652	\$36,911	\$42,207	\$15,682						
	2000	\$43,250	\$48,458	\$19,345	\$43,250	\$48,458	\$19,345	\$14,002	47.9%	\$15,699	47.9%	\$7,715	66.3%
Cornwall	1980	\$17,821	\$19,214	\$6,717	\$40,968	\$44,170	\$15,441						
	1990	\$38,438	\$41,484	\$15,389	\$51,734	\$55,833	\$20,712						
	2000	\$52,692	\$59,792	\$26,902	\$52,692	\$59,792	\$26,902	\$11,724	28.6%	\$15,622	35.4%	\$11,461	74.2%
Ferrisburgh	1980	\$15,345	\$16,957	\$5,947	\$35,276	\$38,982	\$13,671						
	1990	\$33,611	\$36,701	\$13,750	\$45,237	\$49,396	\$18,506						
	2000	\$53,672	\$61,111	\$23,066	\$53,672	\$61,111	\$23,066	\$18,396	52.1%	\$22,129	56.8%	\$9,395	68.7%
Goshen	1980	\$17,917	\$20,000	\$7,612	\$41,189	\$45,977	\$17,499						
	1990	\$35,000	\$38,750	\$17,064	\$47,106	\$52,153	\$22,966						
	2000	\$36,500	\$58,750	\$17,031	\$36,500	\$58,750	\$17,031	-\$4,689	-11.4%	\$12,773	27.8%	-\$468	-2.7%
Leicester	1980	\$12,216	\$13,304	\$4,958	\$28,083	\$30,584	\$11,398						
	1990	\$30,313	\$34,000	\$12,080	\$40,798	\$45,760	\$16,258						
	2000	\$35,781	\$45,375	\$21,938	\$35,781	\$45,375	\$21,938	\$7,698	27.4%	\$14,791	48.4%	\$10,540	92.5%
Lincoln	1980	\$13,438	\$14,769	\$5,193	\$30,892	\$33,952	\$11,938						
	1990	\$29,659	\$32,417	\$12,268	\$39,918	\$43,630	\$16,511						
	2000	\$45,750	\$51,369	\$21,092	\$45,750	\$51,369	\$21,092	\$14,858	48.1%	\$17,417	51.3%	\$9,154	76.7%
Middlebury	1980	\$15,736	\$19,145	\$5,608	\$36,175	\$44,011	\$12,892						
	1990	\$29,784	\$38,457	\$12,622	\$40,086	\$51,759	\$16,988						
	2000	\$37,723	\$46,691	\$17,926	\$37,723	\$46,691	\$17,926	\$1,548	4.3%	\$2,680	6.1%	\$5,034	39.0%
Monkton	1980	\$16,705	\$17,179	\$5,737	\$38,402	\$39,492	\$13,189						
	1990	\$36,161	\$38,056	\$12,929	\$48,669	\$51,219	\$17,401						
	2000	\$53,807	\$58,611	\$22,256	\$53,807	\$58,611	\$22,256	\$15,405	40.1%	\$19,119	48.4%	\$9,067	68.8%
New Haven	1980	\$15,512	\$16,545	\$6,075	\$35,660	\$38,034	\$13,966						
	1990	\$32,197	\$35,521	\$13,990	\$43,334	\$47,808	\$18,829						
	2000	\$47,014	\$52,083	\$21,321	\$47,014	\$52,083	\$21,321	\$11,354	31.8%	\$14,049	36.9%	\$7,355	52.7%

Source: U.S. Census Bureau



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Table 5-9 Addison Region Income 1980 to 2000 (con't)

		Unadjusted			Real			Change 1980 to 2000					
		Median Household Income	Median Family Income	Per Capita Income	Median Household Income	Median Family Income	Per Capita Income	Median Household Income #	Median Household Income %	Median Family Income #	Median Family Income %	Per Capita Income #	Per Capita Income %
Orwell	1980	\$14,125	\$15,000	\$5,365	\$32,471	\$34,483	\$12,333						
	1990	\$28,203	\$29,688	\$10,852	\$37,958	\$39,957	\$14,606						
	2000	\$40,978	\$42,438	\$19,835	\$40,978	\$42,438	\$19,835	\$8,507	26.2%	\$7,955	23.1%	\$7,502	60.8%
Panton	1980	\$12,446	\$15,893	\$5,089	\$28,611	\$36,536	\$11,699						
	1990	\$29,327	\$34,375	\$13,930	\$39,471	\$46,265	\$18,748						
	2000	\$46,184	\$49,375	\$20,586	\$46,184	\$49,375	\$20,586	\$17,573	61.4%	\$12,839	35.1%	\$8,887	76.0%
Ripton	1980	\$11,731	\$15,625	\$6,984	\$26,968	\$35,920	\$16,055						
	1990	\$30,950	\$32,330	\$17,279	\$41,655	\$43,513	\$23,256						
	2000	\$39,583	\$47,813	\$19,597	\$39,583	\$47,813	\$19,597	\$12,615	46.8%	\$11,893	33.1%	\$3,542	22.1%
Salisbury	1980	\$14,643	\$15,511	\$5,237	\$33,662	\$35,657	\$12,039						
	1990	\$33,077	\$37,083	\$12,765	\$44,518	\$49,910	\$17,180						
	2000	\$39,500	\$45,455	\$19,306	\$39,500	\$45,455	\$19,306	\$5,838	17.3%	\$9,798	27.5%	\$7,267	60.4%
Shoreham	1980	\$15,034	\$15,455	\$5,511	\$34,561	\$35,529	\$12,669						
	1990	\$28,611	\$31,979	\$13,472	\$38,507	\$43,040	\$18,132						
	2000	\$39,375	\$43,958	\$17,650	\$39,375	\$43,958	\$17,650	\$4,814	13.9%	\$8,429	23.7%	\$4,981	39.3%
Starksboro	1980	\$13,854	\$14,412	\$5,308	\$31,848	\$33,131	\$12,202						
	1990	\$29,375	\$34,632	\$12,001	\$39,536	\$46,611	\$16,152						
	2000	\$44,559	\$46,771	\$17,688	\$44,559	\$46,771	\$17,688	\$12,711	39.9%	\$13,640	41.2%	\$5,486	45.0%
Vergennes	1980	\$14,219	\$16,820	\$5,710	\$32,687	\$38,667	\$13,126						
	1990	\$24,871	\$30,517	\$11,587	\$33,474	\$41,073	\$15,595						
	2000	\$37,763	\$48,155	\$15,465	\$37,763	\$48,155	\$15,465	\$5,076	15.5%	\$9,488	24.5%	\$2,339	17.8%
Waltham	1980	\$16,250	\$17,321	\$5,694	\$37,356	\$39,818	\$13,090						
	1990	\$35,139	\$37,500	\$14,627	\$47,293	\$50,471	\$19,686						
	2000	\$46,389	\$47,813	\$21,567	\$46,389	\$47,813	\$21,567	\$9,033	24.2%	\$7,995	20.1%	\$8,477	64.8%
Weybridge	1980	\$17,375	\$18,527	\$6,261	\$39,943	\$42,591	\$14,393						
	1990	\$37,847	\$39,500	\$15,799	\$50,938	\$53,163	\$21,264						
	2000	\$51,833	\$56,591	\$24,735	\$51,833	\$56,591	\$24,735	\$11,890	29.8%	\$14,000	32.9%	\$10,342	71.9%
Whiting	1980	\$15,909	\$17,500	\$5,845	\$36,572	\$40,230	\$13,437						
	1990	\$26,250	\$30,313	\$10,882	\$35,330	\$40,798	\$14,646						
	2000	\$31,985	\$41,250	\$20,101	\$31,985	\$41,250	\$20,101	-\$4,587	-12.5%	\$1,020	2.5%	\$6,664	49.6%
Addison County	1980	\$14,751	\$16,548	\$5,574	\$33,910	\$38,041	\$12,814						
	1990	\$29,327	\$32,330	\$12,765	\$39,471	\$43,513	\$17,180						
	2000	\$43,142	\$49,351	\$19,539	\$43,142	\$49,351	\$19,539	\$9,232	27.2%	\$11,310	29.7%	\$6,725	52.5%
Vermont	1980	\$14,791	\$17,206	\$6,179	\$34,002	\$39,554	\$14,205						
	1990	\$29,792	\$34,780	\$13,527	\$40,097	\$46,810	\$18,206						
	2000	\$40,856	\$48,625	\$20,625	\$40,856	\$48,625	\$20,625	\$6,854	20.2%	\$9,071	22.9%	\$6,420	45.2%

Source: U.S. Census Bureau



Table 5-10 Addison Region Full- and Part-Time Employment 1980 to 2000

		Total	Full-Time All Year		Full-Time Part of Year		Part-Time All Year		Part-Time Part of Year	
			#	%	#	%	#	%	#	%
Addison	1980	332	189	56.9%	83	25.0%	26	7.8%	34	10.2%
	1990	452	242	53.5%	107	23.7%	39	8.6%	64	14.2%
	2000	641	334	52.1%	106	16.5%	79	12.3%	122	19.0%
Bridport	1980	396	201	50.8%	132	33.3%	25	6.3%	38	9.6%
	1990	560	258	46.1%	124	22.1%	86	15.4%	92	16.4%
	2000	549	307	55.9%	93	16.9%	59	10.7%	90	16.4%
Bristol	1980	1,243	577	46.4%	483	38.9%	43	3.5%	140	11.3%
	1990	1,788	836	46.8%	474	26.5%	255	14.3%	223	12.5%
	2000	1,613	808	50.1%	372	23.1%	178	11.0%	255	15.8%
Cornwall	1980	464	216	46.6%	162	34.9%	23	5.0%	63	13.6%
	1990	527	239	45.4%	110	20.9%	74	14.0%	104	19.7%
	2000	563	233	41.4%	137	24.3%	68	12.1%	125	22.2%
Ferrisburgh	1980	814	443	54.4%	223	27.4%	48	5.9%	100	12.3%
	1990	1,110	556	50.1%	234	21.1%	131	11.8%	189	17.0%
	2000	1,247	671	53.8%	244	19.6%	178	14.3%	154	12.3%
Goshen	1980	71	32	45.1%	17	23.9%	9	12.7%	13	18.3%
	1990	89	33	37.1%	34	38.2%	1	1.1%	21	23.6%
	2000	107	30	28.0%	24	22.4%	19	17.8%	34	31.8%
Leicester	1980	312	135	43.3%	118	37.8%	26	8.3%	33	10.6%
	1990	368	197	53.5%	92	25.0%	43	11.7%	36	9.8%
	2000	449	210	46.8%	122	27.2%	50	11.1%	67	14.9%
Lincoln	1980	371	136	36.7%	170	45.8%	22	5.9%	43	11.6%
	1990	451	205	45.5%	136	30.2%	38	8.4%	72	16.0%
	2000	583	268	46.0%	108	18.5%	89	15.3%	118	20.2%
Middlebury	1980	4,125	1,077	26.1%	1,914	46.4%	241	5.8%	893	21.6%
	1990	4,816	1,221	25.4%	1,900	39.5%	444	9.2%	1,251	26.0%
	2000	4,602	1,083	23.5%	1,545	33.6%	456	9.9%	1,518	33.0%
Monkton	1980	512	262	51.2%	176	34.4%	18	3.5%	56	10.9%
	1990	696	339	48.7%	167	24.0%	61	8.8%	129	18.5%
	2000	845	419	49.6%	163	19.3%	123	14.6%	140	16.6%
New Haven	1980	558	298	53.4%	169	30.3%	31	5.6%	60	10.8%
	1990	639	326	51.0%	126	19.7%	99	15.5%	88	13.8%
	2000	787	369	46.9%	173	22.0%	92	11.7%	153	19.4%

Source: U.S. Census Bureau



Table 5-10 Addison Region Full- and Part-Time Employment 1980 to 2000 (con't)

		Total	Full-Time All Year		Full-Time Part of Year		Part-Time All Year		Part-Time Part of Year	
			#	%	#	%	#	%	#	%
Orwell	1980	361	173	47.9%	116	32.1%	28	7.8%	44	12.2%
	1990	539	223	41.4%	148	27.5%	58	10.8%	110	20.4%
	2000	542	251	46.3%	116	21.4%	77	14.2%	98	18.1%
Panton	1980	202	95	47.0%	71	35.1%	8	4.0%	28	13.9%
	1990	268	135	50.4%	84	31.3%	19	7.1%	30	11.2%
	2000	304	148	48.7%	75	24.7%	31	10.2%	50	16.4%
Ripton	1980	146	59	40.4%	61	41.8%	5	3.4%	21	14.4%
	1990	232	71	30.6%	90	38.8%	30	12.9%	41	17.7%
	2000	287	126	43.9%	47	16.4%	56	19.5%	58	20.2%
Salisbury	1980	335	157	46.9%	107	31.9%	30	9.0%	41	12.2%
	1990	531	244	46.0%	130	24.5%	64	12.1%	93	17.5%
	2000	483	247	51.1%	75	15.5%	71	14.7%	90	18.6%
Shoreham	1980	418	218	52.2%	130	31.1%	28	6.7%	42	10.0%
	1990	531	239	45.0%	142	26.7%	48	9.0%	102	19.2%
	2000	540	255	47.2%	99	18.3%	62	11.5%	124	23.0%
Starksboro	1980	491	255	51.9%	163	33.2%	13	2.6%	60	12.2%
	1990	696	347	49.9%	170	24.4%	56	8.0%	123	17.7%
	2000	869	427	49.1%	217	25.0%	85	9.8%	140	16.1%
Vergennes	1980	927	396	42.7%	324	35.0%	57	6.1%	150	16.2%
	1990	1,092	463	42.4%	406	37.2%	59	5.4%	164	15.0%
	2000	1,207	493	40.8%	351	29.1%	121	10.0%	242	20.0%
Waltham	1980	174	89	51.1%	51	29.3%	14	8.0%	20	11.5%
	1990	212	114	53.8%	60	28.3%	11	5.2%	27	12.7%
	2000	210	125	59.5%	32	15.2%	10	4.8%	43	20.5%
Weybridge	1980	274	137	50.0%	86	31.4%	17	6.2%	34	12.4%
	1990	368	154	41.8%	99	26.9%	35	9.5%	80	21.7%
	2000	384	166	43.2%	87	22.7%	45	11.7%	86	22.4%
Whiting	1980	157	75	47.8%	55	35.0%	10	6.4%	17	10.8%
	1990	175	85	48.6%	38	21.7%	29	16.6%	23	13.1%
	2000	163	78	47.9%	48	29.4%	13	8.0%	24	14.7%
Addison Region	1980	12,683	5,220	41.2%	4,811	37.9%	722	5.7%	1,930	15.2%
	1990	16,140	6,527	40.4%	4,871	30.2%	1,680	10.4%	3,062	19.0%
	2000	16,975	7,048	41.5%	4,234	24.9%	1,962	11.6%	3,731	22.0%
Vermont	1980	212,622	92,316	43.4%	76,805	36.1%	12,174	5.7%	31,327	14.7%
	1990	263,322	112,542	42.7%	72,908	27.7%	27,894	10.6%	49,978	19.0%
	2000	279,945	122,038	43.6%	67,590	24.1%	35,040	12.5%	55,277	19.7%

Source: U.S. Census Bureau



Table 5-11 Addison County Employers by Size Class of Firm in 2000¹⁶

	Total	4 or less		5 to 9		10 to 19		20 to 49		50 to 99		100 to 249		250 to 499		500 to 999		1,000 or more	Total Confidential	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	#	%
1987	804	438	54.5%	226	28.1%	73	9.1%	44	5.5%	14	1.7%	6	0.7%	n		n		n	3	0.4%
1988	844	463	54.9%	224	26.5%	90	10.7%	43	5.1%	13	1.5%	7	0.8%	n		-	-	n	4	0.5%
1989	884	552	62.4%	170	19.2%	97	11.0%	41	4.6%	13	1.5%	7	0.8%	n		-	-	n	4	0.5%
1990	911	571	62.7%	178	19.5%	99	10.9%	41	4.5%	14	1.5%	4	0.4%	n		-	-	n	4	0.4%
1991	955	612	64.1%	174	18.2%	100	10.5%	49	5.1%	11	1.2%	6	0.6%	n		-	-	n	3	0.3%
1992	952	605	63.6%	183	19.2%	95	10.0%	47	4.9%	13	1.4%	6	0.6%	n		-		n	3	0.3%
1993	956	613	64.1%	179	18.7%	99	10.4%	45	4.7%	12	1.3%	5	0.5%	n		n		-	3	0.3%
1994	942	588	62.4%	174	18.5%	104	11.0%	57	6.1%	12	1.3%	4	0.4%	-	-	3	0.3%	-	-	-
1995	949	582	61.3%	179	18.9%	111	11.7%	54	5.7%	16	1.7%	4	0.4%	-	-	n		n	3	0.3%
1996	949	562	59.2%	196	20.7%	105	11.1%	58	6.1%	19	2.0%	5	0.5%	n		n		n	4	0.4%
1997																				
1998	1,030	627	60.9%	203	19.7%	107	10.4%	61	5.9%	23	2.2%	6	0.6%	n		n		n	3	0.3%
1999	1,053	633	60.1%	210	19.9%	120	11.4%	58	5.5%	21	2.0%	6	0.6%	3	0.3%	n		n	2	0.2%
2000	1,100	650	59.1%	224	20.4%	135	12.3%	57	5.2%	24	2.2%	5	0.5%	3		n		n	2	0.2%
2001	1,154	707	61.3%	214	18.5%	135	11.7%	65	5.6%	21	1.8%	8	0.7%	n		n		n	4	0.3%

Source: Vermont Department of Employment and Training

Table 5-12 Addison County Employees by Size Class of Firm in 2000¹⁷

	Total	4 or less		5 to 9		10 to 19		20 to 49		50 to 99		100 to 249		250 to 499		500 to 999		1,000 or more	Total Confidential	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	#	%
1987	9,573	822	8.6%	1,321	13.8%	1,000	10.4%	1,380	14.4%	998	10.4%	963	10.1%	n		n		n	3,089	32.3%
1988	9,967	902	9.0%	1,417	14.2%	1,356	13.6%	1,222	12.3%	860	8.6%	903	9.1%	n		-	-	n	3,307	33.2%
1989	9,823	1,245	12.7%	1,111	11.3%	1,411	14.4%	1,329	13.5%	934	9.5%	806	8.2%	n		-	-	n	2,987	30.4%
1990	9,665	1,181	12.2%	1,206	12.5%	1,409	14.6%	1,391	14.4%	971	10.0%	582	6.0%	n		-	-	n	2,925	30.3%
1991	9,165	1,238	13.5%	1,149	12.5%	1,273	13.9%	1,583	17.3%	654	7.1%	907	9.9%	n		-	-	n	2,361	25.8%
1992	9,261	1,211	13.1%	1,224	13.2%	1,310	14.1%	1,495	16.1%	778	8.4%	890	9.6%	n		-	-	n	2,353	25.4%
1993	9,259	1,303	14.1%	1,234	13.3%	1,367	14.8%	1,516	16.4%	663	7.2%	908	9.8%	n		n		-	2,268	24.5%
1994	9,507	1,247	13.1%	1,175	12.4%	1,433	15.1%	1,915	20.1%	794	8.4%	727	7.6%	-	-	2,217	23.3%	-	-	-
1995	9,818	1,242	12.7%	1,230	12.5%	1,502	15.3%	1,797	18.3%	1,087	11.1%	735	7.5%	-	-	n		n	2,225	22.7%
1996	10,090	1,232	12.2%	1,363	13.5%	1,397	13.8%	1,849	18.3%	1,272	12.6%	796	7.9%	n		n		n	2,181	21.6%
1997																				
1998	10,847	1,395	12.9%	1,381	12.7%	1,463	13.5%	1,833	16.9%	1,574	14.5%	1,109	10.2%	n		n		n	2,092	19.3%
1999	11,289	1,255	11.1%	1,463	13.0%	1,681	14.9%	1,818	16.1%	1,489	13.2%	989	8.8%	733	6.5%	n		n	1,861	16.5%
2000	11,748	1,287	11.0%	1,550	13.2%	1,670	14.2%	2,046	17.4%	1,640	14.0%	1,024	8.7%	660	5.6%	n		n	1,871	15.9%
2001	12,076	1,360	11.3%	1,569	13.0%	1,707	14.1%	2,030	16.8%	1,688	14.0%	1,427	11.8%	n		n		n	2,295	19.0%

Source: Vermont Department of Employment and Training



(May 12, 2004) ACRPC

Table 5-13 Addison County and Vermont Employment 2000¹⁸

NAICS Code	Industry	Addison County			Vermont		
		Units	Employees	Average Wage	Units	Employees	Average Wage
Total		1,243	13,730	\$27,011	23,851	296,448	\$28,924
Total Private		1,129	11,752	\$27,281	22,174	249,095	\$28,702
11	Agriculture & Forestry	61	488	\$19,710	311	2,194	\$19,548
21	Mining	8	50	\$26,782	69	938	\$35,350
23	Construction	145	687	\$30,736	2,650	14,951	\$31,346
31-33	Manufacturing	70	2,223	\$36,295	1,293	46,722	\$39,830
42	Wholesale Trade	55	312	\$31,052	1,229	9,878	\$38,266
44-45	Retail Trade	188	1,903	\$21,755	3,827	39,779	\$19,851
48-49	Transportation & Warehousing	39	256	\$23,146	597	6,794	\$30,546
51	Information	16	119	\$24,931	479	6,840	\$33,110
52	Finance & Insurance	38	336	\$34,003	899	9,615	\$42,434
531	Real Estate	18	35	\$19,171	494	1,739	\$25,903
532	Rental & Leasing	11	63	\$11,664	184	1,262	\$19,447
541	Professional & Technical	96	428	\$32,145	2,294	12,273	\$41,936
561	Administrative & Support	37	176	\$20,238	916	7,457	\$18,844
562	Waste Management	4	42	\$22,981	93	804	\$34,011
61	Education	13	1,350	40,648	263	8,633	\$28,174
62	Healthcare & Social Assistance	100	1,637	\$23,991	1,736	34,182	\$28,068
71	Arts, Entertainment & Recreation	12	92	\$14,720	345	3,309	\$17,029
721	Accommodation	23	368	\$15,738	517	11,742	\$16,990
722	Food & Drink	49	787	\$10,847	1,250	17,946	\$11,198
81	Other	147	376	\$15,168	2,639	10,008	\$20,544
Government Total		114	1,978	\$25,407	1,677	47,353	\$30,091
Federal Government		39	154	\$32,428	601	6,064	\$40,716
491	Postal service	30	93	\$35,899	397	2,417	\$36,533
92	Public administration	9	61	\$27,168	188	2,798	\$41,632
State government		12	187	\$28,052	255	14,661	\$33,255
237	Engineering & Construction	1	25	\$33,917	16	539	\$33,910
54-56	Professional & Business	1	12	\$34,112	17	555	\$33,829
611	Education	2	50	\$10,935	31	5,561	\$31,753
624	Social Assistance	2	29	\$33,252	36	949	\$34,345
92	Public administration	6	71	\$34,827	146	6,533	\$34,177
Local government		63	1,637	\$24,446	821	26,628	\$25,930
237	Engineering & Construction	2	15	\$27,237	29	536	\$29,956
22	Utilities	4	17	\$32,734	45	385	\$39,613
51	Information	1	15	\$13,379	12	105	\$14,207
561	Administrative & Support	1	5	\$10,789	10	25	\$19,493
6111	Elementary & Secondary Schools	27	1,359	\$25,392	272	19,536	\$26,568
71	Arts, Entertainment & Recreation	1	14	\$13,378	15	264	\$15,128
92	Public Administration	27	213	\$19,345	414	5,493	\$23,103

Source: Vermont Department of Employment and Training



Table 5-14 Employment in Addison County 1970 to 2000

	1970		1975		1980		1985		1990		1995		2000	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Total Employment (Full-time and Part-time)	9,860		10,954		13,991		15,563		17,420		18,318		21,364	
Wage & Salary Employment	7,512	76.2%	8,369	76.4%	10,766	76.9%	11,432	73.5%	12,915	74.1%	13,498	73.7%	15,842	74.2%
Farm	1,011	10.3%	845	7.7%	1,147	8.2%	613	3.9%	548	3.1%	645	3.5%	661	3.1%
Nonfarm	6,501	65.9%	7,524	68.7%	9,619	68.8%	10,819	69.5%	12,367	71.0%	12,853	70.2%	15,181	71.1%
Proprietors' Employment	2,348	23.8%	2,585	23.6%	3,225	23.1%	4,131	26.5%	4,505	25.9%	4,820	26.3%	5,522	25.8%
Farm	958	9.7%	850	7.8%	921	6.6%	928	6.0%	834	4.8%	823	4.5%	883	4.1%
Nonfarm	1,390	14.1%	1,735	15.8%	2,304	16.5%	3,203	20.6%	3,671	21.1%	3,997	21.8%	4,639	21.7%
Private Employment	6,377	64.7%	7,842	71.6%	10,491	75.0%	12,438	79.9%	14,200	81.5%	14,866	81.2%	17,555	82.2%
Agriculture Services, Forestry & Fishing	111	1.1%	95	0.9%	155	1.1%	184	1.2%	307	1.8%			521	2.4%
Mining	1	0.01%	3	0.03%	1	0.01%	3	0.02%	20	0.1%			49	0.2%
Construction	455	4.6%	519	4.7%	708	5.1%	948	6.1%	1,350	7.7%	1,227	6.7%	1,430	6.7%
Manufacturing	1,768	17.9%	2,019	18.4%	3,063	21.9%	3,146	20.2%	2,704	15.5%	2,099	11.5%	2,307	10.8%
Transportation & Utilities	218	2.2%	266	2.4%	273	2.0%	404	2.6%	512	2.9%	527	2.9%	588	2.8%
Wholesale Trade	77	0.8%	332	3.0%	475	3.4%	419	2.7%	439	2.5%	452	2.5%	483	2.3%
Retail Trade	1,235	12.5%	1,287	11.7%	1,645	11.8%	2,207	14.2%	2,628	15.1%	2,915	15.9%	3,338	15.6%
Finance, Insurance and Real Estate	380	3.9%	469	4.3%	513	3.7%	633	4.1%	729	4.2%	711	3.9%	888	4.2%
Services	2,132	21.6%	2,852	26.0%	3,658	26.1%	4,494	28.9%	5,511	31.6%	6,531	35.7%	7,951	37.2%
Confidential											404	2.2%		
Government	1,514	15.4%	1,417	12.9%	1,432	10.2%	1,584	10.2%	1,838	10.6%	1,984	10.8%	2,265	10.6%
Federal	128	1.3%	111	1.0%	109	0.8%	110	0.7%	143	0.8%	136	0.7%	153	0.7%
Military	228	2.3%	285	2.6%	244	1.7%	273	1.8%	288	1.7%	291	1.6%	268	1.3%
State					123	0.9%	120	0.8%	136	0.8%	170	0.9%	201	0.9%
Local					956	6.8%	1,081	6.9%	1,271	7.3%	1,387	7.6%	1,643	7.7%
Confidential	1,158	11.7%	1,021	9.3%										

Source: U.S. Bureau of Economic Analysis



(May 12, 2004) **ACRPC**

Table 5-15 Employment in Rutland County 1970 to 2000

	1970		1975		1980		1985		1990		1995		2000	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Total Employment (Full-time and Part-time)	23,995		25,858		29,824		32,779		35,821		36,432		38,310	
Wage & Salary Employment	19,996	83.3%	21,521	83.2%	24,219	81.2%	26,605	81.2%	29,507	82.4%	29,896	82.1%	31,196	81.4%
Farm	500	2.1%	418	1.6%	553	1.9%	280	0.9%	209	0.6%	192	0.5%	182	0.5%
Nonfarm	19,496	81.3%	21,103	81.6%	23,666	79.4%	26,325	80.3%	29,298	81.8%	29,704	81.5%	31,014	81.0%
Proprietors' Employment	3,999	16.7%	4,337	16.8%	5,605	18.8%	6,174	18.8%	6,314	17.6%	6,536	17.9%	7,114	18.6%
Farm	624	2.6%	576	2.2%	681	2.3%	656	2.0%	582	1.6%	545	1.5%	563	1.5%
Nonfarm	3,375	14.1%	3,761	14.5%	4,924	16.5%	5,518	16.8%	5,732	16.0%	5,991	16.4%	6,551	17.1%
Private Employment	19,523	81.4%	20,923	80.9%	24,959	83.7%	28,031	85.5%	30,573	85.3%	30,907	84.8%	32,788	85.6%
Agriculture Services, Forestry & Fishing	165	0.7%	216	0.8%	289	1.0%	333	1.0%	391	1.1%	503	1.4%	636	
Mining	396	1.7%	191	0.7%	210	0.7%	193	0.6%	232	0.6%	237	0.7%	320	
Construction	1,616	6.7%	1,209	4.7%	1,456	4.9%	2,433	7.4%	2,633	7.4%	2,331	6.4%	2,497	6.5%
Manufacturing	4,705	19.6%	4,883	18.9%	5,776	19.4%	5,564	17.0%	5,749	16.0%	5,014	13.8%	4,982	13.0%
Transportation & Utilities	1,182	4.9%	1,308	5.1%	1,487	5.0%	1,523	4.6%	1,698	4.7%	1,658	4.6%	1,548	4.0%
Wholesale Trade	759	3.2%	1,014	3.9%	1,320	4.4%	1,414	4.3%	1,301	3.6%	1,270	3.5%	1,319	3.4%
Retail Trade	3,967	16.5%	4,411	17.1%	5,021	16.8%	5,720	17.5%	6,228	17.4%	7,112	19.5%	7,380	19.3%
Finance, Insurance and Real Estate	1,444	6.0%	1,493	5.8%	1,832	6.1%	2,096	6.4%	2,097	5.9%	1,741	4.8%	1,862	4.9%
Services	5,289	22.0%	6,198	24.0%	7,568	25.4%	8,755	26.7%	10,244	28.6%	11,041	30.3%	12,244	32.0%
Withheld														
Government	3,348	14.0%	3,941	15.2%	3,631	12.2%	3,812	11.6%	4,457	12.4%	4,788	13.1%	4,777	12.5%
Federal	345	1.4%	323	1.2%	299	1.0%	310	0.9%	366	1.0%	356	1.0%	422	1.1%
Military	513	2.1%	611	2.4%	493	1.7%	518	1.6%	544	1.5%	528	1.4%	474	1.2%
State					1,173	3.9%	1,163	3.5%	1,343	3.7%	1,441	4.0%	1,017	2.7%
Local					1,666	5.6%	1,821	5.6%	2,204	6.2%	2,463	6.8%	2,864	7.5%
Withheld	2,490	10.4%	3,007	11.6%										

Source: U.S. Bureau of Economic Analysis



Table 5-16 Employment in Chittenden County 1970 to 2000

	1970		1975		1980		1985		1990		1995		2000	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Total Employment (Full-time and Part-time)	49,427		51,062		67,241		82,589		99,774		105,543		120,571	
Wage & Salary Employment	44,774	90.6%	45,160	88.4%	59,104	87.9%	70,440	85.3%	84,206	84.4%	89,043	84.4%	102,082	84.7%
Farm	706	1.4%	564	1.1%	536	0.8%	254	0.3%	202	0.2%	199	0.2%	196	0.2%
Nonfarm	44,068	89.2%	44,596	87.3%	58,568	87.1%	70,186	85.0%	84,004	84.2%	88,844	84.2%	101,886	84.5%
Proprietors' Employment	4,653	9.4%	5,902	11.6%	8,137	12.1%	12,149	14.7%	15,568	15.6%	16,500	15.6%	18,489	15.3%
Farm	519	1.1%	477	0.9%	612	0.9%	600	0.7%	509	0.5%	501	0.5%	546	0.5%
Nonfarm	4,134	8.4%	5,425	10.6%	7,525	11.2%	11,549	14.0%	15,059	15.1%	15,999	15.2%	17,943	14.9%
Private Employment	40,779	82.5%	39,990	78.3%	55,456	82.5%	70,732	85.6%	85,819	86.0%	91,529	86.7%	105,294	87.3%
Agriculture Services, Forestry & Fishing	105	0.2%	142	0.3%	268	0.4%	375	0.5%	710	0.7%	878	0.8%		
Mining	56	0.1%	61	0.1%	56	0.1%	68	0.1%	56	0.1%	64	0.1%		
Construction	3,388	6.9%	2,682	5.3%	4,023	6.0%	5,280	6.4%	6,306	6.3%	6,197	5.9%	7,399	6.1%
Manufacturing	10,500	21.2%	9,227	18.1%	15,041	22.4%	17,250	20.9%	16,459	16.5%	14,895	14.1%	17,520	14.5%
Transportation & Utilities	2,186	4.4%	2,222	4.4%	2,621	3.9%	3,093	3.7%	4,030	4.0%	4,397	4.2%	5,035	4.2%
Wholesale Trade	1,940	3.9%	2,303	4.5%	2,801	4.2%	3,571	4.3%	4,427	4.4%	5,217	4.9%	4,518	3.7%
Retail Trade	7,155	14.5%	7,892	15.5%	10,751	16.0%	14,218	17.2%	17,081	17.1%	17,584	16.7%	19,194	15.9%
Finance, Insurance and Real Estate	2,534	5.1%	3,081	6.0%	4,079	6.1%	5,456	6.6%	7,345	7.4%	7,467	7.1%	8,074	6.7%
Services	12,915	26.1%	12,380	24.2%	15,816	23.5%	21,421	25.9%	29,405	29.5%	34,830	33.0%	42,282	35.1%
Withheld													1,272	1.2%
Government	7,423	15.0%	10,031	19.6%	10,637	15.8%	11,003	13.3%	13,244	13.3%	13,314	12.6%	14,535	12.1%
Federal	1,124	2.3%	1,115	2.2%	1,193	1.8%	1,275	1.5%	1,884	1.9%	1,701	1.6%	1,912	1.6%
Military	983	2.0%	1,178	2.3%	1,020	1.5%	1,127	1.4%	1,205	1.2%	1,215	1.2%	1,126	0.9%
State					4,433	6.6%	4,458	5.4%	5,028	5.0%	4,835	4.6%	5,485	4.5%
Local					3,991	5.9%	4,143	5.0%	5,127	5.1%	5,563	5.3%	6,012	5.0%
Withheld	5,316	10.8%	7,738	15.2%										

Source: U.S. Bureau of Economic Analysis



Table 5-17 Employment in Vermont 1970 to 2000

	1970		1975		1980		1985		1990		1995		2000	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Total Employment (Full-time and Part-time)	205,014		220,325		266,414		301,959		343,683		365,213		405,680	
Wage & Salary Employment	173,748	84.7%	183,702	83.4%	217,012	81.5%	239,489	79.3%	272,138	79.2%	287,369	78.7%	318,213	78.4%
Farm	5,965	2.9%	5,018	2.3%	6,693	2.5%	3,521	1.2%	2,960	0.9%	2,868	0.8%	2,705	0.7%
Nonfarm	167,783	81.8%	178,684	81.1%	210,319	78.9%	235,968	78.1%	269,178	78.3%	284,501	77.9%	315,508	77.8%
Proprietors' Employment	31,266	15.3%	36,623	16.6%	49,402	18.5%	62,470	20.7%	71,545	20.8%	77,844	21.3%	87,467	21.6%
Farm	6,977	3.4%	6,348	2.9%	7,641	2.9%	7,562	2.5%	6,657	1.9%	6,448	1.8%	6,871	1.7%
Nonfarm	24,289	11.8%	30,275	13.7%	41,761	15.7%	54,908	18.2%	64,888	18.9%	71,396	19.5%	80,596	19.9%
Private Employment	160,568	78.3%	170,977	77.6%	212,991	79.9%	250,944	83.1%	287,210	83.6%	307,002	84.1%	343,546	84.7%
Agriculture Services, Forestry & Fishing	994	0.5%	1,480	0.7%	1,994	0.7%	2,610	0.9%	4,224	1.2%	5,039	1.4%	6,796	1.7%
Mining	1,159	0.6%	848	0.4%	785	0.3%	639	0.2%	750	0.2%	741	0.2%	895	0.2%
Construction	13,795	6.7%	11,434	5.2%	15,080	5.7%	21,694	7.2%	25,007	7.3%	23,567	6.5%	26,718	6.6%
Manufacturing	41,740	20.4%	40,922	18.6%	55,445	20.8%	54,850	18.2%	50,753	14.8%	49,889	13.7%	53,439	13.2%
Transportation & Utilities	9,201	4.5%	9,482	4.3%	10,414	3.9%	11,734	3.9%	12,879	3.7%	13,931	3.8%	15,074	3.7%
Wholesale Trade	5,881	2.9%	7,851	3.6%	9,583	3.6%	11,563	3.8%	12,621	3.7%	14,510	4.0%	14,323	3.5%
Retail Trade	30,321	14.8%	33,314	15.1%	40,376	15.2%	49,145	16.3%	58,182	16.9%	62,819	17.2%	66,379	16.4%
Finance, Insurance and Real Estate	10,828	5.3%	12,497	5.7%	14,909	5.6%	18,912	6.3%	22,200	6.5%	21,428	5.9%	23,477	5.8%
Services	46,649	22.8%	53,149	24.1%	64,405	24.2%	79,797	26.4%	100,594	29.3%	115,078	31.5%	136,445	33.6%
Withheld														
Government	31,504	15.4%	37,982	17.2%	39,089	14.7%	39,932	13.2%	46,856	13.6%	48,895	13.4%	52,558	13.0%
Federal	3,896	1.9%	4,255	1.9%	4,372	1.6%	4,704	1.6%	5,796	1.7%	5,484	1.5%	6,019	1.5%
Military	4,355	2.1%	5,278	2.4%	4,363	1.6%	4,757	1.6%	5,021	1.5%	4,992	1.4%	4,577	1.1%
State					11,969	4.5%	11,943	4.0%	13,750	4.0%	14,243	3.9%	15,182	3.7%
Local					18,385	6.9%	18,528	6.1%	22,289	6.5%	24,176	6.6%	26,780	6.6%
Withheld	23,253	11.3%	28,449	12.9%										

Source: U.S. Bureau of Economic Analysis



Endnotes

¹ The Town of Middlebury's unemployment rate was substantially higher than the regional average. This is most likely the result of the large student population. The Census recorded an unemployment rate of 9.0% in Middlebury, while the VT Department of Employment and Training calculated an unemployment rate of 2.6% for the town in 2000. If Middlebury is removed the regional unemployment rate drops from 4.5% to around 3.3%, which is more inline with state figures.

² Due to changes in the standardized industrial classification system in the 1990s, it is difficult to compare the 2000 figures to those from previous decades.

³ Due to changes in the standardized industrial classification system in the 1990s, it is difficult to compare the 2000 figures to those from previous decades.

⁴ The Vermont Department of Employment and Training's economic data is based on information from employers paying unemployment insurance and does not fully capture all employment in the Addison Region.

⁵ The Bureau of Economic Analysis is part of the U.S. Department of Commerce. Employment, as defined by the BEA, is the total number of persons: a) performing any type of labor for pay or profit, b) working at least 15 hours per week on an unpaid basis in family enterprises, and c) temporarily absent for non-economic reasons. Employment under this definition includes all full-time and part-time jobs. The BEA employment count is a measure of occupied jobs, rather than a measure of employed persons.

⁶ The average wage figures reported by the DET for the food service sector may not accurately reflect total wages with tips.

⁷ Data from *A Profile of Agriculture in Addison and Franklin Counties, Vermont*. Published by American Farmland Trust in July 2002.

⁸ Data from *A Profile of Agriculture in Addison and Franklin Counties, Vermont*. Published by American Farmland Trust in July 2002. The figure includes farm sales, the secondary impacts of spending by farm business and additional value-added farm expenditures on payrolls and taxes.

⁹ Data on Middlebury College is from the March 2003 report, *The Economic Impact of Middlebury College on the Economies of Middlebury Town and Addison County*.

¹⁰ Data on Porter Medical Center is from the October 2002 report, *The Economic Impact of the Porter Medical Center on the Addison County Economy*.

¹¹ VNA Health Systems of Vermont 2000 Annual Report.

¹² In 1980, the Census Bureau did not ask what type of college degree a person had.

¹³ For the 2000 Census, the Census Bureau switched from the SIC system to the NAICS system for classifying employment sectors. Therefore, the figures from previous censuses are not directly comparable to the 2000 Census.

¹⁴ For the 2000 Census, the Census Bureau switched from the SIC system to the NAICS system for classifying employment sectors. Therefore, the figures from previous censuses are not directly comparable to the 2000 Census.

¹⁵ Dollar amounts were adjusted to 1999\$ using the Consumer Price Index.

¹⁶ Table indicates only private employment covered by unemployment insurance. County figures include Granville and Hancock.

¹⁷ Table indicates only private employment covered by unemployment insurance. County figures include Granville and Hancock.

¹⁸ Table indicates only private employment covered by unemployment insurance. County figures include Granville and Hancock.



6. ACRPC TRANSPORTATION PLAN

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6.1. Introduction

A. Vision and Mission for Transportation in the Region

We envision a transportation system that promotes the economy by effectively moving people and commerce, safely supports all modes of travel, promotes energy efficiency and conservation, enhances regional land uses and the Region's sense of place, exhibits resiliency to natural hazards, and receives sufficient funding to conduct timely, cost effective maintenance and growth or adaptation to meet the Region's emerging and future needs.

B. Overall Purpose of the Plan

The purpose of this Plan is to identify goals, policies and recommendations that will develop a more sustainable transportation system. To achieve this, the Plan sets forth a long-range agenda for the development and improvement of the regional transportation system, in all its parts. A regional planning effort helps to ensure a consistent, coordinated, and proactive response among all twenty-one of our member towns, the State of Vermont, and the various other providers of transportation services. Regional transportation planning promotes transportation as a complete system. That system implements the vision and mission noted above through the Goals, Policies, and Recommendations contained throughout the Plan.

This chapter is intended to be used for, but not limited to, the following purposes:

- To provide useful information regarding the condition of the existing regional transportation system to local and regional decision makers;
- To express the Region's transportation planning concerns and priorities at the State and local levels;
- To guide public investment in transportation infrastructure within the Region;
- To be consistent with state planning goals (24 V.S.A., Chapter 117 §4302);
- To implement the Transportation Planning Initiative and fulfill the duties of regional planning commissions in accordance with 19 V.S.A., Chapter 1 §101(b);
- To serve as a basis for evaluating transportation programs and projects that impact the Region, including the regional Transportation Improvement Plan (TIP);
- To serve as the foundation for the RPC's annual transportation work plan; and,
- To implement the state's energy planning goals under 10 V.S.A. §§ 578(a) and 580.

This Regional Plan contains goals, policies and recommendations for action. The goals and policies frame a state which the Plan seeks to achieve and how to reach that state. The recommendations for action implement the policies to reach the Region's goals. Each section of this Plan includes recommended actions which should be taken to implement the plan, who is responsible for implementation and a rough timeframe for implementation. The timeframe has five categories:

- **ASAP** – The recommendation for action should be implemented as soon as feasibly possible by the responsible party. These recommendations usually reflect an urgent need.

- **Short Term** – The responsible party should implement the recommendation for action within 1-3 years of the adoption of this Plan.
- **Mid-Term** – Mid-term recommendations for action should be implemented within 4-8 years of the adoption of this Plan. Recommendations of this nature often require specific funding that will need to be acquired before implementation, have multiple steps that must be taken to reach implementation, or require substantial public process.
- **Long-Term** – Recommendations for action that are important to this plan, but may take extensive effort and substantial shifts in policy at multiple levels of Government, are viewed as long-term. Implementation of these action items may take longer than the eight-year life of this Plan.
- **Ongoing** – Some the recommendations for actions contained in this Transportation Plan represent the day-to-day work of ACRPC and our municipalities. By designating these action items as ongoing, the Regional Plan is acknowledging that these items are always being acted upon to further the goals of the Plan and the State of Vermont.

The recommendations contained within this document, while extensive, do not constitute a complete and final listing of the Region’s transportation needs over the lifespan of this document. Rather, it is a living, working document.

C. Transportation Advisory Committee (TAC)

The Transportation Advisory Committee was formed to provide local input and involvement in the transportation planning process. The TAC is composed of delegates from the region’s 21 municipalities. Each municipality may have a delegate and an alternate. Alternates represent the municipality when the delegates cannot. The TAC was formed to provide local input to the VT Agency of Transportation, to identify needs and to develop transportation improvement programs.

The TAC is responsible for updating the Regional Transportation Plan, recommending transportation-related planning studies and projects in the region, and commenting on transportation policy. The TAC also is responsible for establishing local priority for capital program projects that are in the project development process. Each year the TAC solicits input on local and regional transportation or traffic-related issues and problems. The TAC works with regional planning commission staff, VTrans, and other agencies and officials to provide local input into the statewide transportation planning and project development process.

D. Long and Short Range Planning

The life of a regional plan is less than a decade, however. Regional Commissions must look beyond that short timeframe and consider how the region may change in the next 10, 20, even 30 years. This Plan takes two approaches. First (short-range planning) looks at the current transportation system and determines how to maintain it to serve the needs of the Region in the near term – the next 10-15 years. The second (long-range planning) looks at population trends, state and national policy, environmental changes, etc., and considers how the transportation system may need to be adapted to accommodate these



changes in the more distant (15-30 years) future. In this plan, short term planning focuses largely on maintaining transportation corridors with a focus on roads and bridges. Long term planning focuses more on alternative modes of transportation, electrifying the vehicle fleet and energy conservation.

The State of Vermont recently passed legislation that sets very significant goals to reduce greenhouse gasses and overall energy use. These goals are long-range, reaching as far into the future as 2050. Working toward the state's emissions/energy goals will not have a significant impact on the region in the near term; however meeting the final targets by 2050 will dramatically change the system. To reach the targets, almost 90% of all vehicles will need to be powered by electricity. Additionally, the Region's pattern of land use and related travel would need to change to reduce daily trips. This plan seeks to balance the immediate short-range needs of the transportation system, with long-range planning goals.

The Regional Transportation Goals are intended to be universal and address both short and long-term goals. The portion of this Plan entitled the "Regional Transportation System" focuses on existing conditions. It includes recommendations for transportation infrastructure and modes of transportation for the near term. The portion of this Plan entitled, "Issues & Opportunities" considers planning for the transportation system of the future. It includes ACRPC's planning process, the intersection of transportation and energy planning; the intersection of transportation and land use planning and the intersection of transportation and natural resource planning. It also includes broader policy recommendations regarding each of those opportunities.



6.2. Regional Transportation Goals

The following goals support the vision and mission described above.

1. *Promotes the Economy.* Transportation networks serve the local, regional and the statewide economies. In some cases, these different levels will have different needs and uses of the transportation system. For example, bicycling on Addison County's scenic rural roads contributes to the local economy, as does large scale agriculture and trucking, and sharing the road between these two uses can be problematic. The policies in this Plan must balance the needs of the larger-statewide transportation system and its value to the economy with the needs of the Region and its municipalities. The impacts of transportation, both positive and negative, on the local economy must be considered in regional transportation planning.
2. *Safely supports all modes of travel:* Addison County's Transportation infrastructure should receive timely preventative maintenance and selected reconstruction of substandard elements in order to keep functioning safely and efficiently for residents, businesses and travelers using all modes of travel. Sections of several of the Region's roadway corridors experience conditions that strain their carrying capacity. Examples of strains include the burdens of many heavy trucks passing through downtowns on a daily basis; high volumes of commuter traffic on local roads challenging the ability of local residents to walk or bike safely; and heavy agricultural trucks and equipment damaging local roads.
3. *Promotes energy efficiency and conservation:* This plan encourages incremental and systematic changes to the Region's transportation infrastructure and practices to reduce transportation energy use and reduce greenhouse gas (GHG) emissions region-wide. Transportation contributes about 37.2 % of greenhouse gases in Vermont, by far the largest single source of GHG emissions. This Plan encourages reducing vehicle miles traveled by using alternative transportation modes, and promoting land use patterns and transportation design choices that reduce reliance on single-occupancy vehicles. It also promotes the use of electric vehicles and other technological innovations to reduce greenhouse gas emissions.
4. *Enhances Regional land uses and the Region's sense of place.* The Region's historic communities, buildings and landscapes constitute scenic and cultural resources unique to the Addison Region. All entities responsible for transportation infrastructure should choose and design transportation projects to enhance the land uses in the project's immediate vicinity. Transportation projects should support historic downtowns and village centers, and the rural, scenic landscapes that define this Region.
5. *Exhibits Resiliency to Natural Hazards:* The Region's transportation infrastructure should be designed, constructed, maintained and improved to survive increased rainfall intensity and flooding severity predicted under future climate change scenarios to preserve the infrastructure's use and promote clean water and functioning ecosystems.
6. *Receives sufficient Funding:* Investments in the Region's transportation infrastructure should position the Region for a more sustainable future in terms of energy utilization, environmental quality, and financial stability. Municipalities and the State should use a life cycle, least-cost approach in the planning and design of infrastructure, which considers the full costs and impacts to residents, municipalities, and state agencies. Investments should focus on achieving a system that reduces energy utilization per trip over time.



6.3. The Regional Transportation System

A. Existing Conditions

The following sections provide a description of the diverse elements that form the Region's transportation system. The Plan divides the system into four different types of infrastructure:

- Air
- Navigable Waterways
- Rail, and
- Roadways

Each section describes the existing conditions of each type of infrastructure. Each includes a description of the infrastructure's condition and use, the challenges or opportunities the infrastructure faces, and makes recommendations to maintain and/or improve the functionality of each type of infrastructure.

This works well for Air, Navigable Waterways and Rail because of their relatively limited use and scope within the Region. However, because roadways are so pervasive and also support many different modes of travel (cars, trucks, buses, bikes, walkers, etc.), this Plan further divides the Roadway Section as follows:

- Roadway network general conditions including:
 - functional classification;
 - traffic volumes;
 - high crash locations;
 - bridge infrastructure;
- Major roadway corridors
- Modes of transportation including:
 - Cars
 - Truck Traffic and Freight
 - Public Transit
 - Ridesharing, Car sharing and Ride hailing
 - Pedestrian and Bicycle Facilities

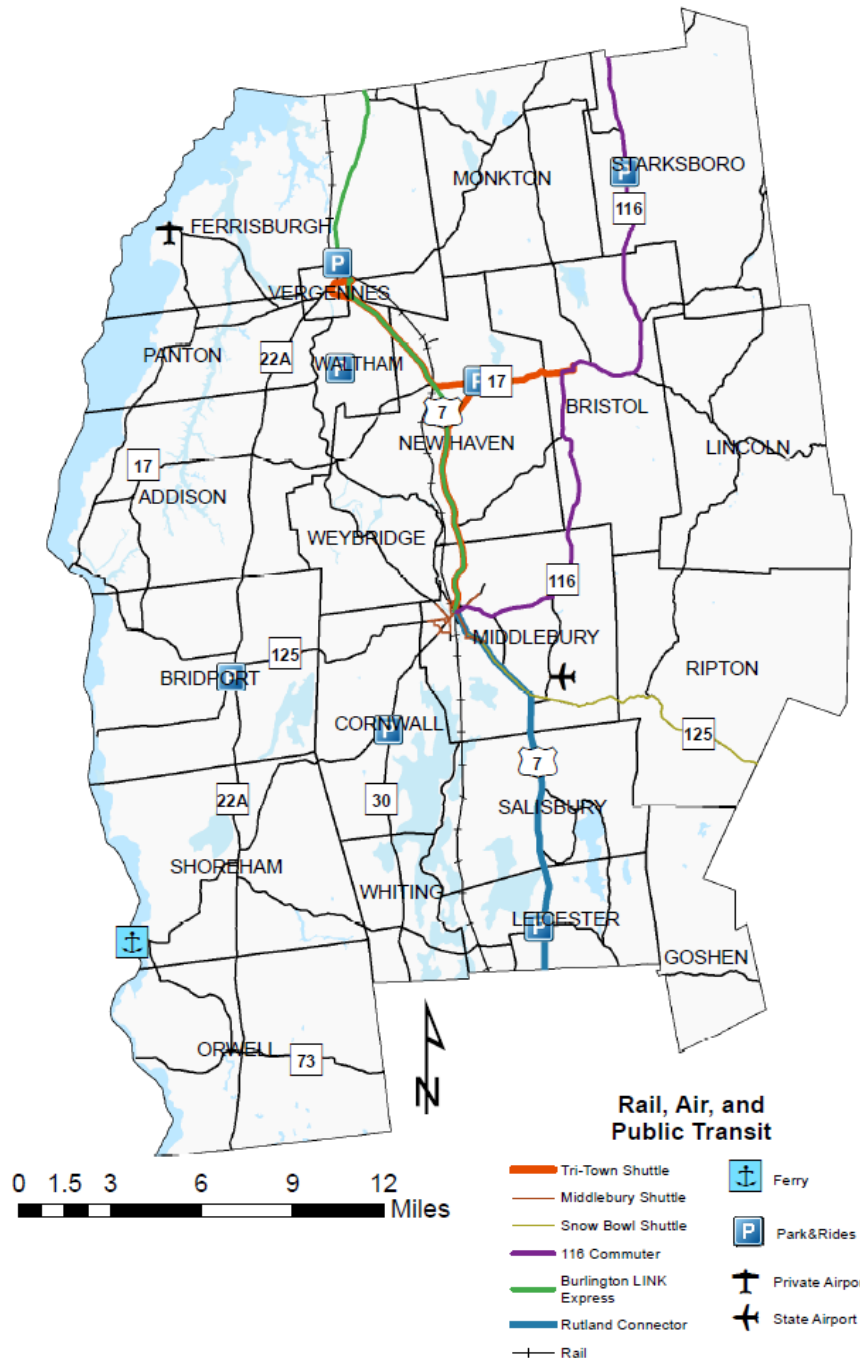


Figure 1: ACRPC's Air, Railroad, Transit and Park and Ride Infrastructure

B. Air Transportation

Middlebury State Airport, located just outside Middlebury's town center, is classified as a "local service" facility. Its primary purpose is to serve recreational and personal flying activities to the community – Sixty-six percent (66%) of all flights are made for local aviation purposes. Corporate activities include flight training, storage for aircraft, specialized local travel businesses, and most notably College use.



Middlebury College brings a large number of users to the airport, including students, their parents, and other visitors. While the Middlebury State Airport does not have national or international significance, it is an important asset to Middlebury and the Region.

The VTrans multi-year transportation program identified a need to improve runway safety by extending the runway and reconstructing the existing taxiway. This project has been largely completed. This Plan supports the safe, thoughtful expansion of the airport.

The Basin Harbor Airport is a specialty service facility for single-engine and smaller aircraft (e.g. ultralights and gliders). The airport is open seasonally, closing during the winter. The majority of flights to and from this location are transient general aviation, many of them relating to the Basin Harbor Club's operation (guests, etc.).

Goals

- *Promote the Middlebury Airport to support economic development in the Region*

Policies

- *Support infrastructure investment and services necessary to allow the Middlebury Airport to function effectively as a small, regional airport*

Air - Recommended Actions:		
Middlebury Airport	Construct additional hangers and parking	
	<i>Responsible:</i> VTrans	<i>Timeframe:</i> mid-term
General	Work with VTrans and Addison County Economic Development (ACEDC) to help recruit new business to use the Middlebury Airport facility	
	<i>Responsible:</i> ACRPC, VTrans, ACEDC	<i>Timeframe:</i> short-term

C. Navigable Water Transportation

The Addison Region borders Lake Champlain, a large navigable lake. Also, historically, many of the Region's rivers were used for travel corridors. Today however, water transportation is related almost exclusively to recreational uses. The Region's only formal water transport is the Ticonderoga Ferry, which connects Shoreham with Ticonderoga, New York. It was originally established in 1759 and operates seasonally on a cable system. Year round (weather permitting during winter) ferry service is available from nearby Charlotte, via Lake Champlain Ferry, connecting passengers to Essex, NY.

Goals

- *Maintain the Region's access to safe and efficient water transportation for commerce and recreation.*

Policies

- *Encourage continued use of the Ticonderoga Ferry and other ferry services just outside the Region.*
- *Promote the recreational travel aspects of the Region's Rivers and Lake Champlain*

D. Rail Transportation

The Vermont Rail System provides heavy haul freight rail service to Vermont, New Hampshire, and upstate New York through its five affiliated short lines. Vermont Railway passes through ACRPC member municipalities of Leicester, Salisbury, Middlebury, New Haven, Vergennes and Ferrisburgh parallel to Lake Champlain. This Plan supports opportunities for continued expansion of freight rail through the Region, particularly if rail can reduce truck traffic on the Region's roadways. Currently, the condition of the western rail corridor limits the amount and type of freight hauling via rail. Bridges that are underrated for heavy freight, along with tracks that limit speeds, limit the type of businesses that use the line. The 2015 Vermont State Rail Plan (SRP) recognizes the need to maintain the rail system in a manner that allows for growth of freight rail transportation. Significant improvements have, and are being made to the corridor to increase its capacity and desirability, including installing continuously welded track for the length of the line and construction of two replacement bridges over the rail line in Middlebury.

There is presently no passenger service along the Green Mountain Railroad line. ACRPC residents must travel to Amtrak stops in Port Henry, New York, Rutland or Essex, Vermont. The Amtrak Adirondack line, which runs from New York City to Montreal along New York's eastern border, can be accessed via ferry. The SRP identified extending the Amtrak's Ethan Allen Express to Burlington, Vermont. (It currently serves the "Empire Corridor" from New York Penn station to Rutland, Vermont) as a priority. As part of the SRP, the State secured funding to improve the rail line between Rutland and Burlington. Once completed, it will support minimum speeds appropriate for passenger rail. Middlebury is currently planning to construct a platform to accommodate new passenger service stops in Middlebury and Vergennes. The State has also relocated and nearly completed renovations of the historic Vergennes Rail station. The Station now sits on the tracks next to the Vergennes/Ferrisburgh Park and Ride in Ferrisburgh. Vergennes desires, and this plan supports an Amtrak stop served by both facilities in Middlebury and Vergennes.

ACRPC recognizes that the extension of passenger rail through the Region could have a number of benefits. Western Vermont is not served by an interstate highway. Extending the Ethan Allen Express would give the Region easy access to New York City and other parts of the Northeast Corridor. If extended from Rutland to Burlington and run on a reasonable schedule, passenger rail could provide a valuable transit service from and through two of Vermont's largest employment centers.

Goal

- *Increase (passenger, freight and rail) services in the Region.*



Policies

- *Improve existing rail infrastructure to broaden rail services and improve safety by working with the Vermont Agency of Transportation to prioritize investments.*
- *Encourage the development of truck to rail transfer stations, including the Middlebury OMYA Rail Spur (even though it is postponed) to carry additional freight and reduce truck traffic on the Region's roadway system, to reduce the number of truck trips through the Region while still encouraging freight travel.*
- *Encourage the use of rail freight where practical and economically feasible*
- *Support Middlebury Bridge & Rail Project as a part of the mainline in the context of the Tiger IV grant*
- *Continue to support the Vermont Western Corridor Transportation Management Plan and its recommendations for improvements.*

http://54.172.27.91/transportation/corridor_studies/western_corridor/

Rail - Recommended Actions:		
General	Implement Western rail corridor recommendations to improve the safety and efficiency of the corridor to serve the Region's economy	
	Responsible: ACRPC, VTrans, towns	Timeframe: short-term
General	Complete rail tunnel and rail replacement in downtown Middlebury	
	Responsible: VTrans, Middlebury	Timeframe: short-term
General	Build rail platform in Middlebury and connect to downtown and ACTR	
	Responsible: VTrans, Middlebury, ACTR	Timeframe: short-term
General	Build rail platform and complete the renovation of the Ferrisburgh-Vergennes train station at the State park-and-ride facility	
	Responsible: VTrans, towns	Timeframe: short-term

6.4. Roadway Network

While the Region's transportation networks are complex and multimodal, the Region's roadway network currently serves as the Region's primary transportation infrastructure. The Region is bracketed by the

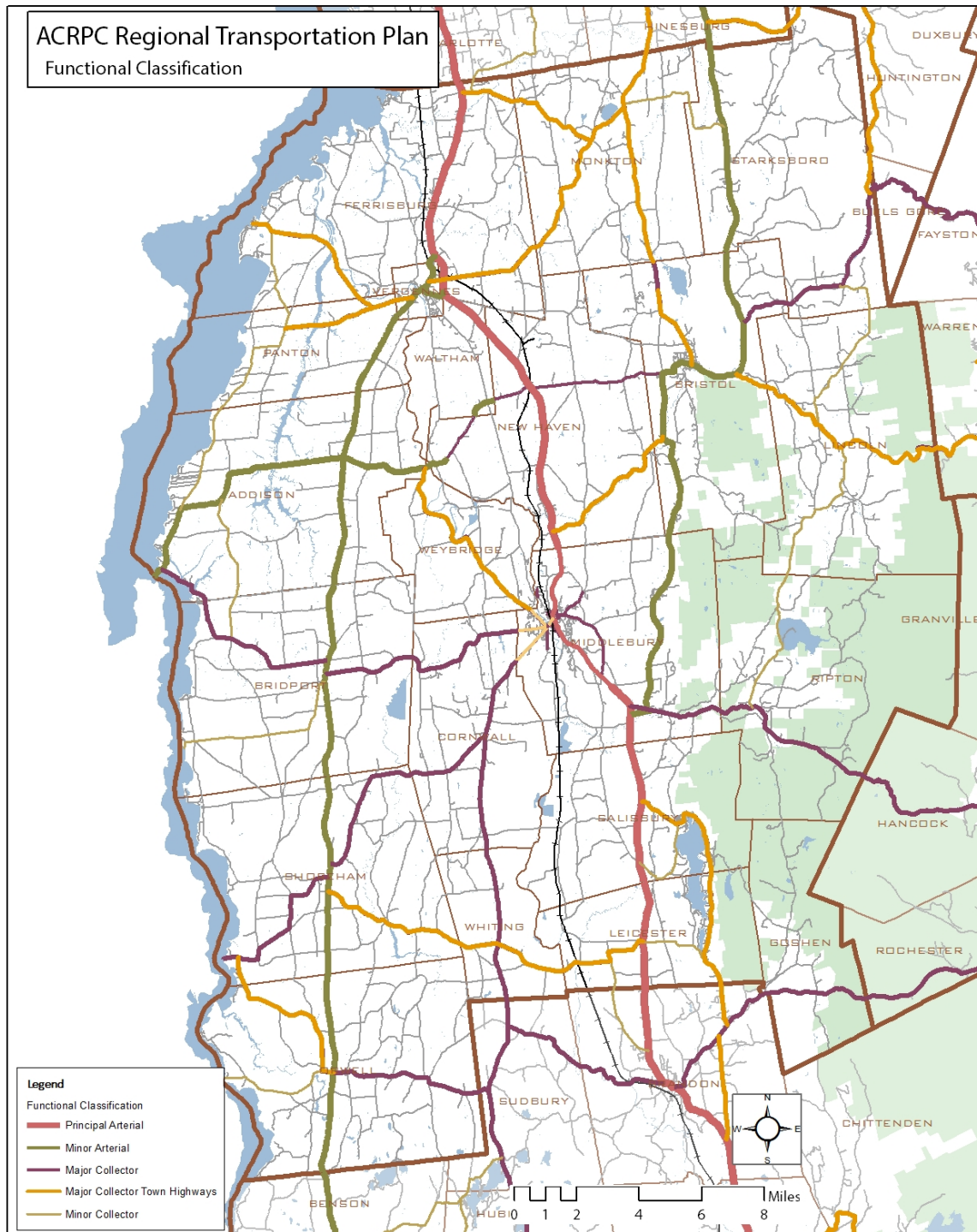


Figure 2: Functional Classification in the ACRPC Region (source: VTrans)

Green Mountains to the east and Lake Champlain to the west, which means that the primary movement corridors are north/south.

The following sections review the primary factors influencing the functionality of the roadway network, including classification systems, traffic volumes, crash and safety data and bridge sufficiency ratings.

A. Functional Classification

The State of Vermont maintains a system to classify state-owned routes by their highway function with US Route 7 as the highest level of Principal Arterial. While there are no interstate highways in Addison County, Route 7 is the most heavily traveled. Minor arterials are the next highest classification. Vermont Routes 22A, 17, and 116 are in this category. Among these, Route 22A has higher traffic and higher truck volumes than the other two routes. The remaining state highways, plus a number of more significant town highways that serve as key connectors between communities, are classified as “Major Collectors.” The town-owned major collector routes can particularly impose a burden on municipalities, as they serve a regional need, but are funded and maintained through municipal budgets. In theory, major collectors are eligible for federal aid, but in practice, as funding is limited, these corridors seldom rise on the priority list for investment. While the state’s functional classification system does not always match the local or regional perception of a road, it can affect both funding and state priorities. For example, as a Principal Arterial, the State is more likely to invest in Route 7 in priority over investments in Route 22A.

Definition of Functional Classifications

Principal Arterials – These highways serve major centers of population, provide a high degree of mobility and can also provide mobility through rural areas. Route 7 is Addison County's only Principal Arterial.

Minor Arterials – These roads provide service for trips of moderate length, serve geographic areas that are smaller than their higher Arterial counterparts and offer connectivity to the higher Arterial system. This includes Routes 22A and 116 as well as parts of Route 17 in Addison.

Major and Minor Collectors – These roads serve a critical role in the roadway network by gathering traffic from local roads and funneling them to the Arterial network. In the rural environment, Collectors generally serve primarily intra-county travel (rather than statewide) and constitute those routes on which predominant travel distances are shorter than on Arterial routes. Roads like Routes 125 and 30 are classified as collectors. Several town roads within the Region also serve as regional collectors.

Local Roads – The most common roads in the Region. Local roads include most municipally managed roads. They see significantly lower volumes and are often posted at lower speeds than more significant highways. They are designed specifically to have high accessibility and to connect to collector and arterial roads, and are typically not used for through traffic.

B. Traffic volumes: Historic Trends and Future Projections

The traffic volumes on the region's roadways generally follow the patterns of the functional classification system, with the highest volumes found on the US Route 7 corridor. The highest traffic in the Region is in Middlebury, where the combination of local trips and through traffic on US Route 7 result in traffic congestion during peak hours. Volumes are also high on the northern end of US Route 7 as it enters Chittenden County, collecting commuters from Addison County. Route 22A through downtown Vergennes and Route 116 through downtown Bristol sometimes experiences congestion as these routes serve both local and through-traffic. In the region's smaller communities, congestion is primarily associated school drop-off times.

Vergennes and Route 116 through downtown Bristol sometimes experiences congestion as these routes serve both local and through-traffic. In the region's smaller communities, congestion is primarily associated school drop-off times.

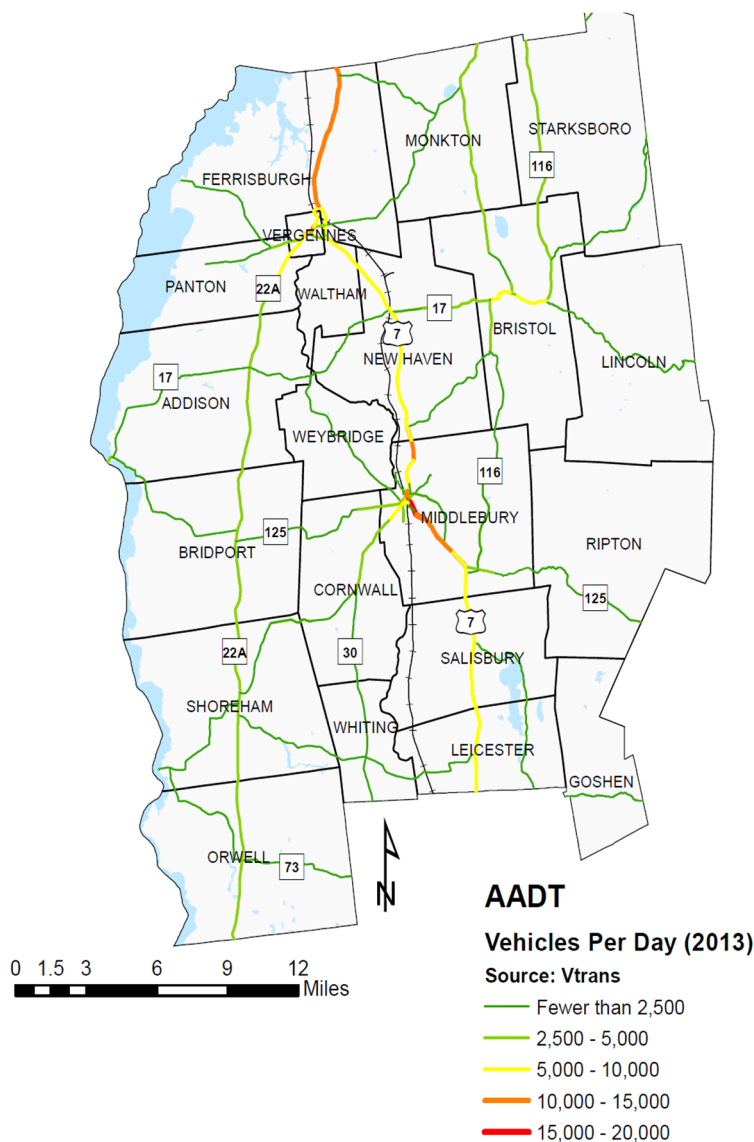


Figure 3: Traffic Volumes in the ACRPC Region (source: VTrans)



Traffic volume trends in the region vary considerably, with some corridors seeing traffic growth, others are stable, and some are even declining. More detail on trends is presented later in the corridor sections.

C. Safety and Crashes

Crash data collected by the Vermont State Police and reported to the Vermont Agency of Transportation provides valuable data on the safety of our roadway network. Fatalities are relatively rare, with 28 occurring in the five-year period from 2012 through 2016. Crashes resulting in injuries are more common, and provide useful information on locations where recurring serious crashes should be evaluated for interventions or countermeasures. Figure 4 shows a “heat map” of injury crashes, and also “High Crash Locations” as reported by VTrans, which are highway segments or intersections with statistically elevated crash rates.

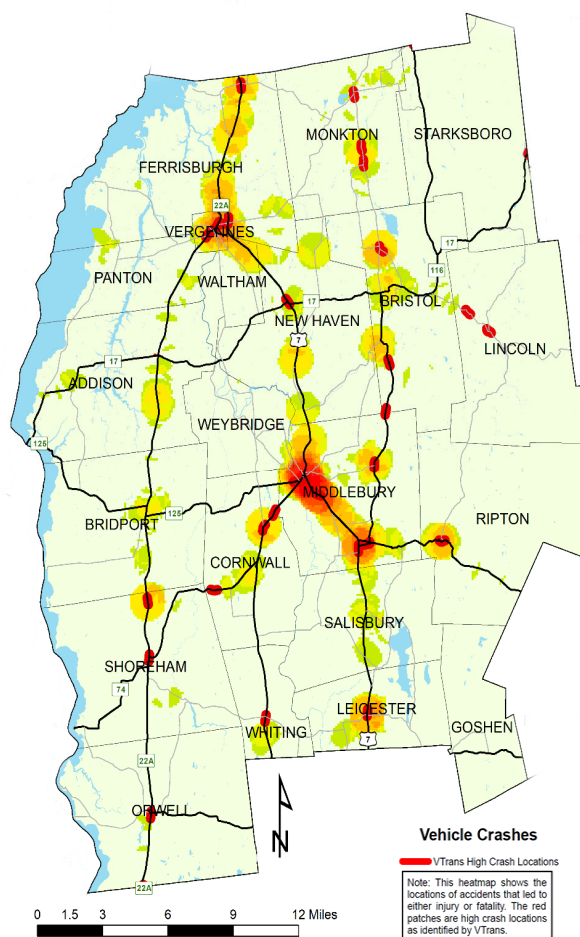


Figure 4: High Crash Locations and Crash Distribution in the ACRPC Region (Source: VTrans, 2012-2016)

Figure 4 and Table 1 analyze the region’s crash data, and provide some insights on the conditions that are associated with injuries and fatalities, in particular.

Figure 5 shows that injuries and fatalities are most prevalent on roads with posted speeds of 50 mph. The table shows the type of collision, with the far most prevalent being a single vehicle crash, typically a driver leaving the road, often due to excessive speed for the road conditions or distraction. These types of crashes are not often correctable by infrastructure improvements, but rather might be prevented through education and enforcement. Additional crash data is available online through ACRPC's Crash Data GIS Database: (<http://54.209.184.198/crash/crashmap.php>) or the VTrans Crash Public Query Tool (<http://apps.vtrans.vermont.gov/CrashPublicQueryTool/>).

High crash locations are also shown as part of each roadway corridor in the Section 6.6. Recommended actions for each corridor include evaluating high crash locations for improvements to reduce their susceptibility to accidents.



Figure 5: Number of Crashes, 2011-2016 (Source: VTrans)



Type of Collision	Fatal	Injury	Property Damage Only	Total
Single Vehicle Crash	12	487	866	1,365
Rear End	2	137	544	683
No Turns, thru moves only, Broadside ^<	2	85	210	297
Same Direction Sideswipe	1	28	237	266
Other - Explain in Narrative	1	18	192	211
Head On	6	65	98	169
Opp Direction Sideswipe	2	31	132	165
Left Turn and Thru, Angle Broadside -->v--	2	26	59	87
Rear-to-rear	0	4	67	71
Left Turn and Thru, Broadside v<--	0	20	40	60
Left Turn and Thru, Head On ^v--	1	4	20	25
Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--	0	1	21	22
Right Turn and Thru, Broadside ^<--	0	5	12	17
Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^--	0	2	13	15
Right Turn and Thru, Angle Broadside -->^--	0	3	12	15
Left Turns, Same Direction, Rear End v--v--	0	1	5	6
Left and Right Turns, Simultaneous Turn Crash --vv--	0	0	5	5
Right Turn and Thru, Head On v^--	0	0	4	4
Left Turns, Opposite Directions, Head On/Angle Crash --^v--	0	0	1	1

Table 1: Vehicle Crash Types, 2011-2016

6.5. Bridges

Bridges constitute an important part of the Region's roadway infrastructure. Bridge sufficiency ratings are developed by VTrans based on detailed bridge inspections to assess structural integrity, adequacy of hydraulic capacity (for bridges crossing a waterway), and "functional" components such as width and alignment. Any of these factors could indicate that a bridge might be considered for replacement or rehabilitation. It also looks at additional considerations such as the context, historical status, and cost of the various options. While deficiency status indicates the condition of the structure, the sufficiency rating determines eligibility for federal funding. The sufficiency rating is a score of 0 to 100. A rating of less than 50 means that the structure is eligible for federal replacement or rehabilitation funds; a score between 50 and 80 makes the structure eligible for federal rehabilitation funds. VTrans pays close attention to the condition of the bridges on state the system and town bridges of more than 20 feet in length.

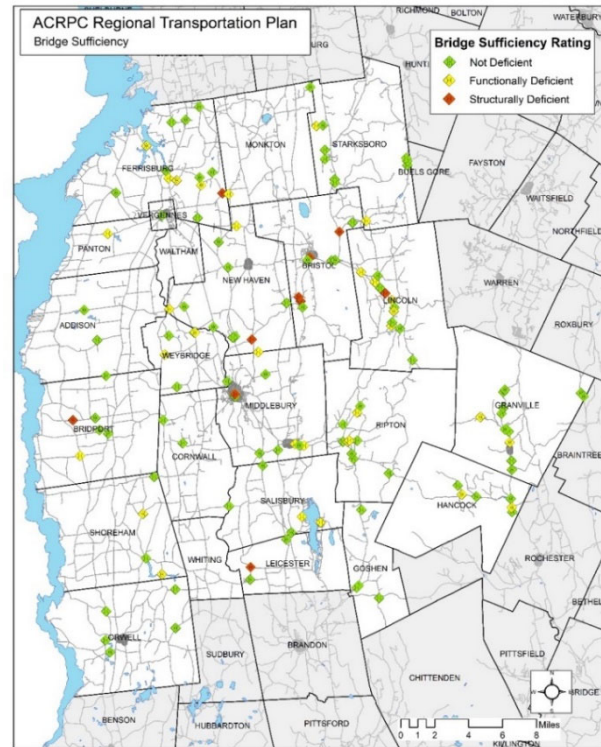


Figure 6: 2017 Bridge Sufficiency Ratings

Bridges Eligible for Federal Replacement or Rehabilitation Funds

Town	Location	River
Bristol	VT 116, near Carlstrom Rd.	New Haven
Salisbury	Swamp Rd./Creek Rd.	Otter Creek
New Haven	Halpin Covered Bridge Rd.	Muddy Branch
Lincoln	York Hill Rd	New Haven River
Middlebury	Pulp Mill Covered Bridge/Seymour St.	Otter Creek
Bridport	West Market Rd.	West Branch Dead Creek
Lincoln	Sugarbush Hill	New Haven River
New Haven	Plank Rd.	Little Otter Creek
Leicester	Old Jerusalem Rd.	Leicester River
Ferrisburgh	Monkton Rd.	Little Otter Creek
Goshen	South Hill Rd.	Neshoba River
Lincoln	East River Rd.	New Haven River
Middlebury	Main St.	Over RR
Bristol	South 116 Rd.	New Haven River
Lincoln	Grimes Rd.	New Haven River

Table 2: Deficient Bridges in the ACRPC Region in 2017



TAC Rank	Town/City	Bridge #	Location	River
1	Vergennes	27	Main Street	Otter Creek
2	Middlebury	101	Main Street	Otter Creek
3	Lincoln	46	York Hill Road	New Haven River
4	Bridport	5	Crown Point Road	West Branch of Dead Creek
5	Shoreham	8	Richville Road	Lemon Fair River
6	Bridport	4	Crown Point Road	Potash Brook
7	Starksboro	75	Gore Road	Huntington River
8	New Haven	30	Dog Team Road	New Haven River
9	Lincoln	18	Grimes Road	New Haven River
10	Ferrisburgh	11	Little Chicago Road	Little Otter Creek

Table 3: 2017 TAC Identified Town Highway Bridge Pre-Candidate Prioritization (SFY 19)*

Recognizing that bridge ratings are not the only consideration when investing in bridge improvements or repairs, the agency also solicits input from the regional commissions through the Transportation Policy Initiative (TPI) consultation process on bridge priority. Regional commissions add qualitative factors that are difficult to quantify to be considered in selecting and advancing projects. In 2017, the ACRPC Transportation Advisory Committee (TAC) identified the facilities in Table 3 as their priority for 2019. The TAC rates bridges annually and ACRPC expects the rankings to change over time as bridges are repaired/upgraded, or are identified as needing rehabilitation. These rankings are incorporated into VTrans project prioritization on a yearly basis. Bridges prioritized for repair are also highlighted as recommended action within the roadway corridor they serve. As the list is updated, roadway recommendations should also change.

6.6. Major Roadway Corridors

Roadway corridors provide a useful scale for transportation planning. The character and conditions on ACRPC's primary roadway corridors varies widely with the Region's diverse topography, economy and environment. Corridor planning is an approach to understand transportation, environmental, land use and community development issues in a comprehensive manner that can help identify priorities for implementation. The following sections review the conditions and issues for the Region's primary roadway corridors to inform needs and priorities for action. For a section of road or intersection to be identified as a High Crash Location (HCL), the location must have experienced five or more crashes in a five-year period, or the average of one crash per year. The table below provides some summary information based on High Crash Location Reports published by VTrans:

Route Name	Maximum Volume and location	High Crash Locations	Features
US 7	17,700 Middlebury	10	Primary arterial travel corridor through the region, which also passes through a number of villages serving local traffic
VT 22A	11,400 Vergennes	5	High level of concern in Vergennes with increasing truck volumes and impacts
VT 17	4,000 New Haven	2	East-west route over the Appalachian Gap to Lake Champlain
VT 116	5,800 Bristol	5	Provides an alternate to US Route 7; passes through downtown Bristol
VT 125	4,700 Middlebury	6	East-west route over the Middlebury Gap Scenic Highway to Middlebury.
VT 73	1,400 Orwell	2	East-west route over the Brandon Gap to Orwell and Lake Champlain
VT 74	2,000 Cornwall	0	Major collector route
VT 30	6,350 Cornwall	0	Rural collector route parallel to US 7 and VT Route 22A
VT 53	2,100 Leicester & Salisbury	2	Town Highway major collector; eligible for federal aid; provides access to Lake Dunmore
Monkton Ridge/ Bristol Rd/Silver St	4,000 Monkton (South of Hinesburg t/l)	2	Aka Bristol Rd + Silver St Growing commuter traffic, avoiding US 7 and VT 116 corridors
Monkton Road	4,600 Vergennes (East of Main St)	0	Alternate route to US 7 for commuters traveling to eastern Chittenden County

Table 4: Primary Corridors in the Addison County Region

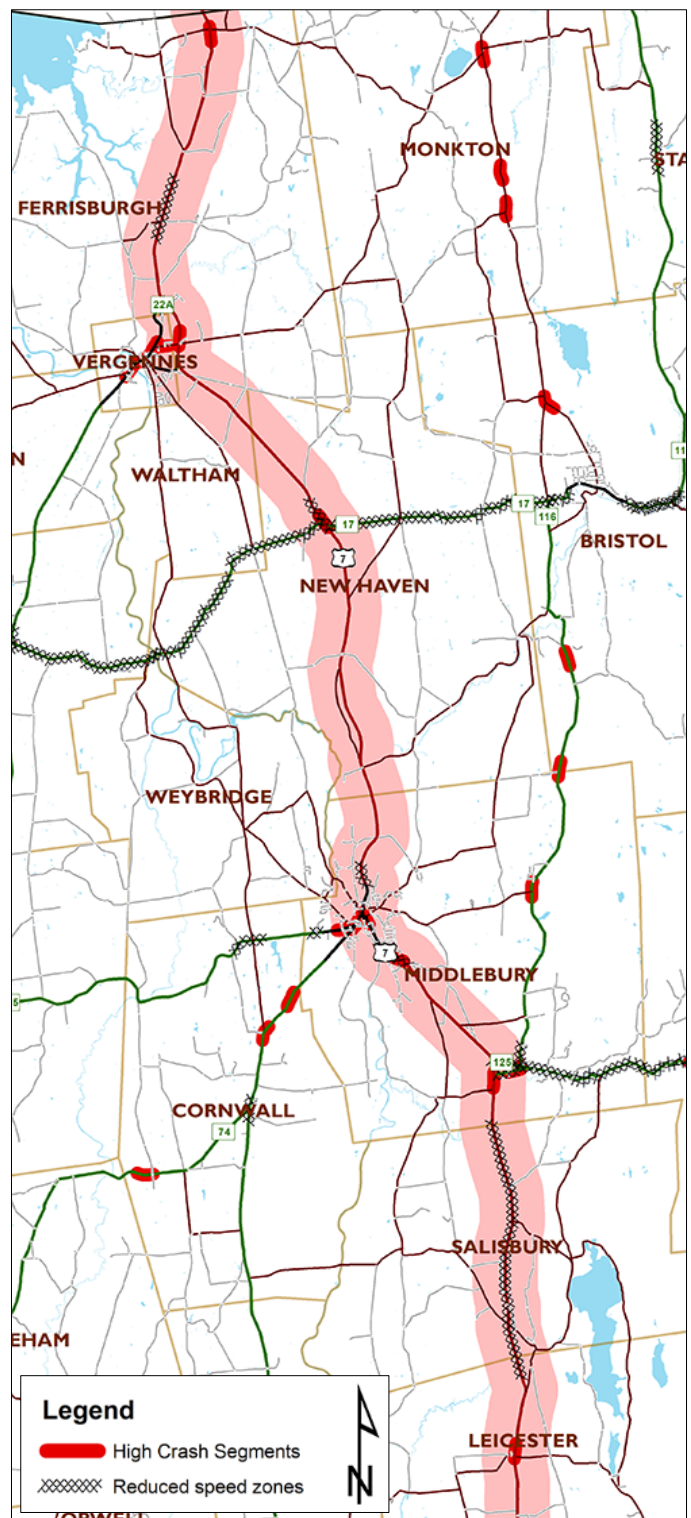


A. US Route 7

Route 7 constitutes the primary route of travel through the Region, and is the primary north-south travel corridor in Vermont between the Green Mountains and Lake Champlain. Important considerations include:

- There are numerous high crash locations along the corridors, which primarily lie at intersections with higher volume side streets. Particularly in the northern end, high through volumes make it difficult for side road traffic to enter the corridor. Volumes in this area may be high enough to warrant the installation of roundabouts. ACRPC supports the installation of roundabouts, not signals, to preserve the carrying capacity of the route 7 corridor.
- High crash locations, including US Route 7/River Road in New Haven and US Route 7/Hollow Road in Ferrisburgh, warrant investigation through a road safety audit or scoping study.
- Exchange Street roundabout is advancing through VTrans Capital Program
- Bicyclists should be encouraged to utilize parallel north-south routes on local roads that are safer, more scenic, and nearly as direct (Greenbush Road in Ferrisburgh is a great example of this).

Figure 7 shows that traffic has increased overall since the 1970s, but has leveled off in the most recent decade. Several locations show a very recent uptick in volume, but not enough yet to indicate a long-term trend.



US Route 7 High Crash Sections

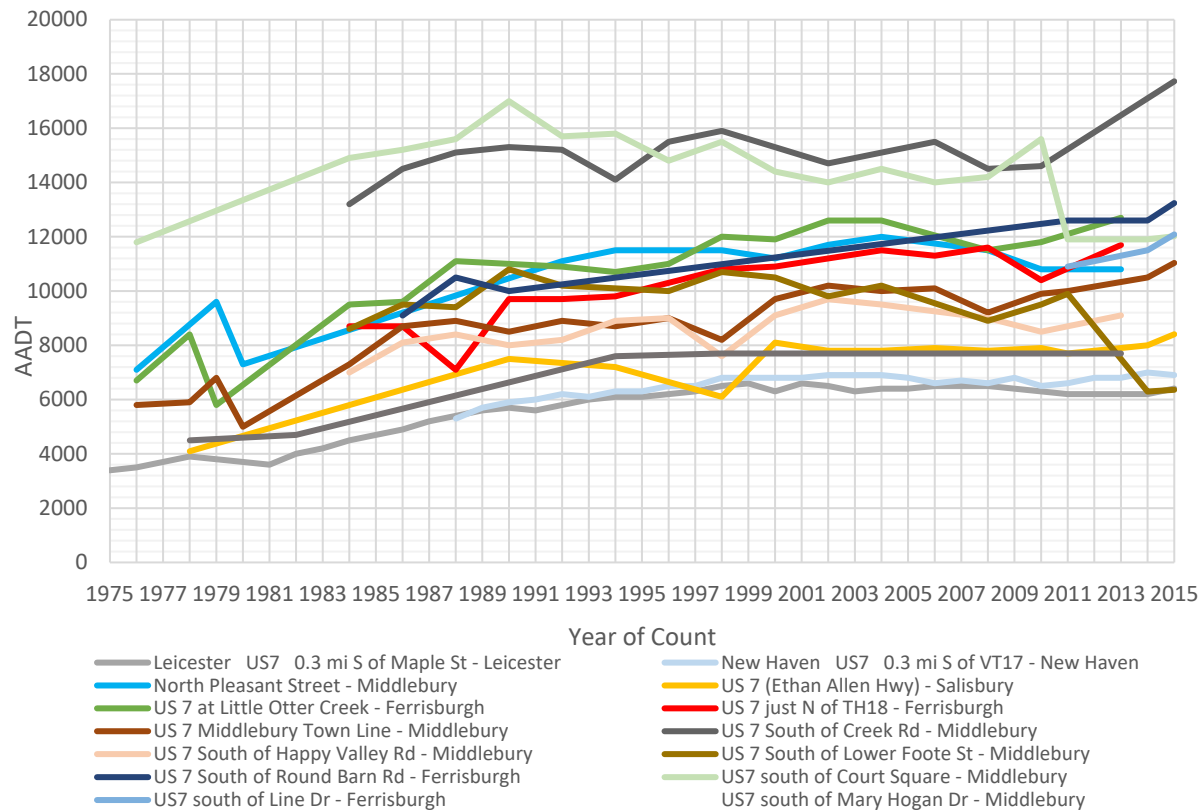


Figure 7: US 7 Historic Traffic Volumes

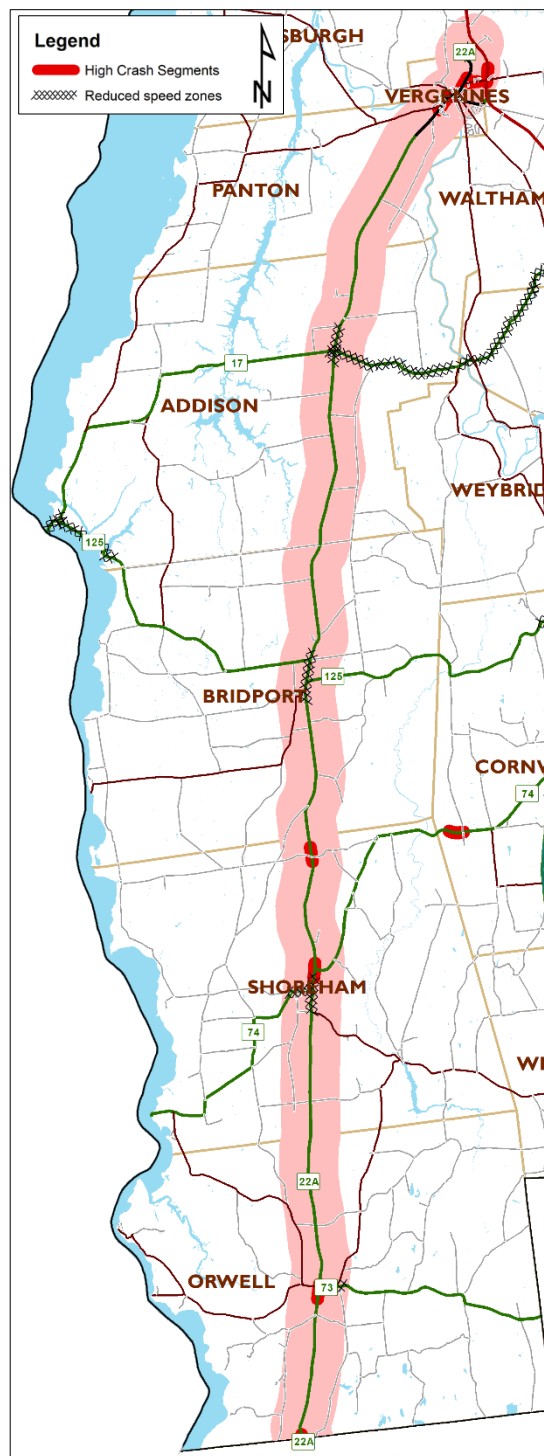
US Route 7 - Recommended Actions:		
Ferrisburgh	Stage/Old Hollow Roads: address existing safety issues and future congestion forecasted in 2030; a roundabout is preferred to stoplights.	
	<i>Responsible:</i> Town of Ferrisburgh, VTrans, ACRPC	<i>Timeframe:</i> short-term
Middlebury	Exchange Street: enhance U.S. Route 7-Exchange Street Gateway & construct the proposed roundabout	
	<i>Responsible:</i> Town of Middlebury, VTrans, U.S. DOT	<i>Timeframe:</i> short-term
Middlebury	Perform traffic study to address (1) congestion at Foote Street-Middle Road South-U.S. 7 and (2) congestion forecasted in 2030 at Boardman Street-U.S. 7 intersections	
	<i>Responsible:</i> VTrans, U.S. DOT, Town of Middlebury,	<i>Timeframe:</i> mid-term
Middlebury	Perform traffic study to explore improvements at (1) Charles Avenue-Monroe Street -U.S. 7 and (2) Court Street-Mary Hogan Drive intersections	
	<i>Responsible:</i> Town of Middlebury, VTrans, U.S. DOT	<i>Timeframe:</i> mid-term
General	Advocate for corridor improvements outlined in Western Corridor Plan, including: shoulder widening, truck climbing lanes, etc.	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> long-term
General	Study High Crash Locations along U.S. 7 and identify recommended improvements	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> mid-term



B. VT Route 22A

The Route 22A corridor is an important link connecting the Route 4 corridor in New York with Chittenden County. Compared to other major routes in the Region, it has higher rates of traffic growth. Concerns and observations include the following:

- Due to the impacts on Vergennes from an increasing number of through-trucks, and the upcoming bridge project on Route 17, the ACRPC can work with VTrans to explore the option of a signed alternate route for trucks. Study of potential truck bypasses can be revisited, but alternatives that were identified had very high costs and impacts, making it prudent to look at existing corridors to carry some of the burden.
- Outside of Vergennes, crashes primarily occur at intersections, involving conflicts between through traffic and turning or crossing vehicles. There are several intersections with poor sight lines and difficult turns in Addison, Bridport, Shoreham and Orwell, some are high crash locations. The rural stretches of the corridor need to provide passing lanes, to alleviate driver frustration and reduce risky maneuvers.
- Sections of the corridor near villages or intersections need improvements and management to enhance safety.
- Narrow shoulders along much of the length of the corridor is not adequate for bicycle use. However, the high speeds and high proportion of tractor trailers on the corridor make it a very low priority for bicycling.
- The Regional Planning Commission should discuss qualifications and benefits of reclassification of Route 22A as a Principal Arterial and pursue reclassification if warranted.



VT Route 22A High Crash Sections

Figure 8 shows that traffic growth along all segments in the corridor has been steady over the past four

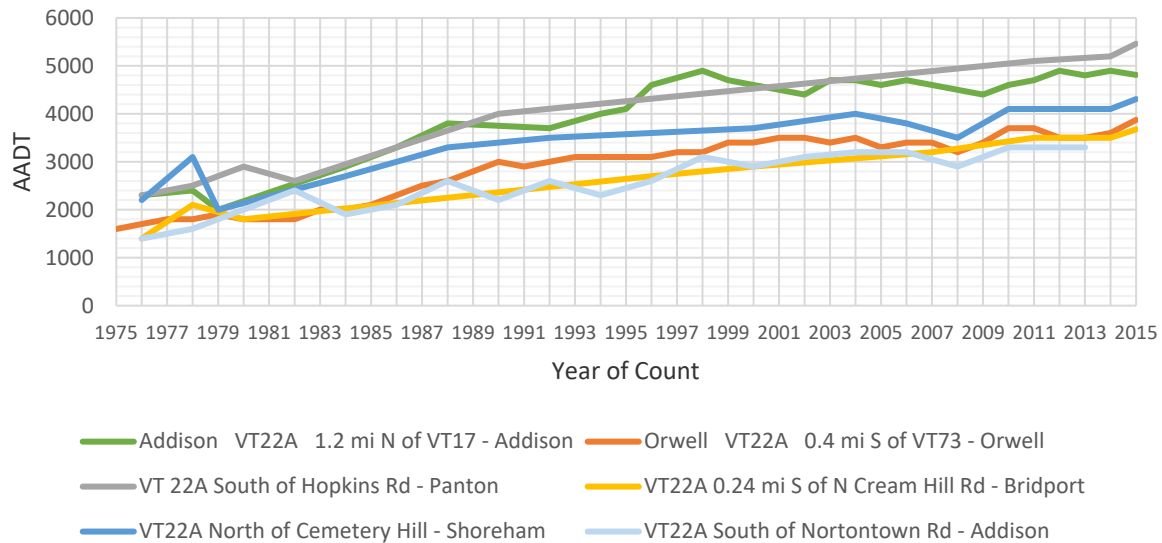


Figure 8: VT 22A Historic Traffic Volumes

decades, especially compared to other corridors.

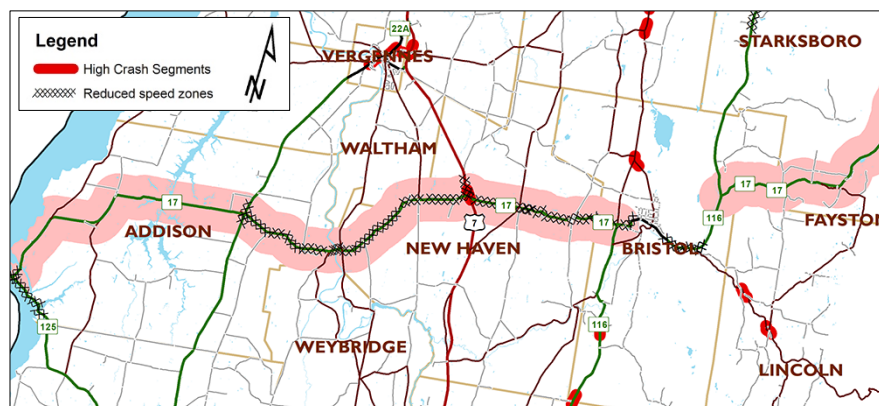
VT Route 22A - Recommended Actions:		
Addison, Bridport & Shoreham	Apply traffic calming elements identified by previous studies, including the Western Corridor Plan, Middlebury Traffic Calming Feasibility Study (contains traffic calming toolbox applicable to entire region), Traffic Calming and Non-Vehicular Routes for Five Addison County Towns, and RRPC Route 22A Corridor Study (Orwell)	
	<i>Responsible:</i> Towns, ACRPC, VTrans	<i>Timeframe:</i> short-term
Vergennes	Reconstruct intersection at VT 22A-South Water Street-MacDonough Drive	
	<i>Responsible:</i> City of Vergennes, ACRPC, VTrans	<i>Timeframe:</i> short-term
Vergennes	Address congestion forecasted in 2030 at Panton Road-VT 22A intersection	
	<i>Responsible:</i> City of Vergennes, ACRPC, VTrans	<i>Timeframe:</i> long-term
General	Advocate for corridor improvements outlined in Western Corridor Plan, including: shoulder widening, truck climbing lanes, etc.	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> long-term
General	Explore and create truck routes that address concerns of Vergennes & neighboring communities	
	<i>Responsible:</i> VTrans, ACRPC, towns	<i>Timeframe:</i> short-term
General	Study High Crash Locations along Route 22A and identify recommended improvements	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> mid-term



C. VT Route 17

This corridor has relatively low volumes, limited traffic congestion and very few high crash locations. Its character is narrow and not well-suited for high volumes, and many stretches, especially between Addison and Bristol, have reduced posted speeds for this reason. Key issues to consider include the following:

- Difficulty at VT Route 22A intersection for crossing traffic due to high volumes and speeds; yet volumes are not sufficient to warrant a traffic signal or roundabout.
- The City of Vergennes has suggested the segment between VT Route 22A and US Route 7 as a possible northbound truck route around Vergennes; lack of consensus based on public comments, concerns from neighboring communities (New Haven, Weybridge and Addison) and poor conditions of road preclude this until the bridge over Otter Creek between New Haven and Weybridge is replaced (on VTrans plan)
- Intersections (i.e. with Quaker Village Road) have poor sight lines
- East of Bristol, narrow shoulders and high bicycle popularity strain the corridor, and therefore there is a need to find a way to expand the corridor to allow for safe biking.



VT Route 17 High Crash Sections

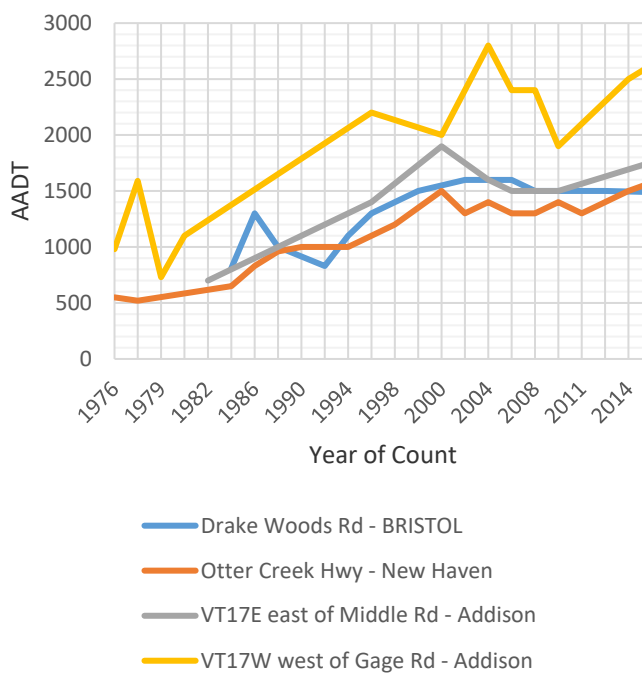


Figure 9: VT Route 17 Historic Traffic Volumes

Figure 9 shows relatively low volumes, and low growth along VT Route 17.

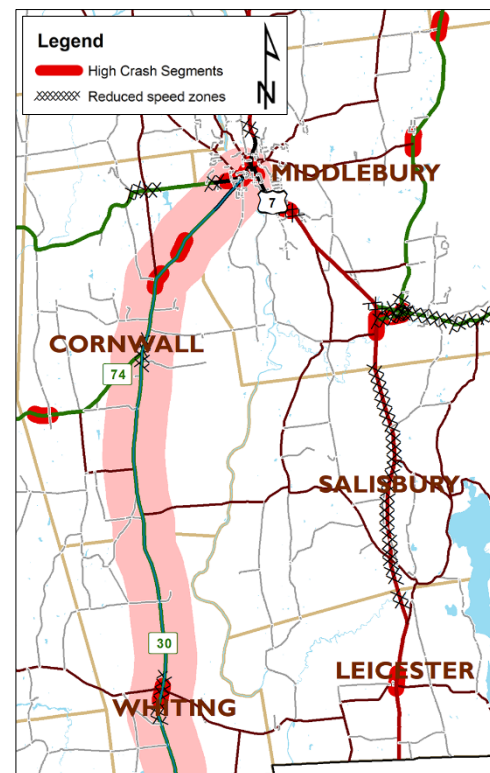
VT Route 17 - Recommended Actions:		
New Haven	Address existing safety issues between mile 6.22 and 6.52: relocate East Street and reduce the crest at intersection of VT 17 and Sawyer Street	
	<i>Responsible:</i> VTrans, ACRPC, U.S. DOT	<i>Timeframe:</i> mid-term
Bristol	Repair road segments between US 7 in New Haven and VT 116 in Bristol	
	<i>Responsible:</i> ACRPC, VTrans, Bristol, New Haven	<i>Timeframe:</i> short-term
Bristol	Advocate for bicycle & pedestrian-related improvements east of Bristol Village, including recommendations in Bristol to Rockydale Bicycle and Pedestrian Feasibility Study	
	<i>Responsible:</i> Bristol, VTrans, ACRPC	<i>Timeframe:</i> mid-term
Addison	Complete study to explore safety improvements at Route 17-Route 22A intersection	
	<i>Responsible:</i> Addison, ACRPC, VTrans	<i>Timeframe:</i> short-term
General	Address all structurally deficient bridges identified in Table 2 on page 16	
	<i>Responsible:</i> VTrans, U.S. DOT	<i>Timeframe:</i> mid-term
General	Study High Crash Locations along Route 17 and identify recommended improvements	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> mid-term

D. VT Route 30

This corridor is very rural, also with low traffic volumes and low traffic growth. There are no High Crash Locations, and public comments were limited to the narrow shoulders, making bicycling challenging.

- VT Route 30 is a popular bike route. Like much of the region's roads, narrow shoulders and high bicycle popularity impact the route and, therefore, there is a need to find a way to expand the corridor to allow for safe biking.

VT Route 30 - Recommended Actions:		
General	Promote the use of this scenic and low - volume corridor as a byway for traffic desiring to enjoy the Region's rural countryside.	
	<i>Responsible:</i> ACRPC, VTrans, towns	<i>Timeframe:</i> Short-term
General	Advocate for improvements necessary to promote as bike alternative to Route 22A and U.S. 7	
	<i>Responsible:</i> ACRPC, VTrans, towns	<i>Timeframe:</i> Short-term



VT Route 30 High Crash Sections



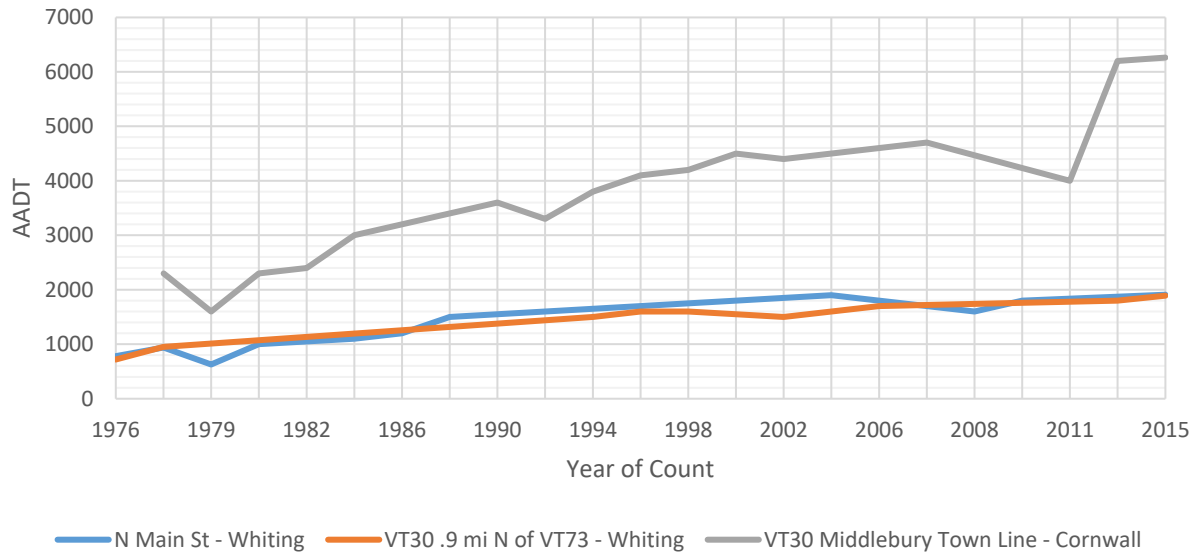


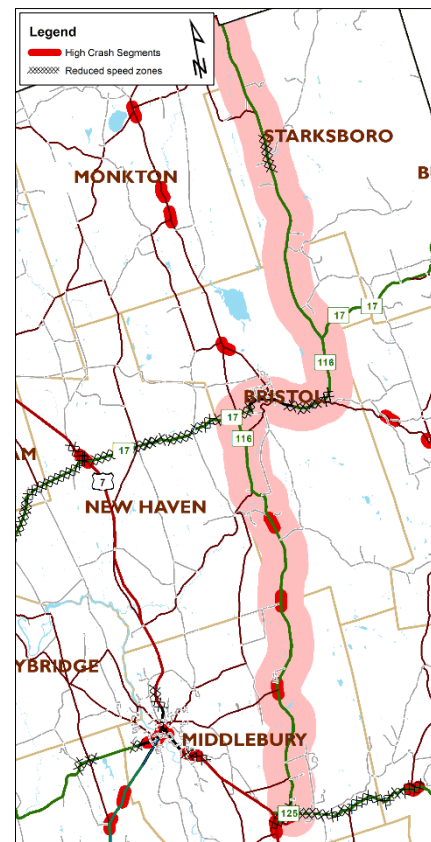
Figure 10: VT 30 Historic Traffic Volumes

E. VT Route 116

This corridor has relatively higher traffic volumes, and more recent growth in traffic. The perception is that this corridor is serving as an alternate to US 7 for commuters seeking to avoid congestion. There are numerous high crash locations along the length of the corridor, which primarily are at intersections with side streets that either have higher traffic volumes or poor sightlines at the intersection. These should also be evaluated for improvements such as roundabouts, or realignment to address visibility and safety.

Issues along this corridor include:

- East of Bristol, narrow shoulders and high bicycle popularity strain the corridor and, therefore, need to find a way to expand the corridor to allow for safe biking.
- Work with Bristol to create a gateway into the Village at the Daniels Four Corners intersection
- The high accident locations in Middlebury, Starksboro and Bristol should be studied in depth to determine how best to reduce the number of vehicle conflicts in these areas.



VT Route 116 High Crash Sections

The chart below shows traffic growth was more significant before the year 2000 than since that time.

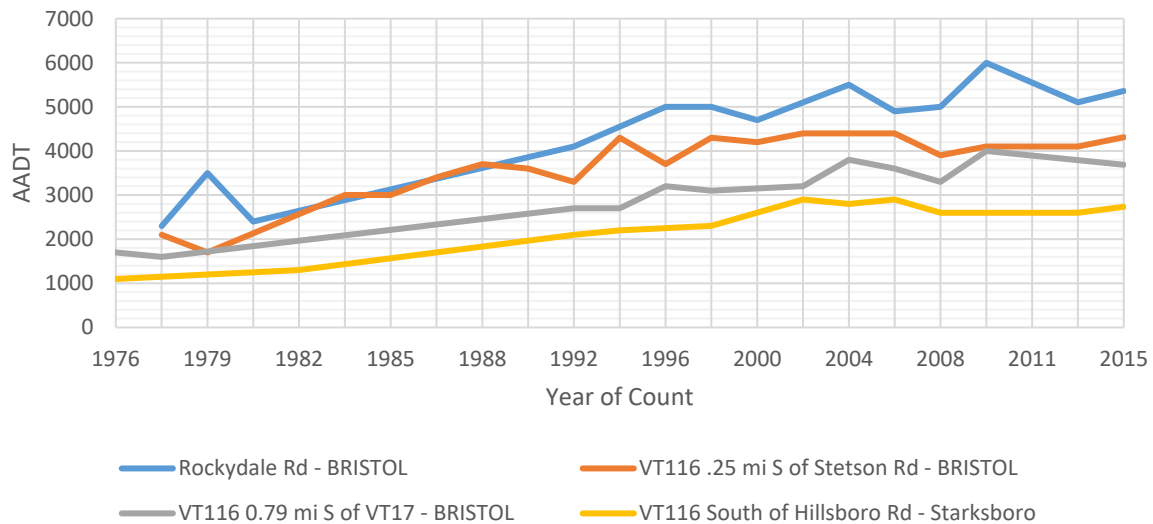
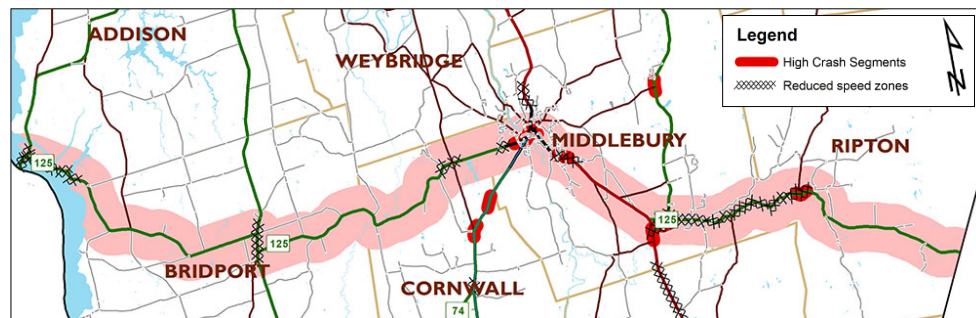


Figure 11: VT 116 Historic Traffic Volume

VT Route 116 - Recommended Actions:		
Bristol	Monitor capacity at VT 116-VT17 intersections both north and south of Bristol	
	<i>Responsible:</i> ACRPC, VTrans	<i>Timeframe:</i> mid-term
Bristol	Advocate for bicycle & pedestrian-related improvements east of Bristol Village, including recommendations in Bristol to Rockydale Bicycle and Pedestrian Feasibility Study	
	<i>Responsible:</i> Bristol, VTrans, ACRPC	<i>Timeframe:</i> mid-term
Bristol	Work with Town of Bristol to implement improvements to create village gateways	
	<i>Responsible:</i> Bristol, VTrans, ACRPC	<i>Timeframe:</i> short-term
General	Apply traffic calming elements identified by previous studies, including Middlebury Traffic Calming Feasibility Study, Starksboro Complete Streets study, and Traffic Calming and Non-Vehicular Routes for Five Addison County Towns (Starksboro)	
	<i>Responsible:</i> Town of Starksboro, ACRPC, VTrans	<i>Timeframe:</i> short-term
General	Address all structurally deficient bridges identified in Table 2 on page 16	
	<i>Responsible:</i> VTrans, U.S. DOT	<i>Timeframe:</i> mid-term
General	Study High Crash Locations along Route 116 and identify recommended improvements	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> short-term



F. VT Route 125



VT Route 125 High Crash Sections

Outside of Middlebury, the traffic volumes on VT Route 125 are generally very low. The character of the corridor varies tremendously from the Middlebury Gap Scenic Highway, through the Ripton Gorge, and then traversing rolling rural landscape to Lake Champlain. There are several high crash locations, again primarily at intersections. The section through the Ripton Gorge is narrow and winding, and is also a very popular bicycling route for advanced cyclists seeking a challenge. Issues include the following:

- West of Middlebury, narrow shoulders for walking and biking create conflicts. Demand is significantly higher for bicycling in this area, therefore it should be considered a high priority bike road.
- Resiliency through Ripton Gorge - Middlebury and Ripton recently preserved an alternate road corridor in the event that Route 125 suffers catastrophic damage from flooding.
- High accident locations should be analyzed to determine the most practical mitigation methods.

Traffic growth on the corridor has been nearly flat for decades, according to VTrans data.

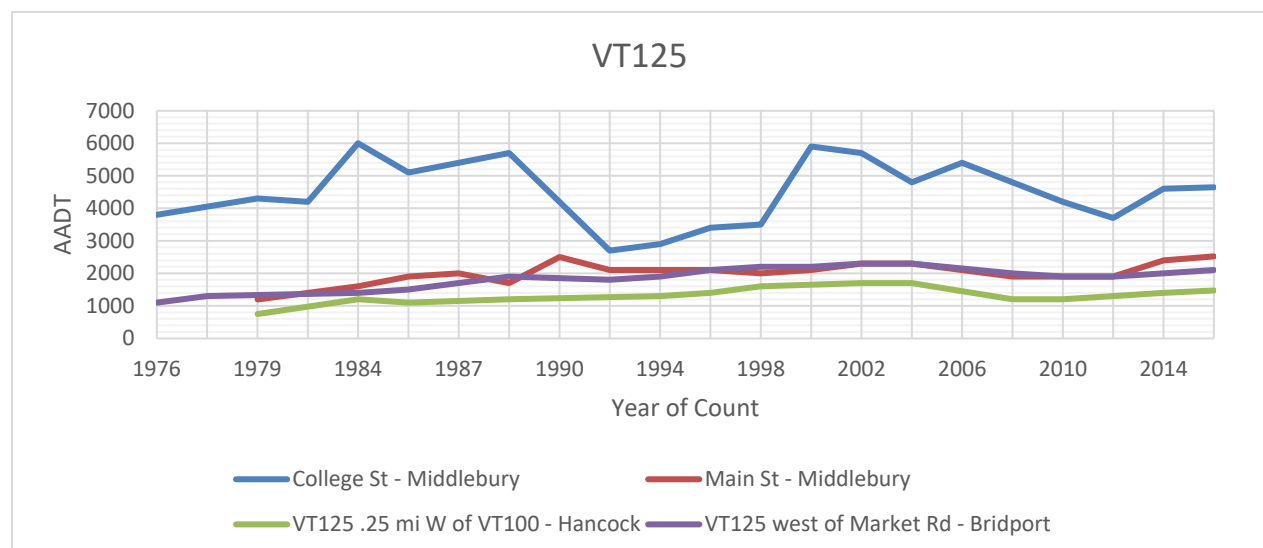


Figure 12: VT 125 Historic Traffic Volume

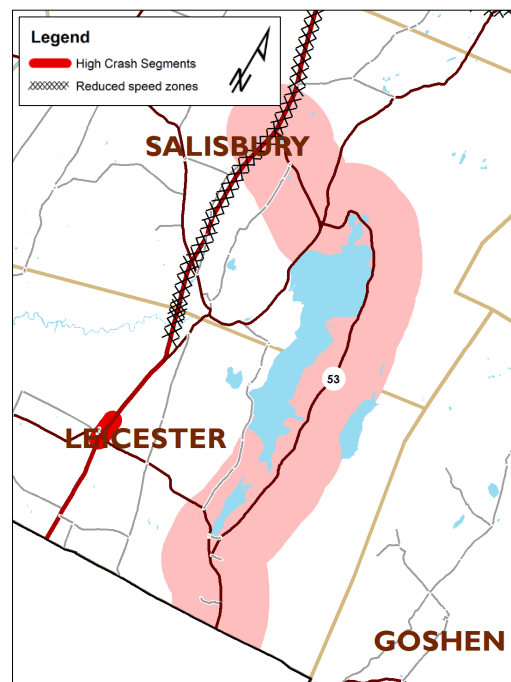
VT Route 125 - Recommended Actions:		
125 East	Identify and advocate for general corridor improvements, including shoulder widening, truck climbing lanes, , etc.	
	<i>Responsible:</i> ACRPC, VTrans	<i>Timeframe:</i> long-term
125 East	Implement flood and erosion-related resiliency improvements recommended by the Middlebury River/VT 125 Benefit-Cost Analysis	
	<i>Responsible:</i> VTrans, ACRPC, Middlebury, Ripton	<i>Timeframe:</i> long-term
125 West	Advocate for general corridor improvements, including shoulder widening and other bicycle & pedestrian safety improvements as identified in the VTrans On-Road Bicycle Plan or otherwise recommended by the Walk-Bike Council of Addison County	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> long-term
General	Address all structurally deficient bridges identified in Table 2 on page 6-16 as that list is amended annually	
	<i>Responsible:</i> VTrans, U.S. DOT	<i>Timeframe:</i> mid-term
General	Study High Crash Locations along Route 125 and identify recommended improvements	
	<i>Responsible:</i> VTrans	<i>Timeframe:</i> mid-term

G. VT Route 53

Route 53 is a small, rural highway that parallels Route 7 travelling on the Eastern side of Lake Dunmore. Issues include:

- Becoming a cutoff route between Route 73 east and US 7 north.
- The close proximity of Route 53 presents the potential for stormwater runoff impacts on Lake Dunmore.
- Increased traffic creates many conflicts in summer months especially with vehicles, walkers and bicycles.

VT Route 53 - Recommended Actions:		
General	Address safety concerns, including improvements to signs, sight distances, and drainage, especially in the High Crash Locations along Lake Dunmore in Salisbury and Leicester	
	<i>Responsible:</i> Salisbury, Leicester, ACRPC, VTrans, U.S. DOT	<i>Timeframe:</i> short-term
General	Work to identify and implement measures to reduce detour traffic traveling between U.S. 7 and Route 73 East	
	<i>Responsible:</i> VTrans, Salisbury, Leicester, ACRPC	<i>Timeframe:</i> mid-term



VT Route 53 High Crash Sections



- The area of Route 53 that passes through Salisbury is a high crash area. Efforts should be made to reduce vehicle conflicts at the “triangle” in Salisbury.

H. Local Corridors of Concern

There are a number of local road corridors that play an important role in the Region’s roadway network as alternate routes or connectors between communities, and they can have a burden on local budgets. The following is a partial list of local corridors which have Regional use and demands:

- Old Hollow Road, Ferrisburgh – high speeds and conflicts with neighborhood uses
- Monkton Road/Silver Street - commuter traffic impacts
- Monkton Ridge - increasing use by commuters

Local Corridors - Recommended Actions:		
Leicester-Whiting	Address drainage and flooding issues along Leicester-Whiting Rd.	
	<i>Responsible:</i> ACRPC, VTrans, Leicester, Whiting	<i>Timeframe:</i> short-term
Monkton	Apply traffic calming elements and other improvements identified by previous studies in Monkton Ridge and Boro areas, including the Town of Monkton - Commuter Corridor Planning & Feasibility Study and Monkton Ridge Village Complete Streets Planning & Feasibility Study	
	<i>Responsible:</i> Town of Monkton, ACRPC, VTrans	<i>Timeframe:</i> short-term
Ferrisburgh Old Hollow Road	Address intersection issues with RT7 (See recommended actions RT7 pg. 6-20)	

6.7. Modes of Transportation

A. Passenger Vehicles

Like most of Vermont, the rural nature of Addison County, which is made up of small communities connected primarily by a network of roadways, means that the most prevalent mode of transportation is the passenger vehicle. Residents use their cars or trucks to travel to work and to reach locations where goods and services are readily available, or to deliver goods and services.

When residents commute to work, they generally do so alone, the US American Community Survey (ACS) indicates that in 2016, 70% of Addison County’s total working population drove by themselves. While 10% of workers carpool, the number of “workers per car” is only 1.8. Seventy percent (70%) of residents work in Addison County, which means their mean travel time to work is roughly 24 minutes.

Single-occupancy vehicles, while incredibly convenient for those that can afford them, can also have negative impacts including the cost of fuel, energy use and impacts on the environment. To achieve more affordability and reduce greenhouse gases, this plan envisions offering the citizens of Addison County other options besides commuting alone. It anticipates that it can maintain access to jobs, goods and services, but reduce driving alone and promote switching to cleaner fuel sources. Many aspects of this plan discuss the actions necessary to enact these long-term shifts.

B. Truck Traffic and Freight

According to the 2012 Vermont Freight Plan, 80-90% of the trade between Vermont and its neighbors takes place by truck. Trade with New York in particular, accounts for 60% of all trade weight (15 million tons) and over 50% by value (14.7 billion). Overall freight transportation demand in Vermont is expected to grow 43 percent between 2007 and 2035, or 1.28 percent per year. This growth has a direct impact on the ACRPC region as two sections of the Vermont Truck Network (the road network designated for freight truck travel in Vermont) are located within the county. US 7 and VT22A are the primary north-south transportation corridors on Vermont's western edge. In a sampling of data taken between 2002 and 2014, it is clear that truck (medium and heavy) traffic is increasing region wide, with the most significant increases occurring in Middlebury (107%) and Vergennes (44%).

The growth of truck traffic puts pressure on roads and can present a hazard to the travelling public. Heavy vehicles also generate significant noise, dust and vibration that is detrimental to villages and downtowns. In addition to the physical impacts of truck traffic, many residents' express concerns about the materials transported through the Region. In an inventory conducted by ACRPC in 2010, it determined that roughly 8% of materials that trucks transport through Addison County are identified as hazardous. This includes the transport of combustible fuels, chemicals, blasting agents and other potentially dangerous products. The majority (60%) of hazardous materials constitute heating and vehicle fuels which are delivered by bulk rail and semi-truck to distribution centers around the County. More of these materials are transported along Route VT22A (11.8%) than other routes (6.8%).

The transport of hazardous materials via rail is more challenging to identify. Vermont Railway does not release information regarding hazardous materials for confidentiality reasons. However, during ACRPC's study of hazardous materials, it

Truck Traffic in Vergennes

The City of Vergennes has an extended history (beginning in 2002) of recommending limiting truck traffic that passes through the City. The intensity of truck traffic through the City of Vergennes is undeniable – in a traffic study from June 6 – June 12, 2012 ACRPC determined that total traffic counts on Main Street in Vergennes were 61,963 north and south bound per week, with 9.1% of those vehicles (approximately 5,639 trucks) being Class 8-13 (four axle or more single and multiple trailers).

In 2015, Vergennes proposed an alternative truck route that would divert northbound truck traffic away from the City of Vergennes via Route 22A in Addison Four Corners and east along VT Route 17 to Route 7 in New Haven.

The Towns of Addison, New Haven, and Weybridge strongly oppose the proposed alternative northbound truck route, citing their own concerns about road safety and damage to infrastructure. In November of 2017, ACRPC and VTrans held a regional forum with Vergennes and its neighbors. At the forum, all the parties acknowledged that heavy truck traffic significantly impacts the quality of life on Main Street in Vergennes. The parties resolved to study the issue, looking at all practical alternatives, including a truck bypass around the City of Vergennes. The parties, including VTrans, ACRPC, Vergennes and its neighbors, shall work toward completing the study and implementing the solution chosen to mitigate the impact of trucks on downtown Vergennes.



observed that Vermont Railway transports gasoline and related petroleum products to depots in Middlebury and Burlington. Each daily northbound train through Addison County includes roughly fifteen loaded gasoline tanks.

The most significant hazardous materials incident involved a 20-car train derailment in downtown Middlebury in 2007, which included 14 tank cars of gasoline. Several cars caught fire and some fuel leaked into the nearby Otter Creek. The incident required the evacuation of schools, homes and businesses and the activation of the State Hazardous Materials crew. While the instance of hazardous materials releases in Addison County is low, regular accidents occur that require notifying the state HazMat hotline. These shipments present the possibility of a danger to our communities and a challenge to local first responders. Local Emergency Planning Commission (LEPC) #8, which covers Addison County, adopted a Hazardous Materials Emergency Plan (HMEP) in August of 2016. This plan formalizes the response procedures, emergency resources, hazard analysis and training requirements for municipalities and first responders in the event of a hazardous materials release.

Goal

- *Provide for the safe and efficient transport of goods through the Addison Region and mitigate the impact of heavy truck traffic.*

Policies

- *Structure, operate and maintain the Region's roadway network to mitigate the impacts of traffic and freight on the Region's communities, especially in villages and downtowns.*
- *Support sound, equitable and well-planned alternative routes for freight transport that will reduce negative impacts on our villages and downtowns, including investigating new, equitable & well-planned alternative routes.*
- *Support LEPC#8 and regular updates to the Hazardous Materials Emergency Plan and Local Emergency Operations Plans.*

Truck Traffic and Freight - Recommended Actions:		
General	Encourage towns to develop hazard mitigation plans that address hazards from materials transported through the community	
	<i>Responsible:</i> Towns, ACRPC, VTrans	<i>Timeframe:</i> short-term
General	Explore and create truck routes that address concerns of Vergennes & neighboring communities	
	<i>Responsible:</i> VTrans, ACRPC, towns	<i>Timeframe:</i> short-term
General	Study High Crash Locations along Route 22A and identify recommended Improvements	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> mid-term

See also rail recommended actions on page 6-9.

C. Agricultural Impacts

This Plan is intended to support agriculture. Agriculture plays a significant role in Addison County's economy. Our farms use our road system to maintain and harvest their crops and bring their foods to market. However, residents of the ACRPC Region have voiced concerns about the impacts of agriculture on the road system. Addison County is home to some of Vermont's largest commercial agricultural operations. Overall, farm production and activity in Addison County is growing.

This growth in farm scale means that farms often have to move large agricultural equipment over longer distances via the road network, which can (over time) damage roads, cause traffic congestion and even present a safety hazard to other drivers. Although communities have the authority to set weight limits on local roads, there is a statutory exemption from permit requirements for agricultural vehicles up to 60,000 pounds. Communities are unable to require compensation for damages to municipal roads done by vehicles under 60,000 pounds without becoming involved in litigation with the towns within their jurisdiction. Heavier farm vehicles do require permits. Municipalities or the State also can control where agricultural vehicles access the public highway system and should carefully consider access requests. If not properly planned, access points can cause damage to road infrastructure and present a traffic safety hazard. A permit is required from either the state or municipality for any new road access.

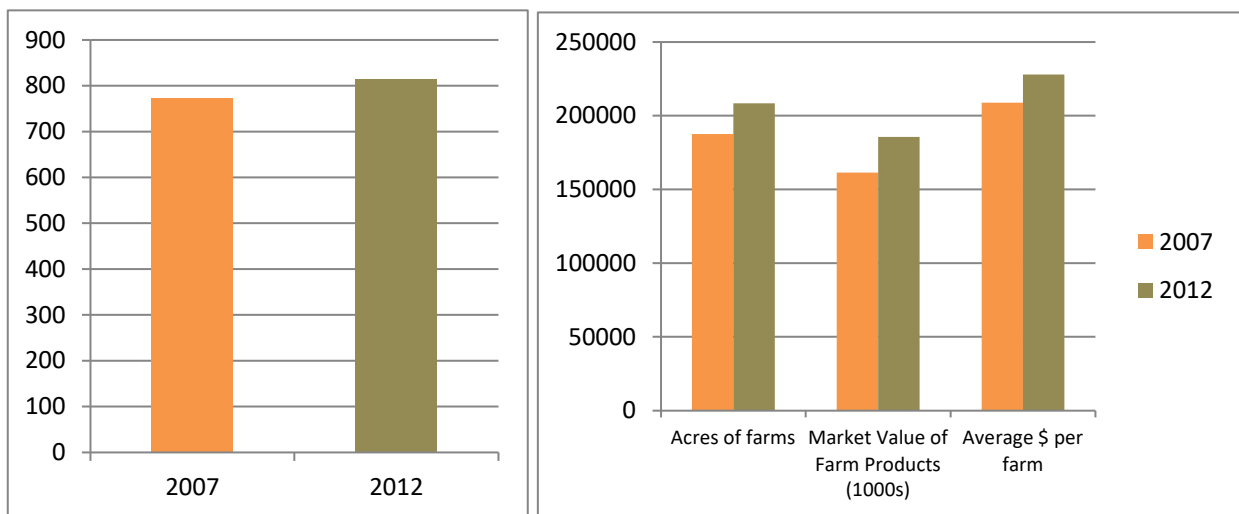


Figure 13: Data from the Addison County Farm Census, 2012: the number of farms (left) and Farm Activities (right)



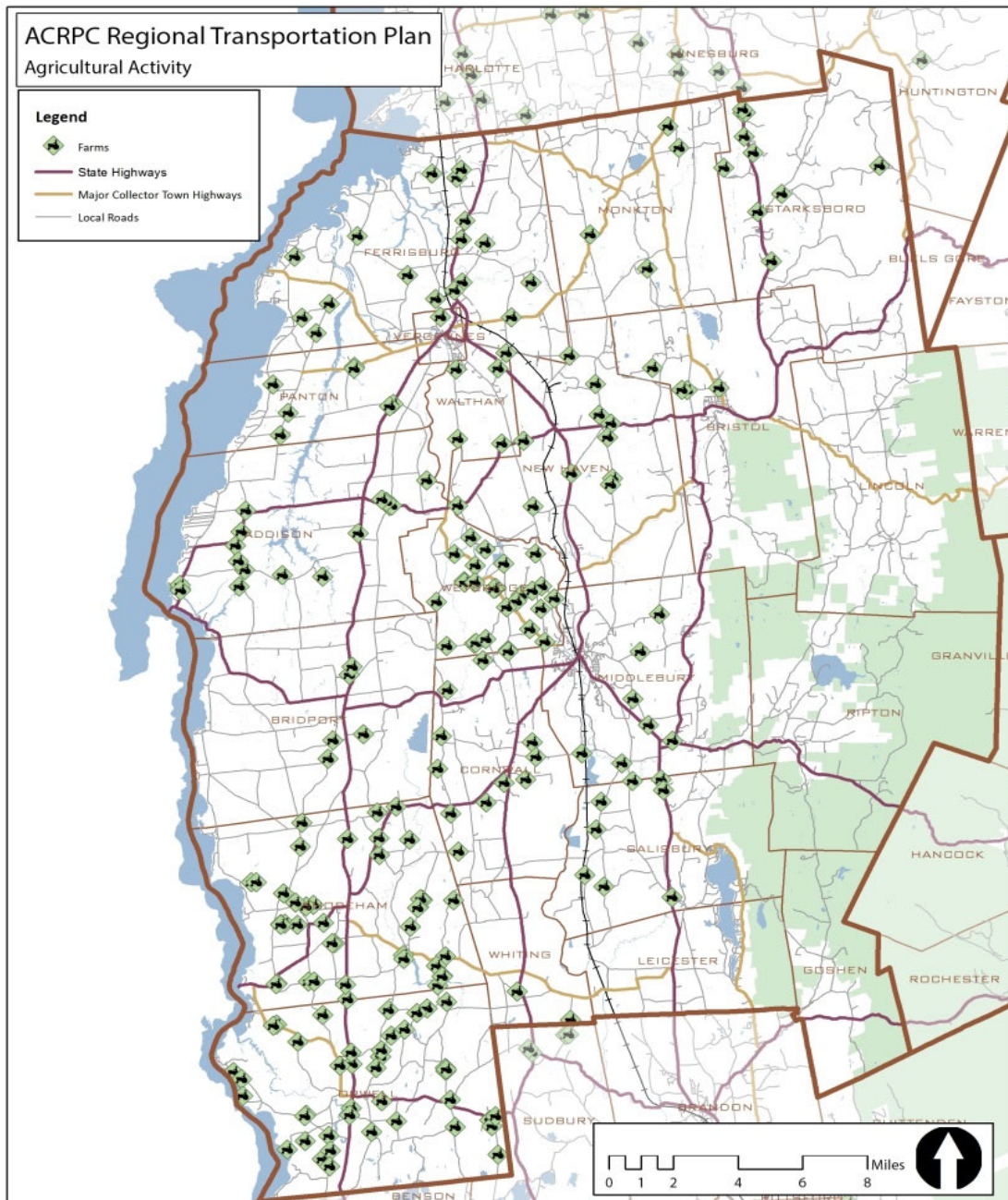


Figure 14: Map of Farms in Addison County

Agriculture Impact-Recommended Actions:

General

This Plan encourages farms and government agencies to use best management practices and work to minimize damage to the road system

Responsible: VTrans, ACRPC, towns

Timeframe: short-term

(Adopted April 11, 2018)

Transportation



6.8. Passenger Transportation

A. Public Transit

Passenger transportation in the ACRPC Region is served primarily by Addison County Transit Resources (ACTR) a branch of Tri-Valley Transit, a non-profit public transit provider that offers a number of routes throughout the Region. ACTR's primary goal is to "provide services that are safe, reliable, accessible and affordable for everyone." Utilizing western Vermont's primary transportation corridor, US Route 7, ACTR links the three primary employment centers in the Region – Vergennes, Bristol, and Middlebury – with each other. ACTR also links many communities in the ACRPC Region to Rutland and Burlington, which is a particularly valuable resource for residents who are employed in those communities.

Overview of current routes

ACTR offers two distinct services, the Dial-a-Ride system, which provides elders, persons with disabilities and other vulnerable populations with access to medical services, shopping and eating destinations, and the ACTR Bus System, which runs to multiple locations within and outside of the ACRPC Region. For more up-to-date route information, go to <http://www.ACTR-vt.org>.

Potential Service Extensions

ACTR Bus routes are currently active Monday - Friday with Saturday service available on selected routes. Trips are generally offered multiple times a day, but are not available earlier than 5:30a.m. or later than 7:30p.m. depending on the route.

ACTR's long-range plans have identified several potential areas for expansion which would be dependent on available funding and ridership needs. In addition to the fixed routes discussed above, this plan also supports the expansion of ACTR's Demand Response services to meet the needs of the Region's transit dependent population. This includes harnessing new technology to facilitate ridesharing.

Communities that have a specific need, such as congestion, high levels of commuters, or an underserved population, should reach out to ACTR to determine what criteria they would need to demonstrate to allow ACTR to access State and Federal funding to support new services.

ACTR's Ridership

Between 2012-2015, ACTR experienced about a 5% increase in overall ridership between the Demand Response and Bus programs.

Ridership on the ACTR bus line is heavily influenced by the cost of gasoline. During the most recent five-year period, ridership on the Bus line peaked in 2014, seeing a drop as high fuel prices relaxed. However, the Demand Response Program, because it supports those who are either unable or cannot drive (and are therefore less influenced directly by fuel costs), has continued to grow in ridership.

Year	Dial-A-Ride	Bus	Combined Total
2016	65,501	115,941	181,442
2015	49,591	121,414	171,005
2014	49,357	128,826	178,183
2013	51,707	125,981	177,688
2012	49,822	122,573	172,395

Table 5 - ACTR Ridership 2012-2016



ACRPC's Transit Dependent Population

	Disabled Residents Age 18 and up	People in Auto-Less Households	Residents Below the Poverty Line (Age 18 and up)	Residents Age 65+	Residents Age 15-19	Total Town Population
Addison	116	20	105	227	103	1403
Bridport	117	14	92	266	65	1172
Bristol	424	57	222	674	303	3903
Cornwall	61	3	26	193	51	1071
Ferrisburgh	195	23	158	411	203	2774
Goshen	32	0	22	42	8	149
Leicester	206	12	122	242	92	1231
Lincoln	146	6	83	209	87	1279
Middlebury	1269	336	972	1343	1355	8530
Monkton	221	8	73	250	146	2049
New Haven	201	30	87	257	86	1677
Orwell	208	15	99	243	111	1310
Panton	97	0	38	98	47	723
Ripton	55	13	71	115	36	619
Salisbury	138	10	121	185	46	1121
Shoreham	169	11	130	194	90	1170
Starksboro	112	13	129	132	91	1762
Vergennes	413	138	334	438	126	2629
Waltham	51	3	13	115	7	441
Weybridge	87	14	65	142	65	851
Whiting	43	6	53	47	26	424

Table 6: Transit Dependent Population by Town

The Region has a significant population of people characterized as “transit dependent” who may not be able to afford a car, are unable to drive, reside in a household without a car, are elderly or for other reasons are more likely to rely on the public transportation system. The chart above summarizes this population by town. It should be noted that the categories often overlap, resulting in a person being counted more than once. However, the numbers also demonstrate that a significant portion of the Region’s population relies on public transportation. Projections expect these numbers to increase as the Region’s population ages.

Emerging Infrastructure Needs and Opportunities

Infrastructure investments allow ACTR to operate efficiently and effectively and advance the state of public transportation in the Region in parallel with investments in other modes.

In the near term, ACTR's transit hub serving Middlebury's downtown needs a permanent location. The planned replacement of state-owned railroad bridges (planned for 2019) within the village will disrupt ACTR routes in Middlebury. ACTR and Middlebury have agreed to a temporary hub located on Academy Street with satellite stops by the post office to serve the downtown.

A location in downtown Middlebury is most advantageous from a connectivity and land use perspective. It delivers riders and customers close to the businesses and services they desire to use. Any hub developed in downtown Middlebury should be sensitive to its effects on the on-street parking supply.

Goal

- *Create and sustain a Region-wide public transit system serving all citizens of the ACRPC region.*

Policies

- *Support ACTR and town and human service agencies in providing public transportation services for a greater percentage of the Region.*
- *Support the relocation of the ACTR transit hub to a permanent location in downtown Middlebury that is suitable for the organization's needs and accessible to places riders want to access.*

Public Transit - Recommended Actions:		
ACTR	Support actions which provide ACTR with the resources needed to provide optimum service	
	<i>Responsible:</i> ACTR, ACRPC	<i>Timeframe:</i> short-term
ACTR	Continue to explore pilot programs to expand potential ACTR services	
	<i>Responsible:</i> ACTR, ACRPC	<i>Timeframe:</i> short-term
ACTR	Continue assisting ACTR with planning, marketing, and general coordination	
	<i>Responsible:</i> ACRPC	<i>Timeframe:</i> ongoing
General	Support connectivity between transit and bicycling and walking	
	<i>Responsible:</i> Towns, ACRPC, VTrans	<i>Timeframe:</i> short-term
General	Incorporate transit planning into town plans, focusing on possible transit stops and hubs in proximity to parking availability.	
	<i>Responsible:</i> Towns, ACTR, ACRPC, VTrans	<i>Timeframe:</i> short-term
General	Monitor transit demand to ensure that service continues to perform at acceptable levels and connects to places where riders can access the system with Park & Rides	
	<i>Responsible:</i> ACTR, ACRPC	<i>Timeframe:</i> mid-term

B. Ridesharing-Carsharing-Ridehailing

To encourage reduced single-occupancy vehicle trips and to encourage collective travel either by ridesharing or by use of public transit, the Region contains a system of 12 formal and informal park and rides. Of the 12, one is maintained by the State of Vermont, 8 are maintained by municipalities and the remaining 3 are informal lots. These facilities are rarely at capacity, indicating that the number of spaces available at the existing park and ride facilities in Addison County is currently sufficient.



The VTrans “Go! Vermont” program helps commuters connect statewide to encourage ridesharing. As indicated in Figure 1 (pg. 6-6), ridesharing is encouraged at 12 park and rides in the ACRPC Region. The traditional ridesharing model, whereby a driver makes a seat in his or her vehicle available for passengers who may or may not pay for the trip, is changing due to growing technological connectivity. New models of ridesharing, often referred to as “ride hailing,” are anonymous, dynamic, involve fares, and are commonly one way. Companies like Uber and Lyft have made ride hailing a popular way of travel in urban areas and are in the early stages of bringing these services into rural areas.

Highest Carpool Commute	
Shoreham	17%
Bristol	17%
Vergennes	13%
Whiting	13%
Waltham	13%
Leicester	12%
Middlebury	12%

Table 7 – Percentage of total commuters.
Source: US ACS 2015

There is a single taxi service in the town of Middlebury. Car-sharing services, which have similarities to traditional car rental models, have expanded over the past decade. Services like Zipcar allow people to utilize cars for travel, booking the vehicles by the hour or by the day. Middlebury College students, and local residents alike, can sign up for a Zipcar account to use several vehicles located on campus.

Modern car-sharing or ride hailing services are generally more common and more effective in urban areas. However, Uber and Lyft are available in and around Middlebury and in areas near Burlington. As technology advances, these services will likely become more effective in the lower-density areas of Addison County. This may present an opportunity to provide transportation to populations that need it such as elderly individuals who are no longer able to drive themselves, people with disabilities and people with low incomes.

C. Travel Demand Management (TDM)

A vast majority of daily vehicle trips involve residents driving to and from work. Major employers in the ACRPC Region are well positioned to play an active role in reducing vehicle trips by encouraging carpooling, bicycling and allowing telecommuting. The Region’s three largest employers are Middlebury College, The University of Vermont – Porter Medical Center, and UTC Aerospace. Local schools are also a significant employer. Employers can employ some or all of the following Transportation Demand Management (TDM) practices to reduce vehicle trips and increase vehicle occupancy:

- **Financial Incentives** - Employers can offer financial incentives to employees that reduce their single-occupancy vehicle (SOV) trips through carpooling or, like Middlebury College, they can provide free access to local public transit.
- **Facilities** - They can provide facilities for employees, such as secure locations for bicycles and access to showers and lockers, or carpoolers can be given preferred parking.
- **Services** - Employers can offer access to vanpooling, shuttles or car-sharing. In addition to their on-campus Zipcars, Middlebury College provides shuttle access for students and employees to the village.
- **Flexible Scheduling** - As access to the internet becomes more broadly available, the ability for an employee to work remotely has significantly improved. With the right equipment and a



connection to the internet, employees can access their office workstations remotely, make and receive calls via the office phone system and otherwise work productively from home. For those occupations that are not well-suited to telecommuting, employers can allow for flex time or a compressed work week. By enabling employees to be able to work more hours over fewer days, the number of vehicle trips to and from work can be reduced.

In 2012 the High Meadows Fund awarded ACTR a grant to develop TDM programs in Addison County. From 2012-2015 ACTR, ACRPC and several communities explored TDM strategies including outreach, education and the promotion of transportation efficiency options. Part of this process involved working with businesses to develop “Commute Trip Reduction” plans. Unfortunately, the effort proved unsuccessful at that time. ACTR concluded that programs of this nature require the following conditions:

- An ongoing commitment from leadership/management that results in assigning staff resources for implementation (i.e., an internal “champion” aka employee transportation coordinator).
- An investment on the part of the business to create a fringe benefit program that could:
 - Reimburse for bus passes;
 - Organize vanpool or carpooling options for its employees;
 - Create other fringe benefits such as investments to incentivize employees’ technology shift to a higher MPG or zero emissions vehicle as well as the interest in or ability to offer flex time;
 - Provide showers for bike/walking commuters, along with bike racks, and offer a free annual tune-up for employees that ride to work on a regular basis;
 - Establish a telecommuting policy.
- The existence of significant barriers that jeopardize profitability or success of a business that could be mitigated with TDM techniques (parking constraints, retention/recruitment issues).

To a large extent, few of these conditions exist in Addison County at the current time.

Goals

- *Support transportation access for all Addison County residents.*
- *Provide alternative infrastructure to reduce single occupancy vehicle dependency.*

Policies

- *Continue to support public transportation, ride-share and car-share programs to reduce the Region’s dependency on single-occupancy vehicle trips.*

Travel Demand Management -Recommended Actions:		
	Work with ACTR, GoVT and others to make emerging ridesharing technologies available in the Region.	
	<i>Responsible:</i> ACTR, ACRPC, VTrans	<i>Timeframe:</i> Mid-term



6.9. Pedestrian and Bicycle Facilities

Vermont's Complete Streets law, Act 34, requires that all users be considered in the planning, design, construction and maintenance of our roadway system. Under these Complete Streets principles, the context of each project is recognized in any recommendations for additional facilities or accommodations. In very rural areas, riders/walkers may share the road with vehicles, in other areas road shoulders provide a reasonable safe and cost-effective facility for pedestrians. In these cases, measures to maintain lower speeds to enhance safety, such as traffic calming, are appropriate. In areas with more multimodal activity, such as downtowns and village centers, there are a range of appropriate accommodations for non-motorized users, including sidewalks of varying widths and designs, bicycle lanes, shared lanes, and separated bicycle paths. Current or future transit stops should be designed to anticipate pedestrian travel to and from the rider's final destination.

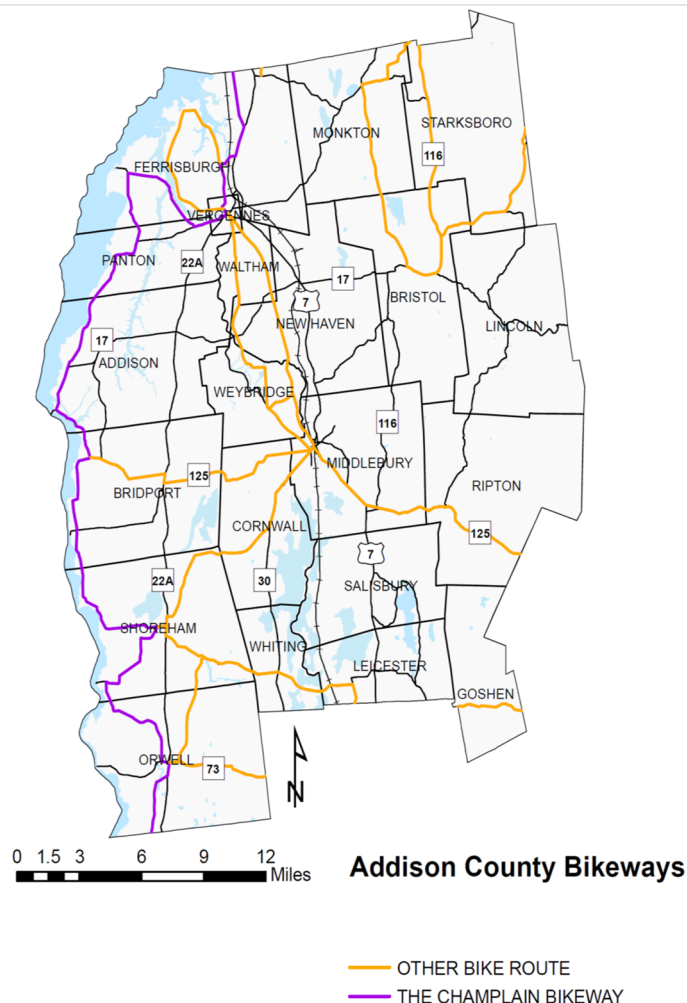


Figure 15: Bikeways in the ACRPC Region (Source: VT Dept. of

This Plan supports Complete Streets and its implementation on a rural scale that is appropriate for the Region.

Walking and bicycling infrastructure is an important component of the Region's goals for sustainable transportation. Higher use of these modes will provide numerous benefits for the Region, including lower traffic volumes, lower emissions, and improved public health. While Vermont's Complete Streets policy should ensure that transportation improvement projects provide for these modes, there are additional considerations that can further the Region's goals. The Safe Routes to School program is a national initiative designed to promote walking and bicycling among school children. Improving safety is the primary program emphasis, but there are also other goals of improving physical fitness and mitigating school-caused traffic impacts. The Region has been supportive of federal and state initiatives that incorporate safe routes programs primarily in schools in or near our villages and downtowns.

Percentage of Workers 16 and Over Who Walk or Bike to Work	
Highest Walk Commute	
Middlebury	25%
Vergennes	11%
New Haven	8%
Whiting	7%
Addison	6%
Panton	6%
Highest Bicycle Commute	
Middlebury	2%
Weybridge	2%
Cornwall	1%
Salisbury	1%
Bristol	1%

Table 8 - Source: US ACS 2015

Bicycle and pedestrian facilities in Addison County are generally concentrated in major villages and downtowns, although non-recreational bicycle travel on all of the Region's roads is seasonally common. This concentration in villages and downtowns is due primarily to the distances people are willing to walk and bike to work, recreation, school or services. Generally, between 2-5 miles is as far as the average person would bike to a specific destination (this figure does not include biking for recreational purposes, which can be significantly larger distances), and between half and one mile is as far as a person is likely to walk. In addition to distance, weather and topography can have a significant influence on one's willingness to walk or bike for transportation. Middlebury, Bristol and Vergennes have downtowns with a network of pedestrian infrastructure. Additionally, these communities - particularly Middlebury, which is home to two of the Region's largest employers - are job centers, which means that cyclists within the 2-5 mile range can bike to work. Over the past decade the Towns of Middlebury, New Haven, Weybridge, Vergennes, Bristol, Cornwall and Ferrisburgh have all actively planned for future improvements to their pedestrian and bicycle infrastructure. As topography is relatively favorable for bicycling, increasing travel by this mode could potentially alleviate traffic congestion and downtown parking demands.



The unique character and diverse topography make Addison County amongst the most desirable destinations in Vermont for recreational cyclists. The Lake Champlain Bikeway, a 1,400-mile bicycle route that circles Lake Champlain through parts of Vermont, New York and Quebec, passes through Addison County, as does the Western New England Greenway, which links Montreal, QC to New York City. In addition, there are many other recreational road bike routes that connect Addison County with other parts of the state. The Moosalamoo National Recreation Area offers off-road cycling opportunities.

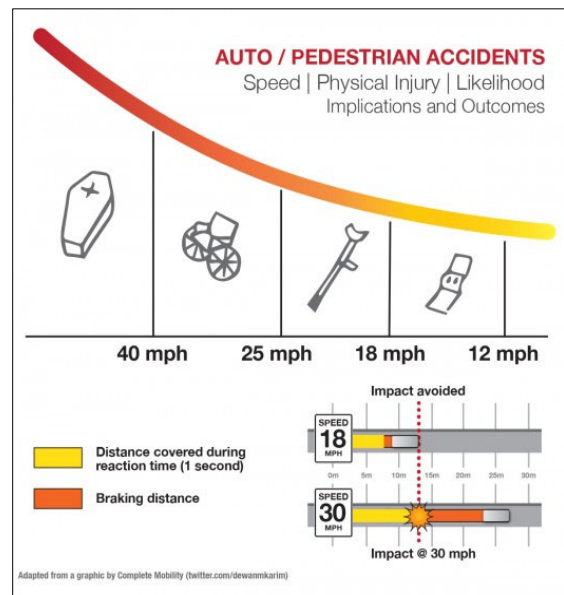


Figure 16: Likelihood of pedestrian/cyclist injury or death relative to speed

A. Bike and Pedestrian Safety

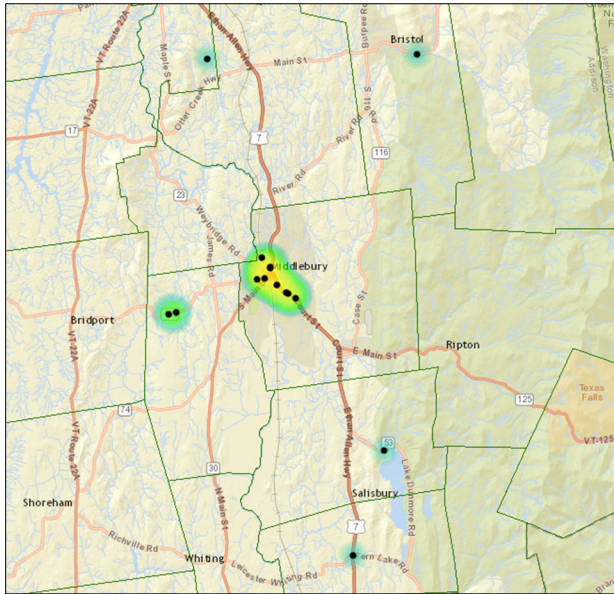


Figure 17: Crashes involving bicycles, 2011-2017 (VTrans)

The primary concern for cyclists as they travel through the Region is safety. While statewide bicycle crash trends have been moving slightly downward, the average yearly number of reported crashes in Vermont is 42. A majority of all bicycle crashes take place during the day, on a weekday at intersections.

In 2017, ACRPC collected citizen input with regard to bicycling and walking within the Region. Utilizing an online “wikimap,” residents indicated areas where they experienced safety concerns, where they regularly walk and bike and where they would walk or bike if safety was improved (see appendix for details). Respondents identified 65 distinct areas of concern. Forty-one percent of all comments made were related to a lack of

adequate road shoulders for bicycle safety throughout the Region. Traffic and traffic speeds, poor visibility, dangerous intersections and poor road conditions were also noted in locations around the Region. See ACRPC website at www.acrpc.org/programs-services/transportation for detailed information on the wikimap project.

It is unlikely that bike/ped improvements will occur in every area of the Region, therefore it is important to focus on where bike/ped infrastructure is used the most. A significant amount of foot travel occurs in areas where population density is highest – villages and downtowns. In these areas communities should:

- Develop bike/ped plans (stand alone or as part of their municipal plan) that plan for new pedestrian infrastructure (where appropriate) and provide connections between important areas of the community, whether for recreation or commerce, as well as connections between other communities.
- Identify local priority bike/ped routes.
- Utilize innovative and inexpensive techniques such as “tactical urbanism” to test possible bike/ped improvements.
- Maintain existing infrastructure and address safety issues quickly.

Tactical Urbanism

“Tactical urbanism” is an umbrella term used to describe a collection of low-cost, temporary changes to the built environment, usually in cities, intended to improve cycling and walking, local neighborhoods and city gathering places. Tactical Urbanism is also commonly referred to as guerilla urbanism, pop-up urbanism, city repair, or D.I.Y. urbanism.

Methods include installing temporary bike lanes, narrowing streets, pop-up parks, open Streets, de-paving, etc. Tactical Urbanism can be used to test concepts at little or no cost to the community, allowing municipal officials to gauge support for an idea before investing in implementation.



- Focus improvements on key intersections where pedestrian and bicycle movements conflict with vehicular traffic.

For cyclists, connections between population centers are also valuable. Many riders choose to commute via bike to their jobs, often traveling from more rural areas to employment centers such as Middlebury or Vergennes. This makes the stretches of municipal and state roads between the Region's population centers an important focus of any long-range transportation planning.

The Vermont Agency of Transportation (VTrans) is developing an On-Road Bicycle Plan in support of enhancing on-road bicycle improvements on State roadways. The plan is expected to be completed in 2018. As part of the first phase of the On-Road Bicycle Plan's development, VTrans created statewide maps that prioritized current and future bicycle use on state roads. In Addison County, VTrans has identified the highest priority areas (see figure 18) along Route 116 in Bristol and Middlebury, Route 17 in Bristol and Starksboro and parts of Route 125 in Middlebury and Ripton. While these areas are important, the Regional Planning Commission remains concerned about areas of priority the State identified, as many of the best cycling opportunities occur on local roads. ACRPC believes the State Transportation plan must recognize these local roads as it develops its priorities in order to allow it to cost-effectively promote interconnected routes that provide the greatest benefit at the least cost.

Also, the state identified several significant bike travel routes as low priority. For example, the portion of the Lake Champlain Bikeway (shown in figure 15) in Addison County was

Complete Streets

Smart Growth America defines "Complete Streets" as "streets for everyone. They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work."

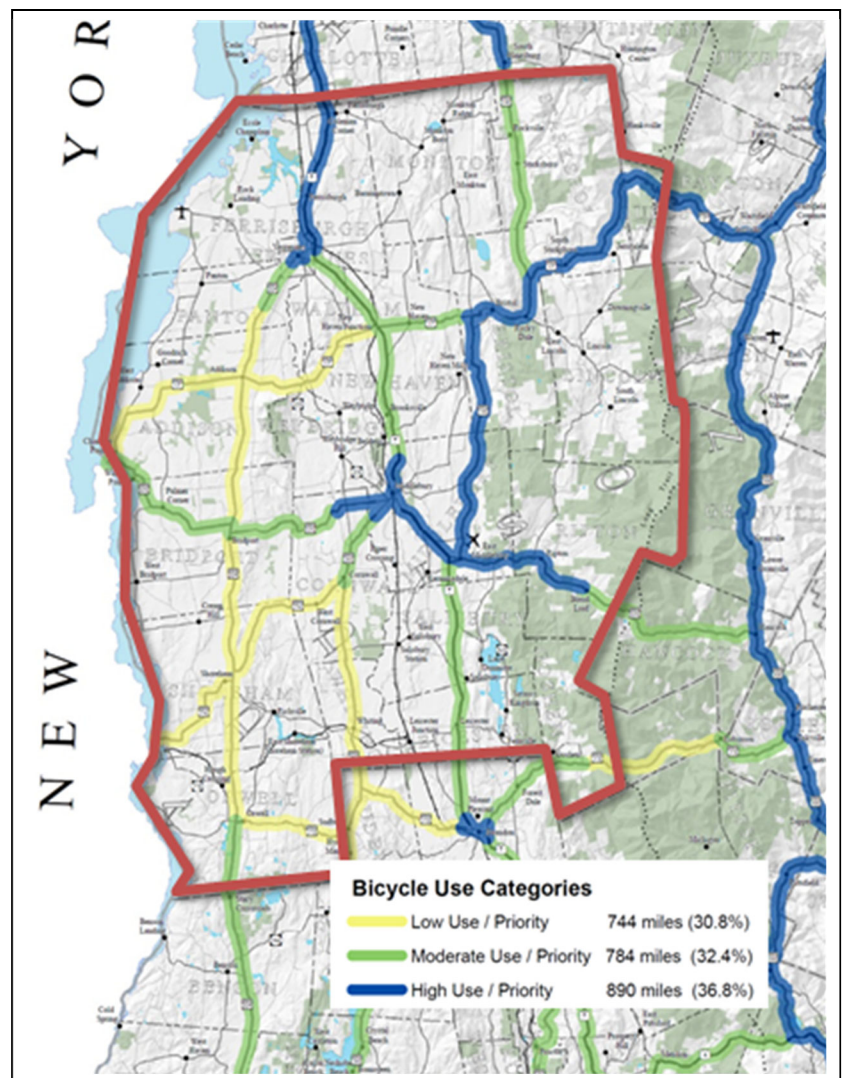


Figure 18: VTrans Bicycle Priority Map

not identified as a priority area. Additionally, the statewide Plan identified important commuter travel corridors, from Vergennes to Middlebury, or the connection between Vergennes and Bristol as moderate priority. Much of the VTrans road system in the Region was considered low-priority.

B. Regional Health Benefits of Walking and Biking

It is important not to understate the added health benefits that safer walking and biking opportunities can bring to the Region. The Vermont Department of Health estimates that more than one in three adults in Addison County do not get the recommended amount of physical activity and more than half (63%) are above a healthy weight, making them susceptible to chronic disease.

Using a context sensitive Complete Streets approach to developing the Region's transportation system will support safe walking and biking. When safe environments for exercise exist, communities have been shown to experience a 35% increase in physical activity.¹ Residents are 65% more likely to walk in a neighborhood with sidewalks.² In 2005, a comprehensive study of walkability has found that people in walkable neighborhoods did about 35-45 more minutes of moderate intensity physical activity per week and were substantially less likely to be overweight or obese than similar people living in low-walkable neighborhoods.³

Designing our transportation system to encourage walking and biking expands economic benefits in a number of ways. The 2017 Burlington Walk Bike Master Plan describes the following:

- Walking/biking increases household purchasing power by reducing transportation related expenditures.
- Human-friendly streets boost retail performance.
- Walking/biking keeps people fit, healthy, and socially connected as they age.
- Walk/bike investments help attract and retain talent.
- Better walk/bike conditions contribute to a healthy and happy workforce.

C. Walk-Bike Council of Addison County (WBCAC)

While very few crashes are fatal, since January of 2014, there have been two fatal bicycle crashes in the Region. Following these fatalities, ACRPC partnered with nonprofit bike/ped advocacy group Local Motion and concerned citizens to form the WBCAC. The WBCAC includes residents and experts in such fields as law and enforcement, transportation planning, marketing, recreation, health and community planning. The Council's primary goals are to:

- Improve on-the-ground conditions for walking and biking through technical review of Regional transportation projects, walk-bike planning guidance and other technical assistance.

¹ VT Department of Health, 3-4-50 Vermont County Data Brief, Addison County, 2017

² Giles-Corti, B., & Donovan, R.J. (2002). "The relative influence of individual, social, and physical environment determinants of physical activity." *Social Science & Medicine*, 54 1793-1812.

³ Besser, L. M. and A. L. Dannenberg. (2005). Walking to public transit steps to help meet physical activity recommendations. *American Journal of Preventive Medicine* 29(4): 273-280.



- Increase public officials' knowledge of and engagement in walk-bike issues by building relationships with law enforcement and local transportation officials, providing training and outreach to key stakeholders and reviewing local land use regulations.
- Build community acceptance of and respect for everyday walking and biking through grassroots outreach and the marketing of a "walk-bike identity" for Addison County.
- Increase rates of walking and biking across all ages, abilities, and communities by supporting the Safe Routes to School Program throughout the Region, identifying opportunities for promotions that incentivize and highlight biking and walking and advising businesses and municipalities about bike infrastructure.

As is the case in many parts of Vermont, not all areas of local transportation are well-suited for walking or biking. In order to ensure safe travel for pedestrians and cyclists, the road network must be designed and maintained to accommodate more than vehicular traffic.

Goals

- *A walking and biking network that is safe, enjoyable and well-maintained.*
- *A well-educated public that understands bicycle and pedestrian safety.*
- *Increased rates of walking and biking across all ages, abilities and the Region.*
- *Reduce energy use by encouraging walking and biking.*

Policies

- *Construction projects should consider improvements for bicyclists and pedestrians as central to project's purpose, rather than an "enhancement." Accommodations for pedestrians include not only the sidewalk surface, but amenities to make walking feel safer and more comfortable including trees, plantings, benches and lighting.*
- *Any future VTrans investments in bike/ped infrastructure in Addison County should include locally identified priority areas.*
- *Encourage the development of bike/ped connections between the Region's population centers, by providing adequate travel space along significant routes.*

Pedestrian and Bicycle Facilities - Recommended Actions:		
General	ACRPC will continue to support the Safe Routes to School initiative and encourage more schools to participate in these endeavors – especially those schools within densely settled villages or downtowns	
	<i>Responsible:</i> ACRPC	<i>Timeframe:</i> short-term
General	Continue to support the efforts of the Walk-Bike Council of Addison County, by providing staff assistance, outreach and coordination, especially as liaison to the TAC.	
	<i>Responsible:</i> ACRPC	<i>Timeframe:</i> ongoing
General	Pursue the projects identified in the Regional Bicycle and Pedestrian Plan and by the Walk-Bike Council of Addison County	
	<i>Responsible:</i> Towns, ACRPC, WBCAC	<i>Timeframe:</i> short-term
General	Assist communities with the development of local transportation plans and policies that consider and plan for multi-modal improvements	
	<i>Responsible:</i> Towns, ACRPC	<i>Timeframe:</i> short-term
General	Encourage Safe Routes to School programs/plans for all Village Center Designation areas	
	<i>Responsible:</i> ACRPC	<i>Timeframe:</i> short-term
Bristol	Develop separated path along New Haven River between South Street and Lincoln Road	
	<i>Responsible:</i> Town of Bristol, ACRPC	<i>Timeframe:</i> mid-term
Bristol	Complete sidewalk inventory	
	<i>Responsible:</i> Town of Bristol, ACRPC	<i>Timeframe:</i> short-term
Ferrisburgh	Consider paving segments of South Middlebrook Road and Shellhouse Mountain Road (both Class 3 town highways)	
	<i>Responsible:</i> Town Ferrisburgh, ACRPC	<i>Timeframe:</i> short-term
Middlebury	Complete local bicycle and pedestrian system plan	
	<i>Responsible:</i> Town of Middlebury, ACRPC	<i>Timeframe:</i> short-term
Middlebury	Consider bikeways and pathways in East Middlebury	
	<i>Responsible:</i> Town of Middlebury, ACRPC	<i>Timeframe:</i> mid-term
Middlebury	Consider link between Wright Park and Chipman Hill	
	<i>Responsible:</i> Town of Middlebury, ACRPC, VTrans	<i>Timeframe:</i> short-term
Monkton	Support safer connections from Ridge to Borough	
	<i>Responsible:</i> Town of Monkton, ACRPC	<i>Timeframe:</i> short-term
New Haven	Support follow-up to 2016 walk-bike survey work	
	<i>Responsible:</i> Town of New Haven, ACRPC	<i>Timeframe:</i> short-term
Salisbury/Leicester	Complete conceptual alignment analysis of route around Lake Dunmore & Fern Lake	
	<i>Responsible:</i> Towns of Salisbury & Leicester, ACRPC	<i>Timeframe:</i> short-term



Pedestrian and Bicycle Facilities - Recommended Actions (continued):		
Vergennes	Support implementation of Downtown-Basin Plan	
	<i>Responsible:</i> City of Vergennes, ACRPC	<i>Timeframe:</i> mid-term
Waltham	Complete conceptual alignment analysis for connection to path by Maple Street/Otter Creek; Support safe sidewalk/bike route connections to Vergennes	
	<i>Responsible:</i> Town of Waltham, ACRPC	<i>Timeframe:</i> short-term
Weybridge	Support walk/bike connections to downtown Middlebury	
	<i>Responsible:</i> Town of Weybridge, ACRPC	<i>Timeframe:</i> short-term



6.10. Issues and Opportunities

A. Promotes the Economy

Addison County's transportation network provides benefits – particularly economic benefits - by connecting us with the work we do, the services we need and our families. Our roadways and rail lines serve as the arteries feeding our facilities and by which our businesses transport our goods to market. Keeping traffic moving freely on our arterial roads is essential to our production economy. Additionally, visitors travel to the Region for leisure, business and personal travel. Seven percent of Addison County's business establishments cater directly to the recreation and tourism industry. Many other businesses benefit indirectly. The Vermont "brand" relies heavily on travel because of the unique rural qualities of the state.

Future transportation improvements must provide safe and efficient multi-modal travel that also preserves the characteristics that make Addison County unique. ACRPC desires a transportation system that allows all its citizens, businesses and visitors to safely and efficiently move from one place to another. Transportation improvements should utilize a Complete Streets approach which considers the context of an area as much as current and potential travel patterns. While sidewalks and well-defined bike lanes are appropriate in the context of a village or a downtown, in rural areas accommodations for multiple modes of travel might mean improving road shoulders to allow for separation between pedestrians and vehicular traffic.

ACRPC continues to support of all modes of transportation structured to help build stronger, more vibrant communities. Vibrant communities will attract new businesses and maintain economic stability.

Promotes Economy - Recommended Actions:

General	Strategically improve arterial roads and practice access management to preserve travel times for commerce	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> mid-term
General	Build complete streets, especially in village and downtowns to create vibrant attractive communities	
	<i>Responsible:</i> ACRPC, towns, VTrans	<i>Timeframe:</i> mid-term
General	Support rail and air improvements within the western corridor to provide additional opportunity for commercial and passenger activity	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> short-term

B. Safely Supports All Modes of Travel

One of the Regional Commission's primary considerations is the safety of travelers throughout the region, regardless of mode of travel. In section 6.6, a number of high automobile crash locations were identified along the Region's major roadway corridors. Many of these locations can benefit from safety improvements, including the installation of roundabouts, which the RPC supports at specific locations.

Automobiles and other modes of transportation, such as bicycle or pedestrian, must exist safely within the transportation system. Throughout the region there are areas where existing infrastructure does not



provide a safe environment for multi-modal transportation. Future investments in these travel corridors should consider improvements that enhance the safety of bicycle and pedestrian travel.

Safe Modes of Travel - Recommended Actions:

General	Support the installation of highway safety improvements at high crash locations as identified and recommended in the corridor plans	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> mid-term
General	Support context-sensitive roadway improvements that enhance bicycle and pedestrian safety	
	<i>Responsible:</i> ACRPC, VTrans	<i>Timeframe:</i> mid-term
General	ACRPC will continue to support programs like the Safe Routes to School, and Strong Communities, Better Connections to ensure safe multi-modal transportation	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> mid-term

Promotes Energy Efficiency and Conservation

The prolific use of fossil fuels over the past two centuries has had a significant impact on air quality, water quality, and climate patterns. Climate change, sometimes referred to as global warming, has resulted from the rapid release of billions of tons of carbon (also referred to as Greenhouse Gases or GHG) that had been locked in solid and liquid fossil fuels. The worldwide impacts of climate change—destruction of ecosystems, sea level rise, greater frequency and intensity of drought and severe storms that threaten millions of homes, farms, and businesses—are already being observed. The Addison Region chooses to write this Plan to limit future damage and adapt to a changing reality. In Vermont, climate change has the potential to alter the composition of our ecosystems, affect the viability of agriculture, and result in more damaging tropical storms, floods, and other severe weather events.

In 2011, the State of Vermont released a significantly revised Comprehensive Energy Plan (CEP) intended to address Vermont’s Greenhouse Gas emissions, and its energy future for electricity, thermal energy, transportation and land use. The 2011 CEP Plan represented a substantial change in approach to energy in Vermont by setting a very significant set of goals for the state, most notably to transition the state’s energy use from 75% fossil fuels to 90% renewable. Since 2011, a significant amount of study and analysis has been done to further inform the question of “how” to achieve the goals of the CEP. Beginning in 2013, the Department of Public Service (DPS) conducted the Total Energy Study (TES), which reviewed the technologies and policies that might achieve Vermont’s

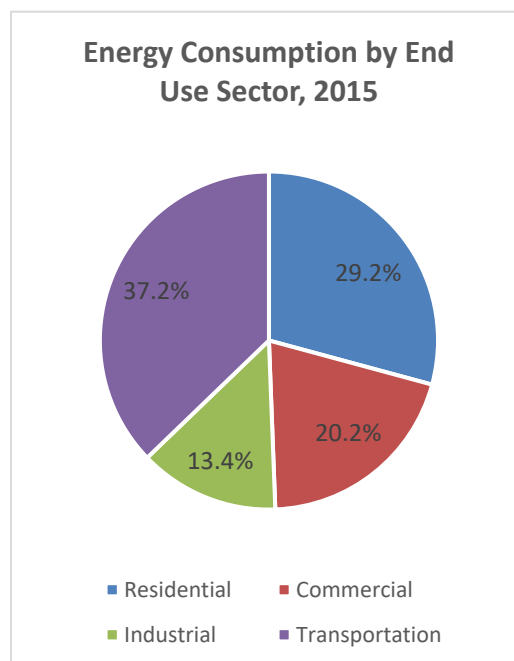


Figure 19: VT Energy Consumption by End Use Sector, 2015

(Adopted April 11, 2018)



greenhouse gas and renewable energy goals. The 2016 revision of the Comprehensive Energy Plan further refined the goals, policies and strategies of the 2011 CEP. Some of the goals of the Plan are to:

- Hold statewide Vehicle Miles Traveled (VMT) per capita levels to 2011 (11,402 VMT per capita).
- Reduce the number of single-occupancy vehicle (SOV) trips by 20% by 2030. (70% of vehicle trips in ACRPC Region are SOV).
- Increase public transit ridership by 110% to 1.9 million trips annually. For ACTR, this would mean adding an additional 199,500 trips annually (based on 2016 ridership).
- Quadruple Vermont base passenger rail trips annually.
- Increase the total number of Electric Vehicles (EV) statewide to 10% of the total fleet by 2025.

The ACRPC Regional Plan supports these goals as part of a strategy to reduce GHG emissions and overall energy use.

Transportation constitutes the most significant contributor to greenhouse gas emissions in Vermont, accounting for 37.2% of Vermont's total in 2015. Use of the automobile as our primary source of travel and truck freight transport is the root cause. Seventy percent of all commuters drive alone in single-occupancy vehicles. This creates a significant opportunity for the Regional Commission to play a role in the reduction of GHG's. ACRPC intends to use its plan to maintain existing economic vitality, but also adopt policies developed to shift future use patterns.

Goal

- *Reduce the Region's contribution to greenhouse gas emissions.*

Policies

- *Reduce vehicle miles traveled by supporting efforts to provide the Region with opportunities to work closer to home and encouraging public transit ridership.*
- *Support programs and planning initiatives such as park and rides and ridesharing that will reduce single occupancy trips throughout the Region.*

Energy Efficiency & Conservation - Recommended Actions:		
General	Actively support ACTR and other forms of local public transit	
	<i>Responsible:</i> ACRPC	<i>Timeframe:</i> ongoing
General	Promote the expansion of the existing park and ride system, focusing on low-cost options in or adjacent to village centers	
	<i>Responsible:</i> ACRPC	<i>Timeframe:</i> ongoing
General	Encourage the expansion of Amtrak's Ethan Allen Express to bring passenger rail service to the Region	
	<i>Responsible:</i> ACRPC	<i>Timeframe:</i> short-term
General	Provide technical assistance to the Addison County Walk-Bike Council, and support their mission to increase walking and biking region-wide	
	<i>Responsible:</i> ACRPC	<i>Timeframe:</i> ongoing
General	Work with VTrans and GoVT to actively support and promote van pools between Chittenden and Addison County	
	<i>Responsible:</i> ACRPC	<i>Timeframe:</i> ongoing



C. Electric Vehicles

The current range of electric vehicles (EV) varies from 70 miles to over 200-300 miles on a full charge. Most EV owners charge at home, however given the distance between our communities and centers of employment, it is essential that the ability to recharge EVs is readily available to the EV owner, if more EVs are to be encouraged. An electric vehicle that has a range of 60-80 miles will take up to 10-14 hours for a full charge using a Level 1 charging station (120 volts), 3-7 hours using a Level 2 charging station (240 volts), and 30 minutes to an hour on a Level 3 Fast Charging Station (over 24 kW). While Level 3 chargers are the most appealing because of their short charging time, they are significantly more expensive to install and require the availability of 3-phase power. There are currently eight locations with public EV charging in the Region (including two at the ACRPC office); however, four are located in Middlebury and only one is a Level 3 Fast Charging Station.

In 2013 the State of Vermont developed an Electric Vehicle Fueling Infrastructure Plan which analyzed the potential for VTrans to provide charging stations statewide. Several state park and rides in VT were identified as good locations for Level 2 chargers, but none are located in the ACRPC Region. Additionally, the EV Plan indicated that while the early implementation of a Level 3 charging network was not recommended, it was very important to provide long distance travelers with EV charging options. Providing regular fast charging opportunities along the Region's major travel corridors (Route 7 and Route 22A) is essential to encouraging the use of EVs in the Region. In Addison County, a public/private partnership will be the most likely avenue to develop that network. By working with municipalities, major employers, energy providers and the State of Vermont, it is possible that over time such a network can be built.

Goal

- *Increase the number of Electric Vehicles region-wide.*

Policies

- *Encourage the development of public/private partnerships that will enable the creation of a network of EV charging stations along the Region's largest transportation corridors.*
- *To provide complete coverage for electric vehicle charging, encourage expansion of the DC Fast Charge (Level 3) vehicle charging station network throughout the region.*

Electric Vehicles - Recommended Actions:

General	Identify ideal locations and develop strategies for construction of EV charging stations along major regional corridors	
	<i>Responsible:</i> VTrans, ACRPC	<i>Timeframe:</i> mid-term
General	Encourage municipalities to explore potential for EV charging stations in village centers or at other recreational/community facilities or Park and Rides	
	<i>Responsible:</i> ACRPC, towns	<i>Timeframe:</i> mid-term
	Encourage commercial development regulations to provide for charging stations in timed/metered parking areas.	
	<i>Responsible:</i> Towns, ACRPC	<i>Timeframe:</i> mid-term
	Encourage residential development regulations to provide for 220 volt receptacles in accessible spaces.	
	<i>Responsible:</i> Towns, ACRPC	<i>Timeframe:</i> mid-term

(Adopted April 11, 2018)



D. Enhances Regional Land Uses & the Region's Sense of Place

Traditional transportation planning techniques have often focused primarily on enhancing auto-mobility – the ability to move freely and easily by car. In many areas nationwide, this focus has led to improvements that allow for faster traffic flow, such as the widening of roads or the installation of turning lanes and streetlights. While in some places these techniques may be the best choice, if applied universally to all locations, they can have detrimental effects. For example, the widening of rural back roads often requires removing the trees that line the road. Tree-lined rural roads are one of the distinct characteristics of rural Addison County. As an alternative to a one-size-fits-all approach to planning, New Urbanists developed the “transect” approach. This approach recognizes that there are different scales of development in every Region, ranging from sparsely developed rural areas, to small hamlets, to densely populated downtowns. Rather than apply one transportation approach to all areas, differing transportation techniques are encouraged in each area.

In the ACRPC Region, planners should focus on a healthy balance between mobility and livability. While moving people from one population center to another at optimal speeds is important along the Region's primary transportation corridors, it is less so along more rural roads. Along the Region's rural roads, it is important to recognize that the character of these roads have a direct impact on livability. Narrow, tree-lined dirt roads lend themselves reasonably well to walking and biking. By keeping these roads lined with trees and vegetation, roads feel naturally narrower, thus slowing vehicle speed. Likewise, the tree-lined road contributes to the rural aesthetic.

While multi-modal transportation is important Region-wide, transportation planning within the Region's villages and downtowns should focus directly on providing a diverse range of transportation options using Complete Streets policy as a guide. Providing pedestrian infrastructure such as sidewalks or walking paths, reducing traffic speeds through streetscaping and other traffic calming techniques, help encourage walking. Developing bike paths, incorporating bike lanes along streets and placing bike racks in useful areas are ways communities can encourage multi-modal transportation that is appropriate for their village. These transportation enhancements help preserve the traditional feel of our villages and downtowns and provide opportunities for residents to interact socially, which further enforces the sense of livability a community has. At the same time, encouraging a high volume of traffic through our villages and downtowns can have detrimental effects. As mentioned earlier, truck traffic through population centers like Vergennes is having a negative impact on the community. Evaluating options that reduce these impacts is important to striking a balance between mobility and livability.

A livable community is one that has affordable and appropriate housing, supportive community features and services, and adequate mobility options, which together facilitate personal independence and the engagement of residents in civic and social life. It is important to recognize that land use decisions also have a significant impact on livability. Population centers should encourage a wide range of appropriately scaled (and affordable) housing and areas of mixed use that are easily accessible by foot.



Goal

- *A transportation system that successfully balances mobility with livability.*

Policies

- *Patterns of land use within the ACRPC Region should support the traditional pattern of densely populated villages and downtowns surrounded by open countryside.*
- *To enhance livability, investments in transportation infrastructure in villages and downtowns should incorporate Complete Streets design.*

Enhancing Regional Land Uses & Sense of Place - Recommended Actions:

General	Encourage appropriately scaled roundabouts and other traffic calming features as preferred safety improvements and as community/village gateways	
	<i>Responsible:</i> VTrans, ACRPC, towns	<i>Timeframe:</i> ongoing
General	Complete Streets appropriate scale to location	
	<i>Responsible:</i> ACRPC, towns	<i>Timeframe:</i> short-term
General	Support access management efforts, focusing on keeping major arterial roads moving freely	
	<i>Responsible:</i> ACRPC, towns, VTrans	<i>Timeframe:</i> ongoing

E. Exhibits Resiliency to Natural Hazards

Shifting climate patterns have led to an increase in severe weather events. In Vermont, a vast majority of declared disasters are flood related. Floods often damage roads and bridges. The cost of repairing or replacing failed infrastructure after a severe weather event can be challenging for the Region's communities. To mitigate against future damages, hazard mitigation techniques such as culvert upsizing, lengthening bridges based on stream hydraulic studies and improved bank stabilization can be implemented. Funding is the primary barrier to implementation at the local level. ACRPC can pursue funding opportunities to advance the planning and construction of projects that preserve or enhance water quality, while also mitigating against future damage. Replacing deficient culverts and bridges has the best return on investment. Designing appropriately scaled structures that can handle flood events, stormwater runoff, and minimize the discharge of sediment has the dual benefit of protecting water quality and reducing the potential for failure during a severe flooding event. In some instances, there are locations that should be avoided or where transportation infrastructure or roadway growth should be limited so as to not exacerbate the

Green Infrastructure

Green infrastructure is an approach to water management that protects, restores, or mimics the natural water cycle. Green infrastructure is effective, economical, and enhances community safety and quality of life. It means planting trees and restoring wetlands, rather than building a costly new water treatment plant.



potential for damage. In these cases, downgrading or relocating existing roadways may be the best option. In more urban areas, flooding can be reduced by installing green infrastructure, eliminating system infiltration and/or separating stormwater systems from sewer systems. Green Infrastructure practices include rain gardens, vegetated swales, green roofs and porous pavements. It also includes preserving or restoring natural areas, such as forests, stream buffers and wetlands, and reducing the size of paved surfaces.

While the Federal Emergency Management Agency (FEMA) can cover a portion (generally 75%) of eligible expenses under a federally declared disaster, communities are responsible for the remainder (25%). Given the cost of rebuilding infrastructure, even one quarter of the total cost can be significant. Vermont created the Emergency Relief and Assistance Fund (ERAF) to help defray the cost to communities, contributing a minimum of 7.5% to their share. In return for taking additional flood mitigation measures, the State will contribute a higher percentage to cover municipal recovery costs. Mitigation measures include:

1. Participation in the National Flood Insurance Program;
2. Adoption of Town Road and Bridge Standards;
3. Annual adoption of a Local Emergency Operations Plan;
4. Adoption of a FEMA approved Local Hazard Mitigation Plan;
5. Adoption of River Corridor Protections.

Communities that take steps 1-4 will receive a 12.5% contribution from the state for their 25% share of the costs. Those communities who add the adoption of River Corridor protections to their mitigation efforts will receive a total contribution of 17.5% from the state. As indicated in the example in Table 10, the increased state contribution can defray a significant portion of the cost of a reconstruction project to communities.

Example ERAF Percentage			
	7.5%	12.5%	17.5%
Total Disaster Cost	\$1,000,000	\$1,000,000	\$1,000,000
Federal Share	\$750,000	\$750,000	\$750,000
State Share	\$75,000	\$125,000	\$175,000
Municipal Share	\$175,000	\$125,000	\$75,000

Table 9: Total municipal portion of a \$1,000,000 FEMA recovery project based on ERAF percentage.

In 2017, the Legislature passed Act 64, an act relating to improving the quality of State Waters. Act 64 establishes a number of water quality related regulations. In particular, municipalities are required to implement a customized, multi-year plan to stabilize their road drainage systems. These systems must be brought up to basic maintenance standards and corrective measures must be implemented to reduce erosion as is required to meet a Total Maximum Daily Load (TMDL) or water quality restoration effort. The Municipal Roads General Permit (MRGP) includes (but is not limited to) the following:

- A valid road inventory of roads that are hydrologically-connected to surface waters through ditches, culverts or other drainage structures.
- The development of an Implementation Plan that prioritizes road segment remediation to bring non-complying road segments up to MRGP standards.



- New projects must be designed to Vermont Stormwater Manual standards if over the permit threshold of 1-acre of impervious surface, or greater than 5,000 square feet.

Goal

- *To develop a transportation system that is safe, efficient and protected from damage during a severe weather event.*

Policies

- *Encourage the moving or abandonment of roads that often experience serious flood damage. Design culverts and bridges to provide the best possible mitigation of potential flood damage, which at a minimum should meet VTrans Hydraulics Manual and ANR Stream Alteration Standards.*

Resiliency to Natural Hazards - Recommended Actions:		
General	Assist ACRPC municipalities with efforts to conform to MRGP requirements.	
	Responsible: ACRPC, VTrans	Timeframe: ongoing
General	Continue to support LEPC #8 and encourage all communities to adopt Local Hazard Mitigation Plans and Local Emergency Operations Plans.	
	Responsible: ACRPC	Timeframe: short-term
General	Assist communities with the adoption of flood mitigation measures which increase the percentage of ERAF funding offered by the state in the event of a Federally Declared Disaster.	
	Responsible: ACRPC, VTRANS, ANR/DEC	Timeframe: short-term

F. Receives Sufficient Funding

Funding of maintenance and repair of roads remains the most tangible and immediate challenge for our communities. Town highway expenses are typically the second largest local expenditure after school budgets, often averaging several thousand dollars per mile to maintain. The State of Vermont provides an annual appropriation to towns for highway maintenance, but that amount generally falls short of the total cost to the community. Municipalities, with assistance from ACRPC, need to maximize potential alternative funding streams to offset maintenance costs. For example, the Better Roads program provides funds for planning and erosion control projects that protect water quality and reduce maintenance costs. Additionally, communities that implement a well-designed Capital Budget and Program for their road work are better able to predict and stabilize costs over the long term.

By supporting State, Regional and local transportation policy and action that strives to reduce SOV trips and VMT, increases ridership and access to public transit, and encourages biking and walking, ACRPC helps to create a more comprehensive, sustainable transportation system. In addition, assisting communities with applying for other funding sources to offset road management expenses and developing strong capital budgeting for transportation improvements and maintenance will be needed.

Sufficient Funding - Recommended Actions:

General	Diversify transportation funding and policies to address rising maintenance costs	
	<i>Responsible:</i> ACRPC, VTrans, towns, ACTR	<i>Timeframe:</i> mid-term
General	Address limited availability of infrastructure and road maintenance materials	
	<i>Responsible:</i> ACRPC, VTrans, U.S. DOT	<i>Timeframe:</i> short-term
General	Help municipalities to plan for and implement capital budgeting for transportation infrastructure	
	<i>Responsible:</i> municipalities, ACRPC, VTrans	<i>Timeframe:</i> sort-term
General	Help municipalities access additional funding to improve water quality and reduce long term maintenance expenses	
	<i>Responsible:</i> VTrans, ANR, ACRPC	<i>Timeframe:</i> short-term
General	Evaluate amending classifications on arterial roads to access additional state support. (See Functional Classifications pg. 6-11)	
	<i>Responsible:</i> ACRPC, VTrans, Towns	<i>Timeframe:</i> short-term



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7. UTILITIES, FACILITIES AND SERVICES

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7.1. Water Supply, Wastewater and Solid Waste

A. Summary

Water Supply

There are 13 community water systems, nine school water systems and over 30 other water supplies in the Addison Region that meet Vermont's definition of a public water supply. In Vermont, a public water supply is defined as any system that provides drinking water through pipes or other constructed conveyances to the public, which has at least 15 service connections or serves an average of at least 25 individuals for at least 60 days a year. Approximately 45 percent of the region's households are connected to a public water supply. The remaining 55 percent obtain drinking water from private or shared wells and springs.

Public and private water supplies are regulated through the Vermont Agency of Natural Resources (ANR). The Water Supply Division undertakes inspections, plan reviews, water quality monitoring and issues operator certificates and operating permits to public water supplies. Private wells are regulated through the licensing of well drillers and state water supply and wastewater permits. The main intent of the water supply and wastewater permit with regards to wells is ensuring adequate isolation distances between potable water supplies and on-site septic systems.

In the Addison Region, there is little specific information on the quantity and location of groundwater resources. Due to topography and soils, the groundwater recharge area for much of the region is in the Green Mountain National Forest or along its western boundary. Drought and contamination are the major concerns relating to groundwater in the region.

Wastewater

A smaller percentage of the region's population is served by community wastewater treatment systems than by community water supplies. Only around 22 percent of Addison Region households are served by a wastewater treatment facility. The majority of residents rely on on-site septic systems to treat waste.

As with water supply, the Vermont ANR regulates both wastewater treatment facilities and on-site septic systems. Wastewater treatment facilities need water pollution control permits and undertake programs of testing and monitoring. Facility operators are also licensed. In 2002, Vermont made significant changes to how it regulates on-site septic systems. When the new rules are fully enacted in 2007, all subdivisions, new construction, system replacements and modification will need a state permit. The new septic rules operate under the basic requirement that all effluent remain at least six inches below ground. The rules do allow for new types of septic systems to be certified for use in Vermont.

Phosphorus reduction has been an important issue facing wastewater treatment facilities in the Addison Region for over ten years. The Lake Champlain Phosphorus TMDL signed by **ACRPC** (Adopted July 18, 2018)

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Vermont and New York in 2002 sets limits on the amount of phosphorus the treatment plants can release. The TMDL will not have any immediate effects on the region's facilities. However, in order for the treatment facilities to accommodate growth over the long-term, they will have to become more efficient at removing phosphorus from the effluent.

Solid Waste

The Addison County Solid Waste Management District (ACSWMD) serves 19 of the region's 21 municipalities. The district operates a transfer station in Middlebury and currently contracts with a landfill outside the region for waste disposal. The towns of Bristol and Salisbury operate pre-existing, unlined landfills under a 1,000-ton exemption.

Vermont revised and readopted its Solid Waste Management Plan in 2001. The 2001 plan addressed a number of issues and increased the statewide recycling goal from 40 to 50 percent diversion. As part of that plan, all municipalities and solid waste districts must have updated their plans by May of 2003.

In their 2003 implementation plans, ACSWMD estimated a disposal rate of 3.2 pounds per person per day, Bristol's rate was 1.15 pounds per person per day and Salisbury's rate was 2.05 pounds per person per day. None of the plans indicated any significant changes to their current services or proposed new facilities in the region.



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B. Goals and Objectives

The Addison County Regional Planning Commission establishes the following goals and objectives for the Addison Region through this plan.

Water Supply Goal A.

To have safe and adequate drinking water to serve the needs of the region's current and future residents.

To meet this goal, it is our objective:

1. Water Quality:
 - a. To maintain and improve, where feasible, the quality of ground and surface water in the region to provide for safe and adequate drinking water.
 - b. To identify and implement measures to ensure the continued viability of the region's aquifers.
 - c. For future development to maintain or improve the quality of the region's drinking water according to the current, applicable state and federal standards.
 - d. To support the efforts of local community watershed groups and operators of public water supplies to test the quality of existing surface water and groundwater drinking supplies.
2. Availability of Water:
 - a. To implement effective water conservation measures and promote water conservation through education efforts in the region.
 - b. To develop aquifer maps that provide accurate information on the location and quantity of the region's groundwater.
 - c. To balance the available water resources and the demand by all users for water for the good of all the region's residents.
 - d. For municipalities to consider the availability of water when deciding what density of development is appropriate in particular areas.
3. Water Supply Infrastructure:
 - a. For the region's public water systems to utilize capital planning and budgeting to meet their future maintenance and improvement needs.
 - b. To develop source protection and risk management plans for the region's public water systems.
 - c. For the region's small water supply systems to work cooperatively whenever possible to increase their administrative capacity and efficiency.
 - d. To secure the region's public water supply facilities against sabotage.
 - e. For municipalities to plan for future infrastructure needs in those areas that are zoned for higher density.
 - f. For any infrastructure projects built in the region to be cost-effective, locally endorsed and meet the needs of residents.



Wastewater Goal B.

To treat the region's wastewater and stormwater in a safe and cost-effective manner that meets the needs of current and future residents while protecting environmental quality.

To meet this goal, it is our objective:

1. Human Health and Environmental Quality:
 - a. To prevent wastewater from contaminating the region's surface and groundwater.
 - b. To replace polluting, failed wastewater systems with safe, functioning and cost-effective systems.
 - c. For there to be technical and/or financial support for individuals, businesses and communities needing to replace failed wastewater systems.
 - d. To prevent stormwater run-off from degrading the quality of the region's surface waters.
 - e. To continue to improve the quality of the effluent released from the region's wastewater treatment facilities and to continue to lessen the environmental impacts on the receiving waters.
2. Wastewater and Stormwater Infrastructure:
 - a. For the region's public facilities to continue to improve their ability to treat wastewater and stormwater in a safe, efficient and cost-effective manner.
 - b. For the region's public wastewater and stormwater facilities to utilize capital planning and budgeting to meet their future maintenance and improvement needs.
 - c. For any infrastructure projects built in the region to be cost-effective, consistent with municipal plans, locally supported and meet the needs of residents.
 - d. For safe and cost-effective on-site wastewater treatment systems to be available to meet the needs of the region's rural residents.
3. Wastewater and Stormwater Planning:
 - a. For municipalities to consider the potential for on-site wastewater treatment and the capacity of any wastewater infrastructure when deciding what density of development is appropriate in particular areas.
 - b. For the region's municipalities to consider and plan for mitigating stormwater impacts from current and future development.
 - c. For municipalities to plan for future infrastructure needs in those areas that are zoned for higher density.
 - d. To use wastewater treatment infrastructure to support the regional goal of encouraging development that follows the traditional pattern of village centers surrounded by agricultural land.
 - e. To use wastewater treatment and stormwater management infrastructure to improve the well-being and viability of existing areas of higher density settlement in the region.
 - f. To no longer use state or local wastewater regulations as a substitute for land use plans and regulations in guiding future growth and development.



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Solid Waste Goal C.

To manage the region's solid waste in a safe, cost-effective and efficient manner and to work on reducing the amount of waste generated per person.

To meet this goal, it is our objective:

1. Infrastructure and Services:
 - a. To manage the region's solid waste as close to the source as reasonable.
 - b. To encourage composting of residential and institutional organic waste.
 - c. To develop a cost-effective and convenient household hazardous waste collection and management system in the region.
 - d. For there to be convenient access to local drop-off centers for all the region's residents.
2. Pollution Prevention:
 - a. For all currently used waste facilities and junkyards to be properly operated, closed when their use is discontinued, and monitored to prevent adverse impacts on human health or the environment.
 - b. To identify, evaluate, monitor and properly clean up if necessary former waste sites to prevent adverse impacts on human health or the environment.
 - c. To eliminate illegal burning and dumping of solid waste.
 - d. To promote effective, non-polluting products for household and business use.
 - e. For local producers of goods to be assisted and encouraged to reduce their use of non-recyclable packaging materials.
 - f. For any land application of septage and sludge to be done in a manner that does not conflict with local land use plans, and that prevents negative human health impacts and environmental degradation.
3. Solid Waste Planning:
 - a. For all the region's municipalities to actively participate in solid waste planning.
 - b. For municipal plans to address solid waste management.
 - c. To gather accurate data on solid waste generation, composition and disposal in the region.
 - d. For all future solid waste management facilities to be sited to best meet the region's needs and result in the least negative social, economic and environmental impacts.
 - e. To consider the indirect impacts and costs of solid waste management – such as those related to the transportation system, water quality and air quality – when planning for where and how to dispose of the region's rubbish.



C. Recommended Actions

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plans, as issues or opportunities arise, to move towards accomplishing objectives and meeting the goals outlined above.

Water Supply

1. Work with interested municipalities in the region to find funding to complete aquifer mapping.
2. Continue to support both local and regional watershed planning efforts.
3. Determine whether a study based on the existing data collected from the region's drilled wells would yield valid information on the region's groundwater supplies. If such a study were feasible and of value, ACRPC should look for funds to undertake it.
4. Assist public water systems with tracking and participating in Act 250 hearings on projects that could impact their water supply.
5. Work with the region's small water supply systems to build administrative capacity, coordinate with each other and develop capital improvement plans and budgets.
6. Support local and regional efforts to plan for water source protection.
7. Assist municipalities interested in developing and seeking funding for water infrastructure projects.
8. Assist municipalities interested in undertaking capital planning and budgeting for water supply infrastructure.
9. Seek funding to support a water conservation education programs.
10. Support the efforts of public water supplies to protect and secure their water supply infrastructure.

Wastewater

1. Assist municipalities interested in developing and seeking funding for wastewater or stormwater infrastructure projects.
2. Assist municipalities interested in undertaking capital planning and budgeting for wastewater or stormwater treatment infrastructure.
3. Continue to offer educational programs on wastewater and stormwater issues in the region.
4. Work with the region's legislators and state agencies to ensure that the state statutes and rules offer cost-effective, realistic options for wastewater treatment in the Addison Region.



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5. Support efforts to allow a greater variety of innovative treatment systems to be certified for use in the region.
6. Work with municipalities interested in reexamining their local planning and ordinances in light of the 2002 changes to the state wastewater rules.

Solid Waste

1. Work to identify and map all former and current waste disposal sites and junkyards in the region.
2. Continue to assist the Addison County Solid Waste Management District and municipalities with gathering data and statistics needed for solid waste planning.
3. Review all solid waste management implementation plans for conformance with the regional plan and encourage municipalities to address solid waste in their municipal plans.



D. Documentation and Analysis

Water Supply

Water Supply Regulations

The Water Supply Division of the Agency of Natural Resources regulates public water supply systems to ensure their compliance with state drinking water quality standards.¹ It also regulates private water supplies in regard to their proximity to on-site septic systems.

The regulations for public water supplies differ depending on how the system is classified.² The Water Supply Division has programs of inspections, plan reviews, water quality monitoring, certified operator requirements and operating permit requirements to continually monitor and evaluate a water system's compliance with regulations. The state also offers technical and financial assistance to public water supplies, especially the small, community systems and those serving rural schools.

Private water supplies are regulated by the state mainly through the process of licensing well drillers and requiring drillers to report information on newly drilled wells. Once the water and wastewater rules enacted in 2002 are fully implemented, all new development will need a single state water supply and wastewater disposal permit. The main concern of the state with regard to individual wells has been and continues to be ensuring that the necessary isolation distances are maintained between potable water supplies and on-site septic systems.

Public Water Systems

There are currently 13 community water supply systems and nine school water supply systems in the Addison Region. There are another 30 systems in the region that meet the state's definition of a public water supply system serving facilities like campgrounds, parks, restaurants and motels.

The region's community water systems serve approximately 6,000 households, or 45 percent of the region's households.³ In 1980, nearly 4,800 households reported to the Census Bureau that their water came from a public system. In 1990, that number had increased to over 6,200.⁴

1. *Middlebury Town Water System*⁵

The Middlebury Town Water System serves around 1,950 residences, businesses and institutions in and around Middlebury's downtown. The water system does serve some customers in Weybridge and New Haven as well. There are approximately 1,560 residential connections to the system.⁶ Middlebury College gets its water from the system, although the college has its own distribution mains.

The system is fed from several wells with a maximum sustainable capacity of 2.2 million gallons per day. The system could pump up to 3.7 million gallons per day, but continued operation at that rate would exhaust the water supply. Middlebury has a 1.5 million gallon



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reservoir and future second reservoir is planned, construction of which is not expected in the near future. Currently, the average daily flow is around 1.98 million gallons per day. The town's capital improvement plan calls for continued replacement of aging pipes and mains throughout the system.

Middlebury believes that the capacity of their water source is ample and will supply their needs well into the future. The water quality in Middlebury's aquifer is good and is expected to remain so due to the aquifer's location largely within the Green Mountain National Forest. Each of Middlebury's wells has a source protection plan.

2. Vergennes-Panton Water District⁷

The Vergennes-Panton Water District began operation in 1973 and currently serves the City of Vergennes and portions of the towns of Panton, Ferrisburgh, Addison and Waltham. The system has 1,874 connections, of which over 1,500 are residential.

Water from Lake Champlain is drawn, treated and pumped from a facility in Panton. The plant has a sustainable pumping and treatment capacity of approximately one million gallons per day and a maximum capacity of around 1.5 million gallons per day. The average daily flow is approximately 620,000 gallons per day. The district utilizes a storage tank that holds 750,000 gallons. Currently the district is working on a \$1.4 million upgrade, mainly replacing older pipes.

The spread of zebra mussels in Lake Champlain has caused problems for the system. Zebra mussels attach themselves to underwater objects such as intake pipes and pumps, necessitating additional maintenance or replacement. Management strategies currently focus on controlling their attachment to surfaces and water intake pipes. The district feels that the problem is currently under control.

The district has no specific short-term expansion plans. However since it began operation in 1973, the district has expanded its service more than doubling the number of connections. This expansion has allowed the system to maintain low, stable rates. The district does envision continuing to add new users to the system in the future.

3. Tri-Town Water District⁸

The Tri-Town Water District serves the towns of Addison, Bridport and Shoreham. The system began operating in 1965. The system draws water from Lake Champlain at a facility in the Town of Addison. The system has a potential capacity of around two million gallons per day. The current maximum daily flow is around one million gallons per day. The district has two reservoirs: one in Addison that holds 625,000 gallons and another in Shoreham with a capacity of 750,000 gallons.

The system serves approximately 1,500 households and about 100 businesses in the three-town area. The Tri-Town and Vergennes-Panton systems are connected, allowing them to serve as back-up systems for each other.

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The Tri-Town system currently has no plans to extend new lines, but will continue to add customers onto existing lines and make improvements to the infrastructure. The system covers the largest geographic area of any of the region's systems. Tri-Town just finished upgrades to its plant including improved clarifiers and filters. Tri-Town was one of the first water plants on the lake to deal with the problem of zebra mussels and currently feels that their infestation is under control.

4. Bristol Water Department⁹

The Bristol Water Department serves Bristol's village area. There are 646 connections, the vast majority of which are residential. The system has demonstrated a capacity of 1.1 million gallons per day. Current demand is around 250,000 gallons per day. The system is supplied by a local spring. Most of the spring's aquifer is within the Green Mountain National Forest (GMNF). The department works with GMNF and several additional landowners to protect the water source from any potential contamination.

The department has no expansion plans in the near future. In the long-term, the department will likely need an additional storage tank to meet state requirements for reserve supply. The system's current reservoir holds approximately 610,000 gallons. The department also sees a future need for upgrading the water mains along North Street.

5. East Middlebury Fire District¹⁰

Fire District #1 in East Middlebury serves approximately 250 residences and a handful of businesses and community buildings. The system is supplied by two wells in the East Middlebury village area and by shallow springs along Route 125. The district does have a source protection plan for its water supplies. Current demand is over 55,000 gallons per day.

There are concerns that the on-site sewage disposal in East Middlebury could migrate into the aquifer that supplies the district's wells. Some years ago, the older well near the Methodist Church was threatened with contamination from a fuel spill. That well is being monitored and currently the water is potable, although not regularly used.

In an emergency it would be possible to supply the East Middlebury system by connecting fire hoses to the Middlebury Town water mains. A permanent connection does not exist because the Middlebury water system operates at a different reservoir level and higher pressure and because the East Middlebury Fire District prefers to remain separate.

6. Starksboro Aqueduct Company¹¹

The Starksboro Aqueduct Company (SAC) is a privately incorporated water system that serves Starksboro's village center. The system is spring fed and supplies over 60 households, as well as several farms, the Robinson School and municipal facilities.

SAC has leased the infrastructure to a cooperative of the system's users, which is now responsible for operating the system on a nonprofit basis. As a condition of this transfer, there can be no additional hook-ups to the system. As a nonprofit, the cooperative is eligible to apply

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for revolving grant funding to address system improvements that were not available when it was a privately held. Currently upgrades are being made to address the acidity of the water, which leads to pipe corrosion and the potential for elevated levels of metals like copper or lead in the water.

7. *Whiting Water Corporation*¹²

The Whiting Water Corporation is also a privately incorporated water system with 23 connections that serves approximately 17 residences, several businesses and community buildings including the school in Whiting's village center. The system has two water sources a well and a spring, which have a defined source protection area. The maximum daily flow of the system is estimated to be around 2,500 gallons per day, with a storage capacity of 4,000 gallons.

Currently, the system's aging pipes need to be replaced. There is around a mile of galvanized pipes that run along and under Route 30. Age, wear and vibration have taken their toll on these pipes leading to frequent leaks and breakages. A major break could cause serious problems along Route 30, potentially flooding the road with several thousand gallons of water. The Whiting Water Corporation is actively working to find an affordable means to fund the needed upgrade. The system currently has no plans for expansion.

8. *Other Community Systems*

There are four community systems serving mobile home parks in Starksboro, Bristol and Vergennes. Together these four systems serve over 700 residents. The Long Point system in Ferrisburgh serves around 125 mainly seasonal residences and there is a system serving the Woodland Apartments in Bristol that serves approximately 30 households.

In Starksboro, Lazy Brook Mobile Home Park (MHP) has 52 connections and Brookside MHP serves around 55 households.¹³ The parks' water systems are supplied from on-site wells that have wellhead protection plans. The KTP MHP in Bristol has 45 connections and water is supplied through the Bristol Water Department. The Otter Creek MHP in Vergennes serves 73 households and gets its water from the Vergennes-Panton Water District. Addison County Community Trust owns and operates all four parks.¹⁴

The Long Point water system distributes water from Lake Champlain to around 110 seasonal residences from May to October. On Long Point there are also about 15 year-round residences with individual wells. The Long Point Association's water system does not currently meet the state's standards for public community water supplies. The association is in the process of decertifying as a public community system and being classified as a non-transient, non-community system. If decertified, the system would still need to provide filtration, in addition to its current disinfection, of the lake water. It is also possible that the Vergennes-Panton Water District could provide water to Long Point in the future.¹⁵



9. School Water Supply Systems

There are nine elementary schools in the Addison Region with their own water supply systems, nearly all of which get water from on-site wells. Important issues for these school systems include source protection, the need for technical assistance in meeting state regulations and funding the continued operation or upgrades of their systems. Together these systems serve over 1,200 students and staff.¹⁶

10. Other Public Systems

There are around 30 other water systems in the Addison Region that meet the state's definition for public water supplies. Most of these are campgrounds, motels and restaurants that are not hooked up to a community water supply. There are also a number of National Forest Service facilities in and around the Green Mountain National Forest and several state parks in the region with public water systems.

Groundwater

Except for those areas served by the public systems that draw water directly from Lake Champlain, the most residents of the Addison Region rely on groundwater for their potable water supply. Parts of the region that are not served by public water systems have private or shared wells and springs. According to the 1990 Census, nearly 950 Addison Region households relied on dug wells for their water supply.¹⁷ As homes sell, dug wells are often upgraded to deeper, drilled wells to meet requirements for financing.

1. Groundwater Recharge Areas

Groundwater supplies are recharged through precipitation and run-off percolating down through the soil to aquifers. Shallow, dug wells and springs tap groundwater before it reaches the aquifer, while drilled wells take water directly out of the aquifer. Therefore, springs and dug wells are more susceptible to drought or contamination.

Water travels through areas with sand or gravel soils more quickly than through denser clays, affecting the rate at which groundwater is recharged. Due to topography and soils, the recharge and source protection areas for a significant amount of the region's water supply is within the Green Mountain National Forest or along its edge.¹⁸

In the Addison Region, there is little specific information on the quantity and location of groundwater resources. State environmental protection rules have required that well drillers file reports, which include data such as well yield, well depth and depth to bedrock. The new state water and wastewater rules require more accurate information on well locations be reported. However, a regional assessment of groundwater based on the information in the filed reports has never been done. Additionally, aquifer mapping examining the underlying geology of the region has not been done.

2. Drought

In recent years there have been several periods of drought in the Addison Region. Lack of rain and snow cover during 2001 caused a drop in both surface water and groundwater levels. In the region, many springs and shallow wells went dry. Drought affects the region's mountain



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towns first and most severely. In those communities, many households get their water from springs or shallow, dug wells. In 1990, the Census indicated that around 70 percent of households in Lincoln obtained water from dug wells or springs, the highest percentage of any Addison Region municipality.

Drought also impacts farming operations, potentially causing crop loss. Farms in the Addison Region are generally not equipped to irrigate fields. Periods of drought, especially during times of high temperatures, also lead to increased household water usage for activities such as watering lawns and filling swimming pools, thus increasing demand at a time when there is little to no recharge of groundwater supplies.

3. Groundwater Contamination

Contamination of groundwater is another threat to the region's potable water supply. In the Addison Region, potential sources of contamination include leaking fuel storage tanks, improperly stored road salt, old dump sites or illegal dumping of waste, failed on-site septic systems and improperly stored or spread farm wastes. Several Addison Region towns have had to supply drinking water to nearby residents when improperly stored road salt has contaminated their wells.

Contamination of groundwater can be in the form of high bacteria levels, excessive amounts of nitrates, petrochemicals, pesticides or herbicides, and elevated amounts of elements like lead, arsenic or sodium. Once contaminated, groundwater is extremely difficult to treat and in some cases may not be safe to drink for many years. The Vermont Agency of Natural Resources Waste Management Division tracks potential sources of groundwater contamination. There are over 80 sites in the Addison Region currently listed on the active hazardous sites list. A large percentage of these are locations of abandoned or leaking underground storage tanks. These sites are in various stages of monitoring and remediation.

While public water supply systems generally have source protection plans and regularly test their water, very few private well owners are certain about where the groundwater recharge area for their water source is located and very few have their water tested annually.

Wastewater

Wastewater Regulations

The Agency of Natural Resources' (ANR) Department of Environmental Conservation (DEC) oversees the state's programs and regulations relating to wastewater treatment and disposal, as well as stormwater discharge.

1. Wastewater Treatment Facilities

Wastewater treatment facilities in Vermont are divided into domestic and industrial facilities. There are five different classes of domestic facilities and four classes of industrial facilities. The classification of industrial facilities is based on the type of industry and method

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of treatment and disposal. The classes for domestic facilities are based upon design flow and method of treatment. The classes of domestic facilities range from Class 1, which are small systems not utilizing any specialized treatment methods, to Class 5, which are large systems utilizing specialized methods. The certification requirements for facility operators are based on the facility classification.¹⁹

In 1972, the National Pollutant Discharge Elimination System (NPDES) Program was established to improve water quality. Under NPDES, all facilities that discharge pollutants from any point source into the waters of the United States are required to obtain a permit. All wastewater treatment facilities in Vermont need a water pollution control permit from the state DEC.

2. On-Site Septic Systems

In 2002, the DEC adopted new regulations for on-site septic systems. The rules went into effect in July 2002 with numerous exemptions. However by July 2007, all subdivisions, new construction, and system modifications and replacements will need a state water supply and wastewater permit. Additionally, certain modifications to existing structures and changes in use will need permits.

The on-site rules establish three different sets of minimum site conditions and approaches to meeting the requirements: prescriptive, enhanced prescriptive and performance based. The basic condition is that the system functions year-round and keeps all effluent at least six inches below ground. The rules also allow for new types of septic treatment systems to be certified for use in Vermont.

While the 2002 rules have had many positive effects, their acceptance and impact in the Addison Region are still somewhat unknown. Many of the region's towns with heavy, clay soils, generally west of Route 7, are concerned that the strict interpretation of the rules combined with seasonally high water tables in large areas of these towns may combine to effectively eliminate residential development in many areas or allow development only with large and expensive mound leachfields.

3. Lake Champlain's Phosphorus TMDL

Phosphorus reduction has been an important issue facing the region's wastewater treatment facilities for over ten years. The federal Clean Water Act required states to identify water bodies for which wastewater effluent limitations normally required were not stringent enough to meet desired water quality standards. A total maximum daily load (TMDL) for the pollutant of concern had to be established for water bodies so identified. A TMDL establishes the allowable pollutant loading from all contributing sources at the level needed to meet the applicable water quality standards.

Since 1991, there has been a statutory requirement (10 VSA § 1266a) for most treatment facilities within the Lake Champlain Basin that discharge more than 200,000 gallons per day to limit their monthly average concentration of phosphorus to .8 milligrams per liter or less. In 2002, Vermont and New York State adopted a TMDL for phosphorus in Lake Champlain.

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Currently, the TMDL recommends two changes to the phosphorus removal policies for Vermont wastewater treatment facilities.

First, the TMDL calls for the statutory exemption for aerated lagoon plants to be removed. In the Addison Region, this applies to the Vergennes Wastewater Treatment Facility, which currently has a monthly average phosphorus limit of 1.0 milligram per liter.

The second change will set an annual cap on phosphorus discharges in addition to the monthly average maximum of 0.8 milligrams per liter. The annual cap was set by multiplying a phosphorus concentration of 0.6 milligrams per liter by the currently permitted flow. This cap will not change if the permitted flow changes. In the region, this change affects the Middlebury and Vergennes treatment facilities. Due to the fact that all the municipal treatment facilities in the region are currently operating at well under their permitted flows, the annual average load limit is not likely to have any immediate impacts. However over the long-term it means that in order for the facilities to accommodate growth, they will need to improve their ability to remove phosphorus from the effluent.

4. Stormwater

As required by the Clean Water Act, ANR has been regulating certain types of stormwater discharges to prevent pollution. Currently, stormwater permits are issued primarily to large construction, commercial and industrial sites. However, ANR is in the process of revising its stormwater management program to meet federal requirements. As the second phase of stormwater regulations go into effect, a wider variety of activities on smaller sites will be required to go through the permit process.

Stormwater has also been an issue facing the region's wastewater treatment facilities, especially in Middlebury and Vergennes. When the region's sewer infrastructure was first constructed, wastewater flowing in from the sanitary and storm drains was not separated. Large quantities of stormwater that flowed into a wastewater treatment facility during a heavy storm could overload the plant's storage and treatment capacity leading to untreated wastewater being discharged directly into lakes and rivers. These combined sewer overflows (CSOs) were a significant source of water pollution.

Throughout the 1990s efforts were made to separate wastewater and stormwater to reduce CSOs and increase plant capacity in the region. Middlebury and Vergennes have both separated a significant portion of their stormwater infrastructure from their sanitary sewer systems.

Due to the TMDL and changes to the stormwater regulations, in the near future the region's municipalities will need to start developing and implementing plans for stormwater management. As stormwater drains continue to be separated from the sanitary sewer, alternative infrastructure may be needed to store and treat runoff from developed land.

Domestic Wastewater Systems

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There are currently six domestic wastewater systems operating in the Addison Region. Four municipalities have wastewater treatment facilities and there are two additional domestic systems serving Basin Harbor Club and Button Bay State Park. The Towns of Middlebury, Shoreham and Orwell have municipal systems that serve portions of those communities. The entire City of Vergennes is on public sewer. Additionally, a limited portion of Bristol's downtown is served by a community septic system. Together the municipal systems serve approximately 2,800 households or 22 percent of Addison Region households.²⁰

1. Middlebury Wastewater Treatment Facility

The Town of Middlebury is served by a municipal sewer system that covers the downtown area and a portion of Route 7. The sewer system serves a somewhat smaller area than is covered by the municipal water system. There are approximately 1,550 residential and around 390 non-residential connections.²¹

Middlebury's Class 4 treatment facility went online in 1999, replacing an older plant. The new facility utilizes sequencing batch reactors, has a system for phosphorus removal and uses ultraviolet radiation for disinfection. The facility discharges into Otter Creek and has a permitted limit of 2.2 million gallons per day. The average annual flow is over 825,000 gallons per day or 38 percent of permitted flow. The facility has an uncommitted reserve capacity of over one million gallons per day.

The Middlebury treatment facility is currently permitted to discharge over 2.4 metric tons²² of phosphorus annually. Under the TMDL, their limit would be just over 1.8 metric tons. In 2001, their actual phosphorus load was less than 1.3 metric tons.²³

2. Vergennes Wastewater Treatment Facility

Vergennes has a Class 2 lagoon wastewater treatment system with a filter to remove phosphorus and chlorination for disinfection. The system discharges into Otter Creek. The facility serves the entire city and some customers in the Town of Ferrisburgh. In total, there are approximately 1,145 residential and 90 non-residential connections.²⁴

The plant has permitted capacity of 750,000 gallons per day and an average annual flow of over 330,000 gallons per day. The facility has an uncommitted reserve capacity of over 405,000 gallons per day. The Vergennes facility is currently permitted to discharge just over .91 metric tons of phosphorus annually. Under the TMDL that limit would be reduced to around .62 metric tons. In 2001, the plant had an actual load of just over .23 metric tons.²⁵

The city has a separated storm drainage system and has been installing culverts, piping and improving ditches in the newer sections of the community. The city is also addressing illegal roof drain connections, sump pumps and other devices that deliver stormwater to the wastewater collection system.

3. Shoreham Wastewater Treatment Facility

Shoreham's wastewater treatment facility began operation in 2001. The gravity collection system serves around 55 residences and 15 non-residential connections in the village center.



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The Class 1 wastewater treatment facility is an in-ground recirculating sand filter with a permitted flow of 35,000 gallons per day. The effluent is disinfected with ultraviolet radiation and discharged underground into Cedar Swamp.

The average annual flow is close to 9,000 gallons per day. Shoreham has an uncommitted reserve capacity of nearly 24,000 gallons per day. There is no phosphorus removal at the treatment facility. Instead, Shoreham decided to implement a town-wide, non-point source phosphorus reduction program. Under the TMDL, Shoreham has a phosphorus limit of over .24 metric tons. In 2001, their actual load was less than .03 metric tons.²⁶

4. *Orwell Wastewater Treatment Facility*

Orwell has a Class 1 lagoon wastewater treatment system, which serves approximately 65 households and a handful of businesses and community buildings in its village center.²⁷ The system uses chlorine to disinfect the effluent before it is discharged into the south fork of East Creek. Currently, the facility does not remove any phosphorus from its effluent.

The Orwell facility has a permitted capacity of 33,000 gallons per day. The average annual flow is over 9,000 gallons per day. Orwell has an uncommitted reserve capacity of over 21,000 gallons per day. In the TMDL, Orwell's phosphorus load is set at just under .23 metric tons annually. In 2001, their actual load was around .07 metric tons.²⁸

5. *Bristol Community Septic System*

Bristol's downtown has a large septic system that serves the businesses, municipal buildings and a few apartments on Main Street. The system is essentially two large conventional in-ground septic systems. It is regulated by a state wastewater permit, similar to other on-site septic systems. It is not considered a wastewater treatment facility like the previous systems. Currently, there is little additional capacity in this system.

6. *Other Domestic Wastewater Treatment Facilities*

The Basin Harbor Club has a Class 2 wastewater treatment facility consisting of septic tanks and a lagoon. The system has a permitted flow of 52,400 gallons per day.

Button Bay State Park has a Class 2 wastewater treatment facility with a permitted flow of 5,000 gallons per day. The system consists of septic tanks, a sand filter and chlorination for disinfection.

Industrial Wastewater Treatment Facilities

There are two industrial wastewater treatment facilities in the region; one serving the Agri-Mark plant in Middlebury and the other serving the Goodrich plant in Vergennes. These facilities pre-treat the industrial wastewater before it is sent to municipal treatment facilities.



Agri-Mark has a Class 1 treatment facility with a permitted flow of 350,000 gallons per day. Their average annual flow is nearly 91,000 gallons per day. Additionally, Agri-Mark sent nearly 270,000 pounds of waste to Middlebury's treatment facility in 2000.²⁹

Goodrich has a Class 2 treatment facility with a permitted flow of 50,000 gallons per day. Their average annual flow is 34,000 gallons per day.

Disposal of Septage and Sludge

Septage is the residue remaining in on-site, individual septic tanks. Septic tanks are periodically pumped and the septage removed. In the Addison Region, the Middlebury Wastewater Treatment Facility is the only system that accepts septage. The Vergennes treatment facility stopped accepting septage in 1995 due to odor concerns and evidence of an accelerated buildup of sludge in the lagoons.

Septic sludge is the residue remaining after the treatment of wastewater in a treatment facility. Once removed from the treatment facility, sludge is considered solid waste. The Middlebury treatment plant was designed to produce biosolids that could be applied to farmland as fertilizer. For a number of technical and political reasons, this is currently not happening. Most sludge from the Middlebury Treatment Plant is currently transported out of state for composting. This has increased the operating expense of the new plant. The facility is still testing its disposal of some material via land application.

On-Site Wastewater Disposal

Currently, only a small percentage of the Addison Region's land area is served by municipal wastewater treatment facilities. Structures outside those service areas are dependent on individual, on-site septic systems to treat wastewater.

Conventional soil-based systems require specific soil and site conditions to adequately treat septic waste. Depth to bedrock, depth to the water table, slope and soil texture all affect a site's ability to effectively treat septic waste. For soil-based treatment to work, partially treated effluent must be able to slowly percolate through the soil. The soil provides secondary treatment of the wastewater by allowing aerobic (oxygen-using) bacteria to continue deactivating the disease germs that remain in the effluent. Two elements are necessary for proper treatment, time and air. Water drains too quickly through sand and gravel soils, not allowing sufficient time for treatment. In clay soils, there are not enough air pockets to allow the effluent to drain through and aerobic treatment to occur.

Large areas of the Addison Region, mainly in the lakeshore towns, have heavy clay soils. It is also common in these areas for the seasonal high water table to be close to the surface during in the spring. The soil texture and seasonal high water table have made conventional soil-based treatment and disposal difficult in many areas.



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Vermont's 2002 on-site rules do allow for alternatives to the conventional soil-based treatment systems, which have been the only permitted systems for the last 30 years. However, the new regulations still require that treated effluent remain at least six inches below ground at all times, which continues to be a limiting factor in some parts of the Addison Region.

Solid Waste

In 1968 the Vermont State Legislature passed legislation that required every municipality to provide for the proper disposal of solid waste. At that time there were ten operating disposal sites, dumps, in the Addison Region. All types of waste were being deposited in these dumps and generally the pile was burned periodically. These waste disposal practices lead to concerns about air pollution, rodents and dangerous compounds leaching into surface and groundwater.

To protect public health and the environment, state legislation required that the dumps be turned into landfills where the refuse is required to be compacted and covered with soil daily. The municipal dumps started closing during the 1970s. While the legislation made proper waste disposal a municipal responsibility as the local facilities closed, there was a shift towards regional and private market solutions for solid waste management.

By the early 1990s, five unlined municipal landfills remained active in the towns of Bridport, Bristol, Lincoln, Salisbury and Starksboro. By 1992, state law required the unlined landfills to close or to accept less than 1,000 tons of trash per year. Currently only two Addison Region towns, Bristol and Salisbury, continue to operate their municipal landfills and plan their own solid waste strategy. The remaining 19 municipalities have joined together to create the Addison County Solid Waste Management District and accept the district's planning efforts as their own.

There are only three remaining unlined municipal landfills operating in Vermont; two of which are in the Addison Region. The remainder of Vermont's solid waste is delivered either to one of two privately owned lined landfills in Moretown and Coventry or is exported out of state. Currently, a few large solid waste management companies control the majority of the landfill capacity and operate most of the collection and transportation infrastructure. While municipalities and solid waste districts are still responsible for solid waste management, most utilize private sector services and facilities to meet this responsibility.

Vermont Solid Waste Management Plan

Vermont's Solid Waste Management Plan was last adopted in 2001. Statute requires this plan to be revised every five years and requires that municipalities be responsible for the management of solid waste in conformance with the state plan. As the region's municipalities and solid waste district develop their management plans, they will need to decide what actions they will take to meet the state's goals and targets.



The 2001 plan has a number of goals including reducing waste through prevention, reuse and recycling. The previous state plan called for diversion of 40 percent of municipal solid waste. The 2001 plan has a goal of 50 percent diversion by 2005. The 2001 plan also points to the need for proper monitoring and maintenance at closed landfills to prevent future environmental degradation from those facilities. Other goals include reducing illegal disposal and better management of junkyards. The plan also addresses disposal of other types of waste such as biosolids, septage, household hazardous waste and other special wastes. As part of its plan, the state required that all municipalities revise their solid waste implementation plans by May of 2003 to be in conformance with the state's plan.

Addison County Solid Waste Management District³⁰

The Addison County Solid Waste Management District (ACSWMD) was created in 1988. The district's solid waste implementation plan guides the disposal of solid waste for its 19 member municipalities. The district has also adopted two ordinances, a Waste Management Ordinance and an Illegal Burning and Disposal Ordinance, which provide implementation and enforcement of the plan. ACSWMD is a nonprofit governmental entity, which is funded through tipping fees, donations or fees for special events, sales of items like compost bins and a per ton surcharge on all other waste generated within the district to be discarded.

The district currently operates a transfer station in Middlebury where waste, certain recyclables and white goods are collected. The transfer station is designed primarily to serve licensed waste haulers. Private haulers provide curbside collection services in the district and the majority of them tip their waste at the transfer station. Waste haulers who operate in the district are required to offer recycling services. In addition, most district residents have access to a local drop-off for recyclables. The district has had a mandatory recycling ordinance in effect since 1993.

District waste is disposed of outside the region at a contracted landfill. The district has a contract with WSI Landfill in Moretown for waste disposal and transport to the facility that will expire in November 2003. The district will be going out to bid for disposal services. During its 2003 to 2008 planning period, the district does not intend to site or own a landfill or any other new solid waste facility.

In 2001, the generation rate for the district was 4.62 pounds per person per day and the diversion rate was 1.42 pounds per person per day. That made the disposal rate 3.2 pounds per person per day for a total disposal tonnage of nearly 17,800 tons. Nearly 7,900 tons of waste was diverted for a diversion rate of around 30 percent.

Bristol³¹

The Town of Bristol's solid waste implementation plan guides its disposal strategies and it currently operates an existing unlined municipal landfill under a 1,000-ton exemption. Bristol adopted a mandatory recycling ordinance in 1991 and collects recyclables at its landfill. The town also offers a used oil collection tank, a lead acid battery collection, scrap



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metal and tire drop off and a yard waste composting area. Bristol contracts with the Addison County Solid Waste District to dispose of household hazardous wastes and contracts with private companies to take its recyclables and white goods. Residents can drop off trash at the landfill during its regular hours of operation or contract with a private hauler for curbside pick-up. In the village, there is a municipal collection service.

In 2001, Bristol's generation rate was estimated at 1.15 pounds per person per day. The total municipal solid waste disposed of in 2001 was estimated at 861 tons. The 2003 Bristol Solid Waste Implementation Plan does not propose any new facilities or significant changes in its services during the 2003 to 2008 planning period.

Salisbury³²

The Town of Salisbury was originally a member of the Addison County Solid Waste Management District, but decided to withdraw in 1991. At that point, the town began using an existing unlined municipal landfill with a 1,000-ton exemption for solid waste disposal. In 1993 that landfill received interim certification from the state and it was fully certified in 2002. Salisbury adopted its first solid waste plan in 1997 and prepared a new plan to meet state requirements in 2003.

In addition to the landfill, Salisbury operates a recycling center, a yard-waste management area and an inert materials disposal site. The town also has hazardous and special waste collection programs and a public information and education program. In 1995, Salisbury adopted a mandatory source separation ordinance. A recycling center is operated at the landfill for resident drop-off. Salisbury contracts with private companies to take its recyclables and any hazardous or special wastes collected. Residents can drop off trash at the landfill during its regular hours of operation or contract with a private hauler for curbside pick-up. Currently, there is no curbside pick-up of recyclables.

Salisbury does not accept some white goods, such as televisions and computer equipment, at its facility. Their implementation plan indicates that the Addison County Solid Waste Management District takes those items at their Middlebury transfer station. Salisbury's 2003 solid waste plan does not propose any new facilities or significant changes in its services during the 2003 to 2008 planning period.

In 2002, the solid waste generation rate for Salisbury was estimated at 2.05 pounds per day. The plan states that due the unknown number of seasonal residents and tourists that visit the Lake Dunmore area each year, it is difficult to calculate a per person disposal rate. The plan also notes that the businesses that serve large numbers of seasonal residents add significantly to the waste stream during the summer months. Waste disposal in the landfill was approximately 549 tons in 2002, including 27.5 tons of construction and demolition waste, 16.3 tons of municipal solid waste from Middlebury and approximately 10 tons from Sudbury.





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7.2. Energy

A. Summary

Background

The Addison County Regional Planning Commission (“ACRPC”) created this Plan, within the overall energy planning framework of the State, in order to plan for our future energy usage and infrastructure. This Plan addresses the Region’s best interests in three key areas:

1. Economic needs and opportunities;
2. Environmental protection; and
3. Energy security.

Economic Needs, Threats and Opportunities

Energy costs have historically increased in both the State and the Region. As fossil fuels have become more difficult to obtain, the costs to extract and bring fuels to market has also risen. Energy producers have passed these costs on to the consumer. In the long term, assuming fossil fuels become scarcer, harder to find, and more expensive to extract, this trend could significantly impact Vermont and the Region. In April 2017, ACRPC estimated that residents of the Region spend approximately \$43 million a year on gasoline for transportation (not including local businesses’ expenses). While some of this money may be retained by local distributors, much of the money spent on gasoline leaves the Region, the State, and sometimes the Country. A similar scenario exists for other fossil fuel–dependent activities. Economic theory explains that money retained in a community multiplies in effect as it passes through the community from one business or person to another. Therefore, regions that retain even a fraction of the money spent each year on fossil fuel–related expenses should experience positive growth.

Electricity prices, and those of other energy sources, have historically risen. However, the cost to generate electricity locally is currently shrinking. Also, State incentive programs, like net metering, provide Vermonters with the ability to produce their own electricity and “zero-out” their costs, controlling the negative effects of inflation and eventually delivering cost savings to those individuals.

Industries that support small-scale solar and other renewable technologies (installers, distribution, sales, etc.) have created jobs in the state, including many in the Region. The Public Service Department’s Vermont Clean Energy – 2015 Industry Report estimated that 2,519 “clean energy”– related business establishments existed in the State and employed approximately 16,000 in-state workers. That number grew in 2016 but has dropped since its high due to federal and state regulatory and incentive changes.



Slowing climate change can also save jobs. Many of Vermont's historic industries, such as the ski industry and others that depend on fall and winter tourism, rely on consistently cold temperatures during the winter months.

The Region also has very strong connections to its working landscape and its citizens making their living from the land. Recently, both the dairy industry and the forestry industry have suffered from economic challenges. ACRPC believes that responsible renewable generation projects or fuel sources may also stem from the Region's forests and agricultural lands, supporting those sectors of the economy.

This plan supports local residential, and thoughtfully sited commercial generation projects. It also supports the responsible and sustainable commercial growing and/or harvesting of the Region's renewable resources. In doing so, this plan seeks to harness the economic opportunities described above in order to promote long-term environmental and economic sustainability of the Region.

Environmental Protection

The burning of fossil fuels, driven by human energy needs over the past two centuries, has increased the amount of greenhouse gases in the Earth's atmosphere. Those gases, primarily CO₂, produced by combustion engines and power and heat generation processes, directly impact the earth's climate and many of its natural systems. Any fossil fuel that is burned for heat or to generate power produces emissions that contain both particulate matter and greenhouse gases. Gasoline used to power vehicles and the fuel oil or wood heating homes in the Region all produce emissions. The emissions produced by combustion include particulates, carbon dioxide, nitrogen and sulfur oxides, nitrous oxide and methane. Carbon dioxide, nitrous oxide and methane are greenhouse gases that contribute to global warming, while nitrogen and sulfur oxides lead to acid rain and acidification of water bodies.

Higher temperatures threaten the future of many of Vermont's indigenous species. Sugar maples and other northern hardwoods rely on cold winters to grow. Cold winters also protect Vermont from numerous invasive species that have been using the warmer temperatures to expand their range to the north. Burning fossil fuels significantly contributes to poor air quality and acid rain. While the Region's air quality largely remains excellent, its high-altitude habitats, including ponds and trees, do suffer from the impacts of acid rain. More frequent and substantial rainfall threatens water quality by destroying private and public infrastructure, like bridges and culverts. Climate change impacts alone justify energy conservation and the promotion of alternative, renewable fuel sources.

However, this does not mean that the Region should promote renewable energy production without considering other regional values. The Region's environment demands and deserves protection. Accordingly, ACRPC has and will continue to support siting policies for all energy transmission and generation projects in the Region to preserve the Region's resources and promote appropriately planned development.



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Energy Security

Vermont currently relies upon other states and countries for a large portion of our energy needs. To address this issue, a State statute (*10 V.S.A. § 580(a)*) has set a goal that by 2025, 25% of the energy consumed within the State will be produced in the State by renewable generation. Transportation energy is a clear example of the threats to both State and Regional energy security. Vermont imports all of the gasoline and diesel fuels that are required to operate passenger, commercial and agricultural vehicles in the State. While there are varying opinions about “peak oil,” there is no debate that fossil fuels are a finite resource. The continuing reliance on a finite resource produced elsewhere, combined with the volatility of the fossil fuel market, will result in higher transportation costs with potentially far-reaching implications.

Our source of electrical energy is also a concern. Vermont currently obtains much of its electricity from hydroelectric facilities located out of State, primarily in Quebec. However, even these hydro resources raise concerns for some regarding their renewability and sustainability.

Although these hydro sources of electricity currently provide the region with low-cost generation, the construction of high-capacity transmission lines from Quebec to southern New England, currently in development, may create increased competition for electricity between Vermont and other, faster-growing states seeking electricity from renewable sources to fulfill their own energy portfolio standards. With increased demand, costs typically increase. Decreasing reliance on electricity from sources located outside Vermont will make both the State and the Region more energy secure.

Since 2004 ACRPC’s Energy plan has incorporated the philosophy that the Region will reduce its energy usage by promoting conservation and efficiency, convert fossil fuel usage to renewably generated electrical resources, build renewable electrical generation and produce as much of the energy it consumes as practicable. ACRPC has engaged in a number of planning projects to support this philosophy. These projects include funding the local production of bio-fuels, planning for energy production on municipally owned properties, and engaging in local energy conservation education and outreach. ACRPC believes the Region has the potential to conserve more energy and to generate more energy. ACRPC has supported and will continue to support thoughtful renewable generation within the Region. However, ACRPC also recognizes that producing our own energy can come with negative aesthetic and local environmental costs. ACRPC chooses to plan for our energy future while promoting our economic well-being, preserving our environment and mitigating concerns about energy security.



Outline

This Plan includes the following sections:

1. Executive Summary
2. Introduction
3. Thermal Use, Targets and Strategies
4. Electrical Use, Targets and Strategies
5. Transportation Use, Targets and Strategies
6. Land Use - Generation and Transmission Use, Targets and Strategies
7. Conclusion

A brief summary of the function of each section follows:

Section 1, **Executive Summary**: this section provides an overview of the Plan and explains the content and function of each section.

Section 2, **Introduction**: this section offers background information regarding how this plan fits into the State of Vermont's energy planning efforts and why ACRPC chose to perform the work.

Section 3, **Thermal Use, Targets and Strategies**: ACRPC's "Thermal Uses, Targets and Strategies" focus on education and outreach to the people, businesses, organizations and municipalities of the Region that control thermal spaces. It analyzes current uses, applies targets to those uses to support the State's Energy Plan and provides Strategies in the form of Goals and Recommended Actions to achieve the targets. Based on ACRPC's estimates, which it developed in collaboration with Vermont Energy Investment Corporation (VEIC), the Region currently uses approximately 1.782 trillion BTUs to space heat residential units each year and about 0.739 trillion BTUs to space heat commercial, industrial, and institutional structures. The energy saved via conservation and improved efficiency for both residential and commercial/industrial space heating is targeted to equal approximately 1.214 trillion BTUs by 2050. Strategies include investing in improved thermal envelopes, new technology to provide heat more efficiently and conservation techniques.

Section 4, **Electric Use, Targets and Strategies**: ACRPC's "Electric Uses, Targets and Strategies" focus on educating users about, and incentivizing them to adopt, electrically efficient equipment and conservation measures and improving local energy storage capacity. It analyzes current uses, applies targets to those uses and provides Strategies in the form of Goals and Recommended Actions to achieve the targets. Regional electricity use totals roughly 0.91 trillion BTUs per year based on 2016 data available from Efficiency Vermont.

Section 5, **Transportation Use, Targets and Strategies**: ACRPC's "Transportation Uses, Targets and Strategies" focuses on facilitating the transition to electrification of the passenger vehicle fleet, improving ride-sharing capabilities, and using agricultural solutions to switch the heavy vehicle fleet to bio-diesel fuel. It analyzes current uses, applies targets to those uses to

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support the State's Energy Plan and provides Strategies in the form of Goals and Recommended Actions to achieve the targets. Regional transportation energy use exceeds 1.975 trillion BTUs per year for approximated passenger vehicle fuel use¹. Total regional transportation energy use is certainly greater due to farm and commercial vehicle use in the Region.

Section 6, **Land Use, Generation and Transmission Uses, Targets and Strategies**: ACRPC's "Land Use, Generation and Transmission Uses, Targets and Strategies" focus on planning land uses to reduce energy usage, including transportation, and on wisely siting energy generation and transmission resources. It includes a mapping exercise to analyze current uses, applies targets to those uses to support the State's Energy Plan and provides Strategies in the form of Goals and Recommended Actions to achieve those targets. As of October 2017, the Region annually generates 136,306.65 MWh of electricity through hydro, wind, solar, and biomass technologies. It had 60.91 MW of total generation capacity from all sources, according to renewable wind, solar and biomass data available from the Community Energy Dashboard (<https://www.vtenergydashboard.org/>) and Green Mountain Power, and hydro data available from the Low Impact Hydropower Institute (www.lowimpacthydro.org). Future energy generation and potential is extrapolated from data by the Department of Public Service ("PSD"), Community Hydro, and modeling documents developed by PSD. Regional energy production targets were then produced using a spreadsheet model created by Vermont's Northwest Regional Planning Commission in order to align with projected use and the goal of 90% renewable by 2050. Specific targets for new in-Region electricity generation by 2050 include the following: 87.5 MW (107,310 MWh) of solar generation, 19.3 MW (59,173.8 MWh) of wind generation, and 2 MW (7,008 MWh) of hydro generation (see Table 9)². Although overall electrical consumption is forecast to remain approximately level, owing to a massive drop in consumption by the industrial sector, the shift to renewables requires more renewable generation. This model represents one generation mix to meet targets. While the generation targets identify renewable generation sources, they do not currently include biomass as a source of electric generation. Production estimates for biomass combined heat and power, biomass district heat, and methane generators are extremely site specific. As noted in this plan, ACRPC supports and encourages the use of sustainable biomass and biofuel generation as a renewable energy source for the Region.

A substantial part of the Region's effort to set renewable electricity generation goals involves the creation of regional energy generation maps in Section E. The regional energy generation maps are meant to guide the development of new solar, wind, and hydro energy generation facilities in the Region. A resource map was also created to identify potential wood resources in the Region that could be sustainably harvested and used for biomass generation. The maps provide a macro-scale look at different factors that impact the siting of renewable generation facilities, including generation potential and known and possible natural resource constraints.

¹ Jonathan Dowds et al., "Vermont Energy Transportation Profile," (2017)

² The future projections for solar and wind were calculated by PSD, and future hydro data was taken from a study produced by PSD in collaboration with Community Hydro.

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The maps demonstrate that on a macro-scale, the Region has the resources, including the land mass, to allow for sufficient renewable electricity generation to sustain our energy use, while avoiding undue adverse impacts upon known and possible constraints (These resources are specifically identified in the Maps). The Maps may also be used in regulatory proceedings (Section 248), but should not be considered determinative. Each project will need to do its own site-specific mapping to ensure resources and constraints are accurately represented with respect to that project.

Section 7, **Conclusion**: The Conclusion focuses on specific Recommended Actions ACRPC can undertake to enact changes recommended in this plan. It extracts implementation steps from the Goals and Recommended Actions in each of the previous sections. The Conclusion also discusses the feasibility of meeting regional goals and enumerates challenges to the Plan's implementation.



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Introduction

History of Vermont State Energy and Electricity Planning

Vermont began to plan for its energy needs after the energy crisis of the 1970s. The first comprehensive state energy plan was created in 1991 and the Vermont legislature subsequently required that plan be periodically updated. In the Vermont Comprehensive Energy Plan, last revised in 2015, the State of Vermont adopted several ambitious energy goals. The Vermont Comprehensive Energy Plan (2016), developed by the Vermont Department of Public Service (“PSD”), calls for the State to meet 90% of its total energy needs through renewable energy sources by 2050 (90 x 50 scenario). State statute also contains several goals pertaining to greenhouse gas emissions, energy generation, and energy efficiency including the following highlights:

Greenhouse gas reduction goals, See 10 V.S.A. § 578

- It is the goal of the State to reduce greenhouse gas emissions... from the 1990 baseline by: 25% by 2012; 50% by 2028; and if practicable by using reasonable efforts 75% by 2050.

25 by 25 State goal, See 10 V.S.A. § 580

- To produce 25% of energy consumed within the state through renewable energy by 2025.

Building efficiency goals; See 10 V.S.A. § 581

- To substantially improve the energy fitness of at least 20% of the state’s housing stock by 2017 (more than 60,000 housing units) and 25% of the state’s housing stock by 2020 (approximately 80,000 housing units);
- To reduce annual fuel needs and fuel bills by an average of 25% in the housing units served;
- To reduce total fossil fuel consumption across all buildings by an additional 0.5% each year, leading to a total reduction of 6% annually by 2017 and 10% annually by 2025;
- To save Vermont families and businesses a total of \$1.5 billion on their fuel bills over the lifetimes of the improvements and measures installed between 2008 and 2017;
- To increase weatherization services to low-income Vermonters by expanding the number of units weatherized, and/or the scope of services provided, as revenue becomes available in the home weatherization assistance trust fund.

Renewable energy goals; See 30 V.S.A. § 8001-8014

- To support the development of in-State renewable energy resources;
- To include renewable energy plants in the State’s energy portfolio.



Energy Units and Conversions

This plan uses multiple units of measurement to describe current and future energy use. Definitions and conversions for those units are described below³.

Power and Energy Unit Definitions	
BTU	A British thermal unit (BTU) is a measure of the heat content of fuels or energy sources.
kW	A kilowatt (kW) is a unit for measuring power that is equivalent to one thousand watts. It is often used to describe generation capacity.
kWh	A kilowatt- hour (kWh) is a measure of power usage as a function of time. For example, one kilowatt-hour is one hour of using electricity at a rate of 1,000 watts.
MW	A megawatt (MW) is a unit for measuring power that is equivalent to one thousand kilowatts. It is often used to describe generation capacity.
MWh	A megawatt- hour (MWh) is a measure of power usage as a function of time. For example, one megawatt-hour is one hour of using electricity at a rate of 1,000 kilowatts.
GW	A gigawatt (GW) is a unit for measuring power that is equivalent to one million kilowatts. It is often used to describe generation capacity.
GWh	A gigawatt-hour (GWh) is a measure of power usage as a function of time. For example, one gigawatt-hour is one hour of using electricity at a rate of one million kilowatts.
Energy Unit Conversions	
1 kWh of electricity	3,412 BTUs
1 MWh	1,000 kWh
1 MW	1,000 kW
1 GWh	1,000 MWh
1 trillion BTUs	10 ¹² BTUs
1 gallon of heating oil	138,500 BTUs
1 cord of wood	20,000,000 BTUs

Purpose of the Plan

The Addison County Regional Planning and Development Commission developed the Region's first energy plan in 1980. That plan indicated that Addison County imported an

³ Energy definitions and unit conversions were provided by the U.S Energy Information Administration.



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estimated \$16 million more in energy than it produced in 1977. The policies in that plan expressed concern about the future location of large-scale electric generation and transmission facilities in the Region. It supported the development of locally generated energy sources and pointed to their potential contribution to the Region's economy. The plan also recommended encouraging the concentration of new residential development near existing employment centers and discouraging a scattered pattern of residential development in the rural countryside, thus reducing gasoline consumption. ACRPC subsequently updated its Energy plan in 1994, 2005 and 2011. This Addison County Regional Energy Plan ("this Plan") was funded by the Vermont Department of Public Service ("PSD"). The Addison County Energy Plan constitutes one of eleven that that PSD has funded, one for each region of the State. By funding and completing in-depth energy planning within each region, PSD intends to enable Vermont to achieve state and regional energy goals—most notably, the goal to have renewable energy sources meet 90% of the state's total energy needs by 2050 (90 x 50 goal).

Although the energy picture often appears abstract and beyond the influence of local communities, sound regional and municipal planning can effectively guide certain types of energy decisions. The Region can move toward a position of sustainable energy use that will maintain a healthy environment and build a foundation for economic vitality. ACRPC and its member municipalities can promote appropriate land use patterns, participate in energy development decisions, facilitate alternative transportation options and encourage energy conservation strategies in the Region.

As of 2015, the Region used approximately 2,521 Billion BTU's of energy across all sectors. That constitutes a lot of energy. In order to contribute its share to the State of Vermont's goal of using 90% renewably generated energy by 2050, the Region and its citizens will need to make significant changes to the way we use and consume energy across all sectors.

Present and Future Electricity Generation and Usage

Vermont's supply of electricity currently comes from a combination of in-state and imported sources, with some of those sources classified as renewable and others non-renewable. The recent closing of the Vermont Yankee nuclear power plant in Vernon resulted in a sharp drop in electricity obtained from nuclear power and a significant decline in the amount of electricity generated from in-state facilities. Additional electricity to replace the nuclear-sourced energy has been obtained from regional markets in the northeast, primarily from natural gas powered generators. Hydroelectric energy, primarily from contracts with Hydro Quebec, is a significant source of electricity for the state, and woody biomass provides fuel to two generating facilities in northern Vermont. In-state wind and solar energy are beginning to provide a greater share of Vermont's electricity.



To realize the goal of obtaining 90 percent of all energy used in Vermont from renewable sources, and with significant growth in the demand for electricity anticipated, a transition in the make-up of the state's sources of electricity will have to occur. The Vermont Energy Investment Corporation (VEIC) and the regional planning commissions made use of a program for energy policy analysis and climate change mitigation called Long Range Energy Alternatives Planning (LEAP) System to assess current and future energy usage to meet predicted supply and demand. The LEAP model was designed to compare the goal scenario (or 90x50), statewide and regionally, to a reference scenario that assumed a continuation of existing policies and practices. The 90x50 goal scenario illustrates the types of changes required across all sectors to go beyond the reference scenario and achieve the desired outcomes. This scenario also assumes that extensive electrification of heating systems and of passenger vehicles significantly reduces total energy demand because these end uses are three to four times more efficient than the fossil fuel combustion technologies they replace. The LEAP analysis anticipates some continued supply of electricity from New England nuclear facilities, but by 2050 nuclear will be the only electricity obtained from nonrenewable sources. Because of the large amount of generation required to meet the State's demand, the LEAP model assumes that by 2050, 50% of the electricity used in Vermont will be imported from other states and Canada.

Most of that imported electricity will come from hydroelectric facilities (probably from Hydro Quebec). Total new hydroelectric supply will amount to over 2,400 GWh annually. Hydroelectric generation (existing and projected new supply) will account for almost half of the state's electricity by 2050, with a significant amount imported.

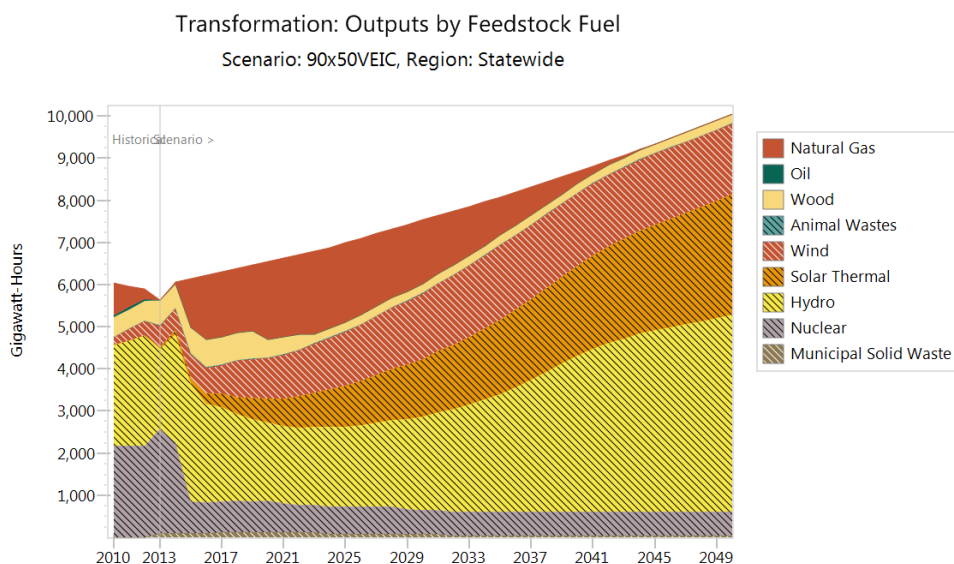


Figure 1: Vermont Electricity Consumption by Fuel Source 2010-2050⁴

⁴ VEIC's LEAP Analysis results, 2012



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The results of the LEAP model provide only one scenario of future energy use in the Region, which ensures that State and Regional energy goals are met. However, the model only provides projected Regional energy demand through assumed energy conservation and generation strategies. It does not provide details about how the Region may specifically attain the goals set by the model.

In order to meet the projected energy consumption modeled by LEAP, PSD and the Northwest Regional Planning Commission (NWRPC) developed targets for new renewable energy generation (from wind and solar sources) for RPCs in the State. The targets were based upon the percentage of the population living in each region, and the percent of total prime and secondary renewable energy resource area in each region. The target for new hydroelectric energy generation was based on a study completed by Community Hydro and PSD, which examined undeveloped energy potential at established dams in Vermont. It does not include the potential identified along Otter Creek by the Middlebury Energy Committee. The table below illustrates the renewable energy generation targets created for each target year.

Table 1: Renewable Energy Generation Targets

Renewable Energy Generation Targets by Source and Year			
Year	New Hydro (GWh)	New Solar (GWh)	New Wind (GWh)
2025	2	36	19
2035	4	71	39
2050	7	107	59

Based on these targets, and the LEAP models projections for energy usage, ACRPC analyzed the outcome of regional energy generation in 2050. If assumed electric consumption is correct, and the targets are met in the region, 96% of the energy consumed in 2050 will be produced locally by renewable sources. See the table below.

Table 2: Regional Renewable Electricity Generation based on LEAP's predicted Electricity Consumption

Year	Projected Electric Consumption (LEAP) GWh	Total new energy generated based on targets above (GWh)	Renewable Energy currently produced in the Region (GWh)	Imported Energy (GWh)	% of Energy produced in the Region by renewable sources
2015	351	-	136.3	214.7	39%
2025	337.7	57	136.3	144.1	58%
2035	342.9	114	136.3	92.6	73%
2050	322.4	173	136.3	13.1	96%

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However, the LEAP modeling's projection of future electricity use was based on an estimate of current electricity usage that is significantly higher than the actual electricity consumed in the Region (351 GWh vs 266 GWh). ACRPC discussed this concern with both VEIC and PSD, and decided to also create projected electricity consumption for target years based on current consumption and the general trend that electricity consumed in the Region would remain fairly constant through 2050. See the table below.

Table 3: Regional Renewable Electricity Generation
based on LEAP trend for Electricity Consumption

Year	Projected Electric Consumption (LEAP trend and Efficiency VT) GWh	Total new energy generated based on targets above (GWh)	Renewable Energy currently produced in the Region (GWh)	Imported Energy (GWh)	% of Energy produced in the Region by renewable sources
2016 ⁵	266	-	136.3	129.7	51.3%
2025	266	57	136.3	72.7	73%
2035	266	114	136.3	15.7	94.1%
2050	266	173	136.3	0	116%

According to the analysis illustrated in the table above, if the Region meets the proposed targets and electric consumption remains constant through 2050, the Region will produce an excess of 16% of electricity from renewable sources. To further understand the targets and projected LEAP trends, please review section C of this plan starting on page 7-47.

Table 3 above does not include the predicted imported energy that Vermont will use from other states and Canada by 2050. If **50%** of the electricity consumed in the Region, (which according to the LEAP trend is predicted to be 133 GWh) was in fact imported from renewable sources outside of Vermont, 442.3 GWh of electricity would be available to the Region in 2050. The figure below illustrates the amount of electricity generated for usage broken down by source for the years 2018 and 2050.

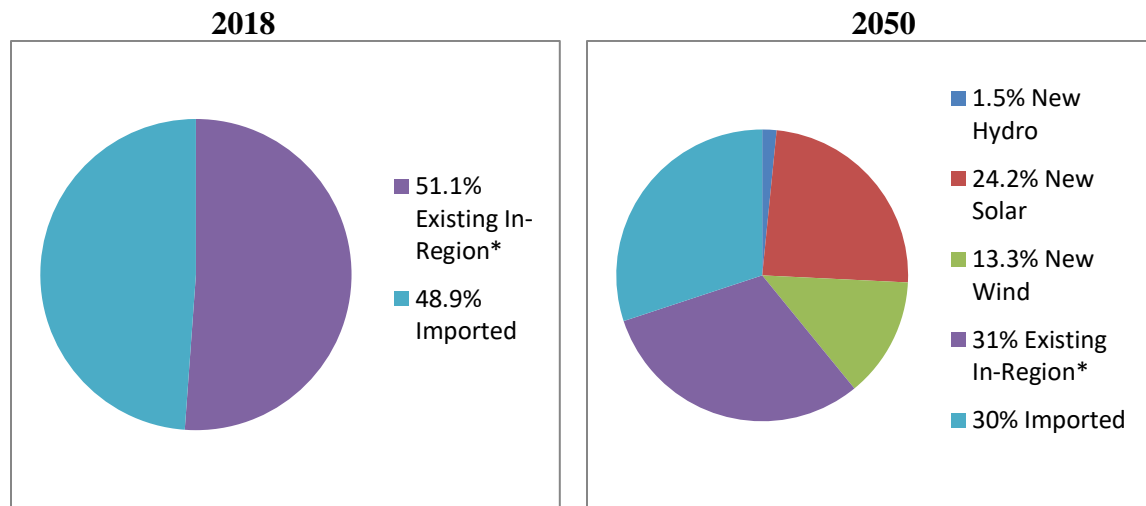
⁵ Efficiency Vermont data for electricity consumption in the Region for the years 2015 and 2016 were roughly the same.



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Figure 2: Source of Addison Region Electricity

Imported vs. In-region, 2018 and 2050



**Existing in-region energy is approximate as of June 2018, data was collected from a variety of sources cited below. This figure assumes it will remain constant.*

ACRPC acknowledges that generating 442.3 GWh of electricity significantly exceeds the predicted demand of 266 GWh. ACRPC has therefore identified regional goals and strategies for energy conservation and renewable energy generation that support the attainment of Vermont's energy goals, while also considering the demand required by its residents and businesses. ACRPC has also identified specific implementable strategies appropriate to the Region to accomplish these goals. ACRPC will continue to revise these targets to accommodate Regional and State needs in future versions of this plan.

The modeling work completed by VEIC provided a framework for ACRPC to create specific strategies to help the Region achieve state energy goals. The modeling also assisted in the creation of regional maps prioritizing locations for the development of future renewable generation facilities in the Region. The maps also allowed ACRPC to calculate renewable generation existing in the region. The potential generation calculated from renewable sources is displayed below alongside the targets for 2050 and current renewable energy generation in the Region. The potential energy generation is a theoretical number calculated from the total available land mass in the Region after "Known Constraints" have been removed. ACRPC believes it grossly overstates potential. Nonetheless, it also demonstrates that we have the resources and land mass available to meet the Region's energy generation goals.



Table 4: Regional Renewable Energy Generation, Targets and Potential

Renewable Energy Generation Summary		
Current Renewable Generation Existing in the Region (GWh)	New Renewable Generation Targets for 2050 (GWh)	Potential Energy Generation in the Region (GWh)
136.3	173	312,065

Please see Section C and E below for more detailed information on current renewable generation, renewable generation targets and potential renewable generation.

While reading this document, it is important to keep in mind what the Regional Energy Plan will not do. Much like the Vermont Comprehensive Energy Plan, the Addison County Regional Energy Plan does not intend to directly address every specific energy-related issue within the Region. It does not discuss or provide recommendations regarding specific renewable energy generation projects that have been proposed in the Region. Although it provides a prospective vision of the mix of renewables that may be developed in the Region to attain state goals, the Regional Energy Plan does not specify the mix of renewable energy generation facilities that will actually be built or contracted by utilities serving the Region. In addition, this Plan does not provide direct information about the costs of implementing this Plan or the costs of failing to implement this Plan.

The energy landscape in Vermont has changed rapidly over the past 10 years. Climate change, policy changes, material cost, and quickly evolving technologies have all contributed to these changes. ACRPC anticipates that methods of generating, distributing, and conserving energy will continue to evolve over the next 30 to 40 years. This Plan should be revisited and revised, 3-5 years more frequently than other elements of the Addison County Regional Plan, to account for changes in federal and state policies and regulatory frameworks, and for changes in technology or environmental conditions due to climate change.



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B. Thermal Use, Targets and Strategies

Thermal Uses

An estimate of current residential thermal energy demand in the Region, based on data from the 2011-2015 American Community Survey (ACS)⁶, is shown in Table 5.

Table 5: Current Regional Residential Heating Energy Use

<u>Fuel Source</u>	<u>Regional Fuel Use by Households (ACS 2011-2015)</u>	<u>Percentage of fuel use by Regional Households</u>	<u>Total Regional Square Footage Heated</u>	<u>Regional BTUs (in Billions)</u>
Natural Gas	185	1.3% ⁷	383,320	23
Propane	3214	22.4%	6,659,408	400
Electricity	358	2.5%	741,776	45
Fuel Oil	7474	52.1%	15,486,128	929
Coal	17	0.1%	35,224	2
Wood	2878	20.1%	5,963,216	358
Solar	22	0.2%	45,584	3
Other	185	1.3%	383,320	23
No Fuel	3	0.0%	6,216	0
Total	14336	100.0%	29,704,192	1,782

The data shows that in 2015 the majority of residences in the Region heated with fuel oil, (about 52%), followed by propane (22%) and wood (20%). Together these three heating sources account for about 95% of residential thermal heating fuel usage in the Region. Residential users are the biggest user group of energy in the Region. Next to transportation, the largest percent of energy used by residential customers is for space heating and cooling, and domestic water heating. In 2000, two-thirds of households in the Region used fuel oil to heat their homes. Nearly all the remaining households used either gas or wood. Since 2000 there has been a shift away from fuel oil, and to a lesser extent, wood (Dropping from 25% in 1980 to 20% as of 2015) towards propane gas. Also, just this year, Vermont Gas completed the installation of a controversial natural gas pipeline to Middlebury in the Region. Over the next several years, the pipeline is expected to expand residential service to the most densely

⁶ All values in this chart are derived from the American Community Survey (ACS) from the U.S. Census Bureau.

⁷ Since a natural gas pipeline did not exist in the Region until 2016, ACRPC believe the values concerning the number and percentages of households using natural gas constitute an error. ACRPC believes the natural gas numbers should be added to the propane values in the chart above.

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populated areas of Middlebury, Vergennes, Bristol, Monkton, New Haven and parts of Ferrisburgh.

Firewood is the least expensive fuel currently in the Region. Firewood is potentially renewable, carbon neutral, and for large parts of the Region, locally abundant. However, firewood is also heavy to move, generates smoke and particulates, to a degree dependent on the age and efficiency of the wood stove or furnace, and some people find the effort and process to be unacceptable or unfeasible.

Fuel oil, propane gas and non-renewable natural gas constitute fossil fuels. In order to meet State targets, their use will need to be largely eliminated by 2050. Making homes more thermally efficient is one way to reduce fossil fuel use. Another is to improve technology to make it work more efficiently. The third and best long-term solution is to replace the fuel source with technology using an alternative, renewable fuel source, like electricity produced through renewable generation. The cost of the change, both capital investment in new equipment and the operating cost of the fuels being used, constitute the major barrier to entry. While the Region has little control over the costs of energy, it can and does work to encourage conservation, efficiency and affordability for low income residents by providing lower local renewable generation costs.

Services available currently providing cost subsidies and/or promoting weatherization and efficiency include:

- The Champlain Valley Office of Economic Opportunity (CVOEO) provides fuel assistance to income-qualified residents either on a seasonal basis (call CVOEO at 800-479-6151) or on a crisis basis (call CVOEO Addison Community Action at 388-2285). The CVOEO website CVOEO.org describes additional fuel assistance programs available to Vermont residents;
- Efficiency Vermont has a number of programs to improve energy efficiency. It describes most on its homepage at Efficiencyvermont.com. Current programs include:
 - energy audits;
 - incentives for Home Performance with Energy Star;
 - information on appliances, compact fluorescent and LED bulbs;
 - home heating help; and
 - Efficiency Vermont's reference library.
- Champlain Valley Weatherization Service, part of CVOEO, provides free weatherization services to income-qualified Addison County households;
- Neighborworks of Western Vermont also offers audits and subsidized weatherization services through their HEAT Squad program <https://heatsquad.org/>;
- Lastly, many of the Region's municipalities run services that supply firewood or other sources of heat to their residents.



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Vermont also has residential energy standards. Officially called the “Residential Building Energy Standards” (RBES), the Residential Energy Code contains minimum standards of energy efficiency for all new residential construction in Vermont. The Vermont Residential Energy Code Handbook edition 4.1 March 1, 2015 includes two primary requirements:

1. A list of technical requirements that includes minimum standards for energy-efficient building components and construction practices; and
2. A certification requirement for reporting compliance. Upon completion, state law requires every Vermont builder to self-certify that the home complies with the RBES standards as built. The builder must complete and sign a certificate and submit it to the Town Clerk for filing. This must be on record before the Zoning Administrator issues a Certificate of Occupancy.

The Zoning Administrator’s duty to distribute information about the Energy Codes provides an opportunity for all towns to communicate with homeowners regarding energy programs and conservation opportunities⁸.

The average household in the Region that heats with fuel oil uses about 700 gallons annually. At \$2.90⁹ per gallon, they would pay over \$2,030 annually. The Region’s residential users as a whole use about 5 million gallons or nearly \$10 million worth of fuel oil annually. Not many years ago, prices were higher, and they spent considerably more.

Homeowners can reduce the energy consumed to heat their homes in a variety of ways. Shell improvements like upgraded insulation, air-sealing and window efficiency are important. New and upgraded heating systems tend to be far more efficient than older models, with cold climate heat pumps and geothermal systems topping the list. The Vermont Energy Dashboard provides a comprehensive list of resources available to homeowners seeking to reduce heat-related energy consumption

(<https://www.vtenergydashboard.org/resources#heat>).

Estimates for commercial and industrial thermal energy use are more difficult to calculate. An estimate of total commercial energy use (thermal and electricity) is provided in Table 6 and based on data from the Vermont Department of Labor (VT DOL) and the Vermont Department of Public Service (PSD).

⁸ Established under Act 89 passed in 2013.

⁹ Fuel oil prices are estimated as of January 15, 2018.



Table 6: Current Regional Commercial Energy Use

	<u>Commercial Establishments in Region (VT DOL)</u>	<u>Estimated Thermal Energy BTUs per Commercial Establishment (in Billions) (PSD)</u>	<u>Estimated Thermal Energy BTUs by Commercial Establishments in Region (in Billions)</u>
Regional Commercial Energy Use	1,019	0.725	739

While these are only estimates, they do indicate the substantial thermal energy use by commercial establishments in the Region and therefore the need for their participation in conservation and efficiency efforts.

Thermal Targets

Thermal targets for the Region include increasing weatherization of homes and commercial establishments, converting the use of old inefficient wood heating systems to new efficient systems, and switching to efficient heat pump systems. See Tables 7A – 7D below for target numbers corresponding to one scenario that could help us meet the 90 X 50 State goal.

Table 7: Thermal Targets

<u>Table 7A. Residential Thermal Efficiency Targets</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
Residential - Increased Efficiency and Conservation (% of municipal households to be weatherized)	3%	11%	55%

<u>Table 7B. Commercial Thermal Efficiency Targets</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
Commercial - Increased Efficiency and Conservation (% of commercial establishments to be weatherized)	17%	18%	51%

<u>Table 7C. Thermal Fuel Switching Targets (Residential and Commercial) - Wood Systems</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
New Efficient Wood Heat Systems (in units)	51	98	626

<u>Table 7D. Thermal Fuel Switching Targets (Residential and Commercial) - Heat Pumps</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
New Heat Pumps (in units)	1,472	3,558	7,008



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To hit the goal of 90% renewable energy use in the Region, targets have been established for each of the strategies noted above to reduce the energy needed for space-heating or change the type of fuel used for space-heating. In order to hit the 2050 targets, property owners in the Region will need to make significant improvements to their homes and businesses. Approximately half of the houses and businesses in the Region will need to be weatherized. In this scenario, the number of homes currently heating with wood that will need to invest in new wood-burning technology is relatively modest. By far the largest change will be achieved by converting houses currently heating with oil or propane (and some heating with wood) to cleanly generated electrical heat by installing efficient electric heat pumps. Electricity currently plays an insignificant part in heating the Region's homes. The 2015 Community Survey estimated only 2.5 percent (358 households) were heated with electricity (Table 5). This plan relies on renewably generated electricity becoming the dominant source of space heating to enable the Region to hit its greenhouse gas reduction targets.

Thermal Pathways to Implementation

Goals, Policies and Recommended Actions

Given the significant changes that the Region must make to meet the stated thermal targets, ACRPC promotes the following Goals, Policies and Recommended Actions for itself and its citizens.

Goal A.

Increase the Region's thermal energy efficiency and self-sufficiency by reducing both its energy use and carbon footprint to meet local and State targets of 90% renewable energy by 2050.

Policies and Recommended Actions

ACRPC's Recommended Actions for the Commission focuses on education and outreach to the people, businesses, organizations and municipalities of the Region that control thermal spaces. In conjunction with service providers, ACRPC proposes to help implement changes that improve the efficiency of heating structures and convert heating devices within those structures to use renewable sources of energy.

1. Promote thermal efficiency in the Region's municipal buildings:
 - a. Help the Region's member municipalities conduct energy audits of all municipal buildings to identify weatherization retrofits and other strategies, and to incorporate the cost of the audit's recommendations into the municipal capital budget.
2. Encourage and promote local and sustainably harvested wood and efficient wood heating:

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- a. Require outdoor wood boilers in the Region to comply with state efficiency and emission standards;
 - b. Promote EPA III approved energy efficient wood stoves through education and outreach;
 - c. Promote the management and use of town forests for sustainably harvested cordwood for low-income citizens;
 - d. Support a regional energy fair;
 - e. Work with forestry organizations to promote landowner education and sustainable forestry operations.
3. Encourage and support the Region's resident's efforts to weatherize their homes:
- a. Coordinate with CVOEO, Neighborworks of Western Vermont, Efficiency Vermont and other weatherization service providers to encourage the Region's residents to participate in weatherization programs.
4. Encourage proposed development to optimize design features and energy systems that conserve energy and use renewable sources:
- a. Promote the installation of air source and geothermal heat pumps;
 - b. Promote compliance with existing residential and commercial building energy standards by educating and working with Zoning Administrators and encouraging them to distribute information about Vermont's Energy Codes to permit applicants and explain energy efficient options to builders and owners;
 - c. Encourage municipalities, businesses, organizations and homeowners to build to higher energy standards to increase efficiency and use renewable resources as heating or cooling sources (e.g. the Energy Star Home Program, the "Stretch Code" or passive solar homes such as PassivHaus);
 - d. Work with local planning commissions to incorporate additional energy standards into municipal plans and zoning regulations;
 - e. Work with existing energy providers in the Region (Fuel dealers, GMP and Vermont Gas) to encourage them to transition their business models to that of "energy service providers", offering efficiency improvements and a diverse range of renewable energy products.



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C. Electrical Uses, Targets, and Strategies

Summary

Electrical energy constitutes a significant portion of the Region's current energy use. This Plan projects that the Region's energy use will shift from non-renewable fossil fuels to electric vehicles, electric heat pumps and other technologies using electrical power. It further projects that increasing supplies of electricity will come from locally distributed renewable generation sources. However, surprisingly, it also predicts the demand for electricity will remain relatively flat. This is because it anticipates substantial reductions in electric use because of efficiency and reduced demand in the commercial sector. The traditional pattern of electrical generation and supply will also change, driving changes in local energy delivery systems. This sub-chapter explores these changes and how they will impact the delivery system. It also sets targets for electric uses, and creates goals, policies and recommended actions to help the Region transition to a more renewable, less carbon-based electrical energy system.

For most of the last century, the US electrical generation and transmission grid has consisted of the following components. First, large central generation plants use fuels like nuclear fission, coal, or natural gas to create large amounts of energy to feed into the grid through transformers at high voltage, which can be shipped long distances over transmission lines. Upon reaching a consumer destination, sub-stations along the transmission line tap into the transmission line and use transformers once again to step down the electric voltage to a level at which it can be transferred to a local distribution system and then to customers.

While this model still describes most of the electric power system in the Region, things are rapidly changing with the addition of more locally distributed generation assets. Some local generation sources have existed since the beginnings of the grid, like the Region's hydroelectric facilities described in the sub-chapter addressing generation. Others, like residential solar or wind power, have only recently begun to proliferate in significant numbers. These small-scale electricity generation facilities are commonly referred to as distributed generation. They produce energy that, for the most part, is consumed locally. Benefits include lessening the need for costly new large generation facilities and transmission infrastructure. Also, the distributed and redundant nature of small-scale generation facilities can provide stability and resilience if integrated properly. However, the variable and intermittent power production of renewable generation sources, including the cumulative output of small generators and commercial-scale projects, adds a significant burden of design and management complexity to the grid. Changing weather patterns that include increasingly destructive storms and flooding call for an increased focus on resilience. One approach that addresses all of these issues involves the design and creation of microgrids. According to the U.S. Department of Energy (DoE) a microgrid is a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both connected or "island-mode".

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In the Region, the grid consists of transmission infrastructure feeding or passing through the Region, electric distribution infrastructure providing service to businesses and residents and a variety of local generation facilities, most of which are described in the sub-chapter dealing with generation.

Electricity Transmission Infrastructure

1. Transmission Lines

The Vermont Electric Power Company (VELCO), a private corporation, owns most of the bulk power transmission system in the Region and the State of Vermont. VELCO currently has a 345kV and a 115-kV electric transmission line in the Region that runs on a north-south route through the towns of Leicester, Salisbury, Middlebury and New Haven. The 345KV line ends at the New Haven substation. North of the New Haven Substation, the line divides into two 115kV lines: one travelling through New Haven and Monkton on its way to the Williston Substation and one travelling through New Haven, Waltham, Vergennes and Ferrisburgh on its way to the South Burlington sub-station. There are additional regional level transmission lines that serve parts of the Region. Generally, those lines feed power generated at the region's hydro-plants into the transmission grid or link substations with transmission lines.

Additionally, merchant power companies interested in shipping renewable power from the north, primarily carrying power from hydro or wind facilities in New York and Quebec or other Canadian provinces, have promulgated plans to build transmission lines within the Region. These lines are proposed to be built largely underwater in Lake Champlain and exit the Lake either in or South of the Region to feed into the grid. While this Plan conditionally supports those projects, it demands that they pay their fair share of local property taxes, compensate towns and citizens for the rights of way and services that they use and the impacts they create. They must demonstrate benefits to the Region beyond local property tax and minimal construction jobs, and compensation should be appropriate to the magnitude of the impacts they create. Finally, they must be built to the requirements contained later in this Plan in the sub-chapter addressing requirements for sub-stations, generation facilities and transmission corridors.

Power lines, electrical wiring and appliances all produce electric and magnetic fields. Electric and magnetic fields have different properties. Electric fields are produced by voltage and are easily shielded by conducting objects. Any appliance that is plugged in produces electric fields. Magnetic fields are produced by current and are not easily shielded. An appliance must be turned on and using power to produce a magnetic field. Electric fields reduce in strength logarithmically with increasing distance from the source.

Experts have long debated and researched the potential impacts of electric and magnetic fields on human health. Due to their greater strength, the debate has largely focused on the fields generated by transmission lines. In 2007, the World Health Organization (WHO) compiled research on the potential human health effects associated with electric and magnetic



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fields. The WHO concluded that exposure could not be declared entirely safe because of a weak association found between electric and magnetic field exposure and increased risk of leukemia, especially in children. WHO, as well as other organizations such as the National Institute of Environmental Sciences (NIEHS), encourages power industries to continue their current practice of siting power lines to reduce exposures. This can include burying transmission and distribution lines when possible, properly grounding and wiring lines by following current electrical codes, and even educating the public and the regulated community on risk and reduction of exposure¹⁰.

2. Substations

There are a number of substations throughout the Region. These facilities convert the electricity transmitted along the power grid to allow it to be carried on distribution lines to consumers. New or expanded substations proposed to be built shall also meet the requirements contained later in this plan in the sub-chapter addressing siting requirements for substations, generation facilities and transmission corridors.

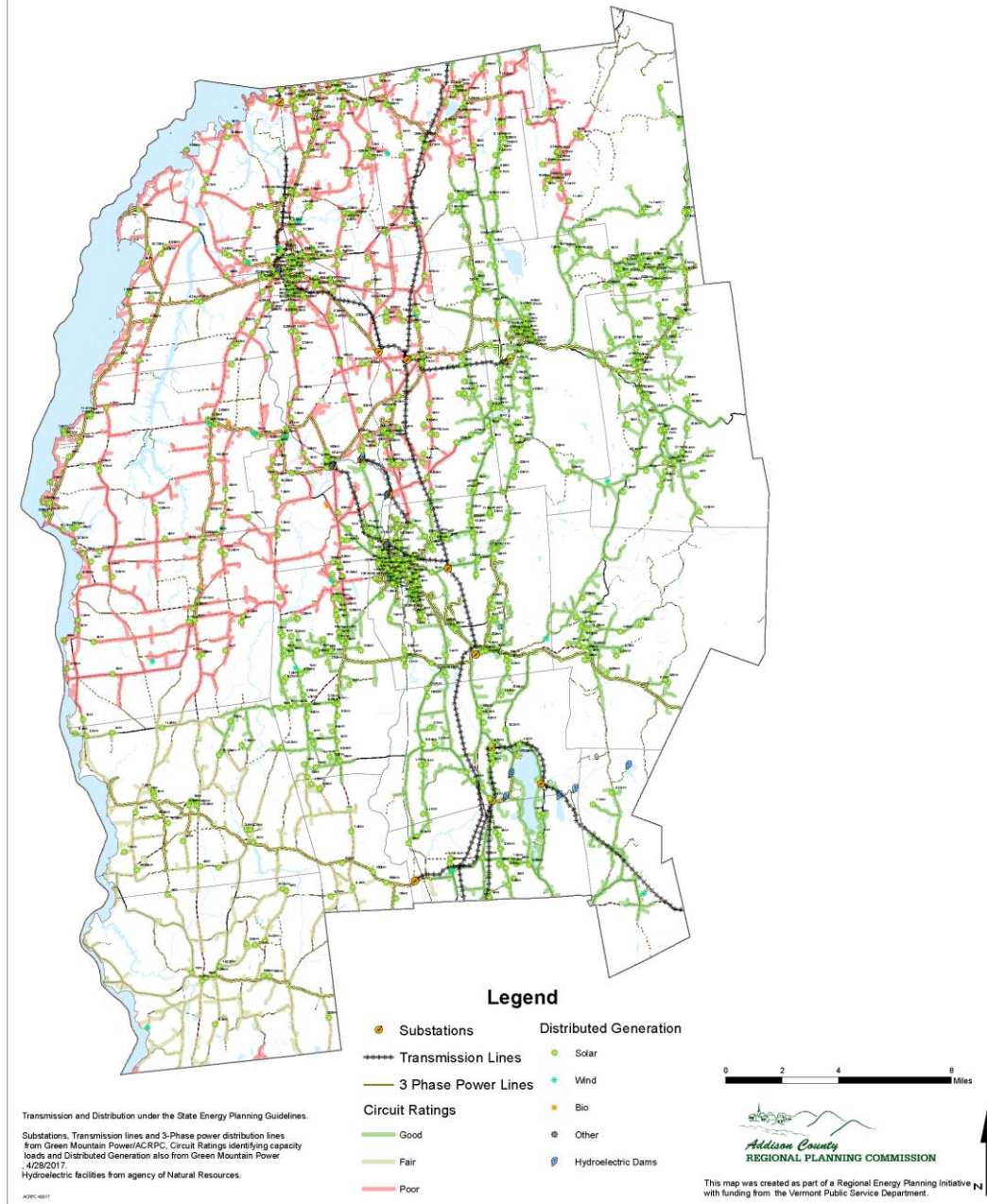
3. Electric Distribution Infrastructure and Services

Green Mountain Power Corporation (GMP) provides and maintains electric utility service to nearly all customers in the Region. The small exception is that the Vermont Electric Cooperative (VEC) covers the northeastern corner of the Town of Starksboro. Generally, these lines are maintained and upgraded periodically, but have the capacity to support new projects. Local energy generation and distributed generation, however, are causing certain areas of the local distribution grid and its sub-stations to become constrained in their ability to deliver power 24/7. Map 1, showing constrained circuits in the Region, demonstrates this issue.

¹⁰ Information from the World Health Organization was gathered from their website (<http://www.who.int/peh-emf/en/>)



Renewable Energy Potential: Transmission and Distribution Resources and Constraints



Map 1. Renewable Energy Potential: Transmission and Distribution Resources and Constraints (2017)



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Recent growth in local solar generation facilities, largely within the northern portion of the Region, clearly shows constraints on the system. This plan supports capital investment in and the incremental improvement of local distribution infrastructure and substations to ensure the Region continues to enjoy reliable electric service and opportunity for economic growth. This plan also supports State policy requiring new commercial/industrial scale generation facilities to pay for any improvements to the distribution grid and sub-stations required to support their new facility. Similarly, it also supports each utility's duty to provide sufficient infrastructure to allow residential distributed generation.

4. Storage and Microgrids

The electricity grid is a complex system in which power supply and demand must be equal at any given moment. Constant adjustments to the supply are needed for predictable changes in demand, such as the daily patterns of human activity, as well as unexpected changes from equipment overloads and storms. Energy storage plays an important role in this balancing act and helps to create a more flexible and reliable grid system.

While the U.S. electric grid may not necessarily need more storage immediately, storage capacity will become more important as wind, solar, and other variable renewable energy resources continue to expand in the power mix. Studies have shown that the existing grid can accommodate an increase in variable generation¹¹ but a variety of scalable storage technologies must be developed to help us accommodate an even greater amount of renewable energy on the grid and assist us in reaching our 2050 goals.

In 2017, Green Mountain Power Corporation (GMP) proposed a 1 MW battery storage facility associated with its 5MW photovoltaic project in the Town of Panton, a facility now in place. It is in the process of developing and building a very similar project in Ferrisburgh. It appears that these developments will have the ability to effectively create microgrids and supply power locally for some limited period of time if the bulk transmission grid fails—effectively islanding. Additionally, the storage--a Tesla lithium ion battery bank--is able to store some of the output of the associated solar array and feed it back for local consumption in peak power periods, saving GMP and its ratepayers the cost of peak load demand power generation.

Electrical Use

Residential customers use just under 47 percent of the electricity sold in the Region. Commercial and Industrial customers represent about 53 percent of electricity sales. An estimate of electricity uses in the Region collected by Efficiency Vermont in 2016 is shown in Table 8 immediately below.

¹¹ National Renewable Energy Laboratory, "The Role of Energy Storage with Renewable Electricity Generation," (January 2010).



Table 8: Current Electricity Use

<u>Use Sector</u>	<u>Current Electricity Use (Efficiency Vermont)</u>
Residential (kWh)	123,901,781
Commercial and Industrial (kWh)	142,651,889
Total (kWh)	266,553,670

1. Residential Use

The average household in the Region uses about 640 kilowatt-hours of electricity monthly¹². At a rate of 16¢ per kilowatt-hour¹³, the average household electric bill is about \$1,220 annually. The Region's 14,336 households therefore use more than \$17 million worth of electricity every year.

Simple, inexpensive measures such as turning off lights in empty rooms or replacing light bulbs with new, more efficient bulbs can substantially reduce energy usage. Using timers or sensors to regulate lighting, heating or cooling in a home can also significantly decrease energy consumption. Other conservation measures that can have a profound impact on energy usage include improved insulation and weatherization of new and existing structures. New, more efficient appliances, motors and heat pumps can also help reduce electricity usage.

2. Commercial and Industrial Use

As shown above, commercial and Industrial electricity users in the Region used 142,651,889 kilowatt-hours (142 GWh) of electricity in 2016, the last year for which data is currently available, a little more than half of the electric energy used in the Region. The electricity used by the Region's businesses runs the pumps and motors that power its industrial processes and all of the associated lights, computers and appliances of its service and retail sectors. All of these businesses will need to invest in improved conservation and efficiency if the Region is to achieve the targets below.

¹² Efficiency Vermont, 2016

¹³ GMP residential Rate as of January 2018 is 15.67 cents per KWh.



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Energy Conservation and Efficiency Target

Like the thermal targets noted in Table 7, the Region will need to focus on efficiency and conservation to impact the amount of electricity that it uses. Since the electrical consumption in the Region is split almost evenly between residents (47%) and commercial and industrial entities (53%), the targets will require both individual home owners and commercial and industrial users to participate.

However, even with significant efficiency steps taken by businesses and residents, the Region's electrical usage will likely remain about the same. This is because many of the new technologies needed to reduce fossil fuel consumption, like heat pumps and electric cars, replace fossil fuel inputs with electricity. Importantly, this strategy of switching away from fossil fuels only works to reduce greenhouse gases if the electricity is generated renewably. Table 9 (below) shows that the Region must increase its efficiency and conservation by nearly 60% by 2050 to meet the proposed targets. Technological advances, such as better fuel or motor efficiency will help drive this change. However, this plan anticipates that the Region and its residents will also need to make significant capital investment in new technologies and efficiency to meet the targets.

Table 9: Electricity Efficiency Targets

<u>Electricity Efficiency Targets</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
Increase Efficiency and Conservation	10.8%	37.2%	59.2%

Efficiency Vermont is a statewide energy efficiency utility, the first of its kind in the nation. Efficiency Vermont helps consumers reduce energy costs by making homes and businesses more energy-efficient. It provides technical assistance and financial incentives to help Vermonters identify and pay for cost-effective approaches to energy-efficient building design, construction, renovation, equipment, lighting and appliances. Efficiency Vermont is funded by an energy efficiency surcharge on electric bills.

Some of Efficiency Vermont's programs include:

- Efficiency Excellence Network
- Heat Saver Loan Program
- Smart Thermostats
- LED Lighting Fixtures Program
- Home Performance with Energy Star
- Cold Climate Heat Pumps

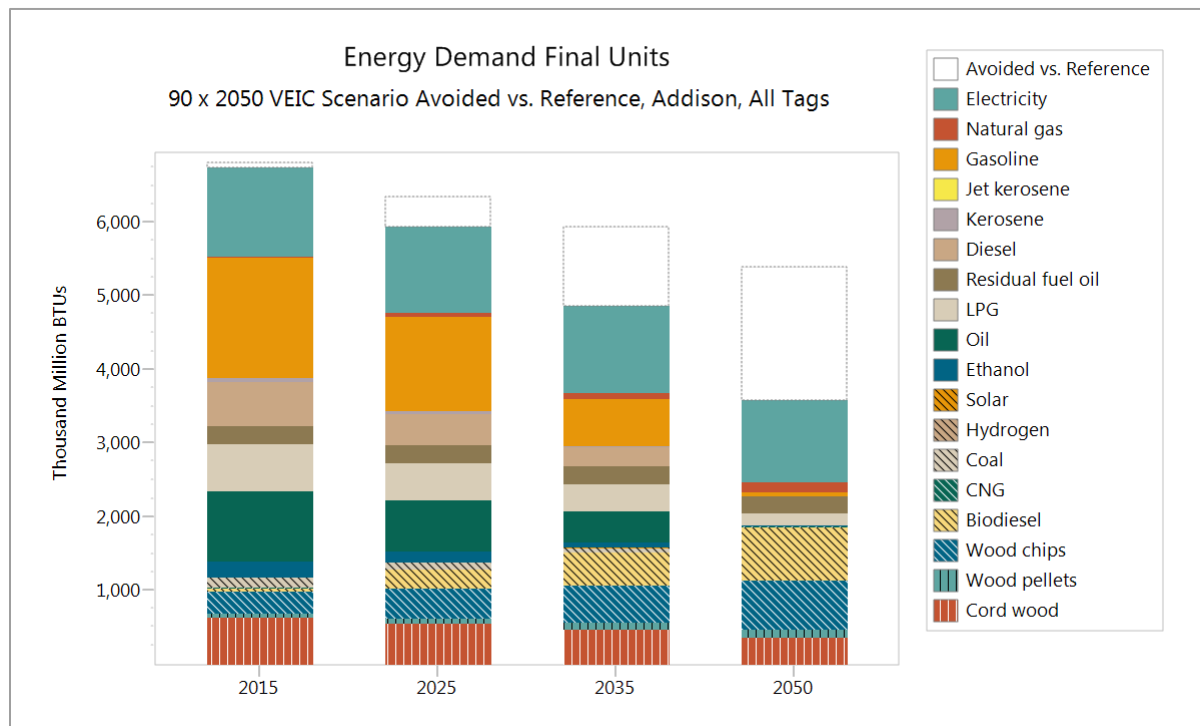
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Electrical Generation Future Demand and Targets

Electricity demand in the Region, which is currently 266,553.7 MWh, is projected to remain fairly constant according to demand trends that were produced by VEIC in conjunction with ACRPC (Figure 3). This is based on the assumption that current sources of energy demand will shift over time in each sector (transportation, residential, etc.). These consumption estimations are also based on the assumption that the Region is successfully on the path to the State's 90x50 renewable generation target.

Figure 3: Total Regional Energy Consumption



As Figure 3 above illustrates, VEIC's modeling estimates that the Region's overall energy demand will decrease substantially by 2050. The largest contributors to this deduction will be from conservation and efficiency improvements. Thermal conservation and more efficient equipment will shrink the amount of energy the Region uses by about one third ($1/3^{\text{rd}}$). This change is represented by the white space in Figure 3 above (See Section B for the projected targets and actions to improve thermal efficiency). Additionally, with the exception of natural gas, which is projected to rise slightly in use as it becomes available in the Region (the red bar), VEIC's model projects that fossil fuel use in the Region will significantly decrease by 2050 (The orange, green and beige bars). Fossil fuels will be replaced by increases in the use of biomass, wood chips and pellets (blue and red striped bars) for heating commercial and industrial spaces, biodiesel (yellow striped bar) for use in heavy equipment and electricity (light blue bar) in residential space heating and light vehicles.



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Electric energy demand for the Region (light blue bar) is especially dynamic because different sectors see different changes. While changes will occur across all sectors, VEIC predicts that the commercial and industrial sectors will see significant reductions in electric usage because of their actions. At the same time, VEIC predicts the residential and transportation sectors will increase their electric usage as the Region switches to heat pumps to heat residential structures (See Table 7) and electricity to power light vehicles (See Table 12). As a net result of these changes, VEIC' predicts that the decrease in electrical usage in the commercial and industrial sectors will largely be offset by the increased electric usage in the residential and transportation sectors. Accordingly, it estimates the Region's electric consumption will remain relatively flat through 2050. Thus, the light blue bar representing electric usage in Figure 3 remains relatively the same size.

Figure 4: Regional Commercial Energy Consumption by Fuel

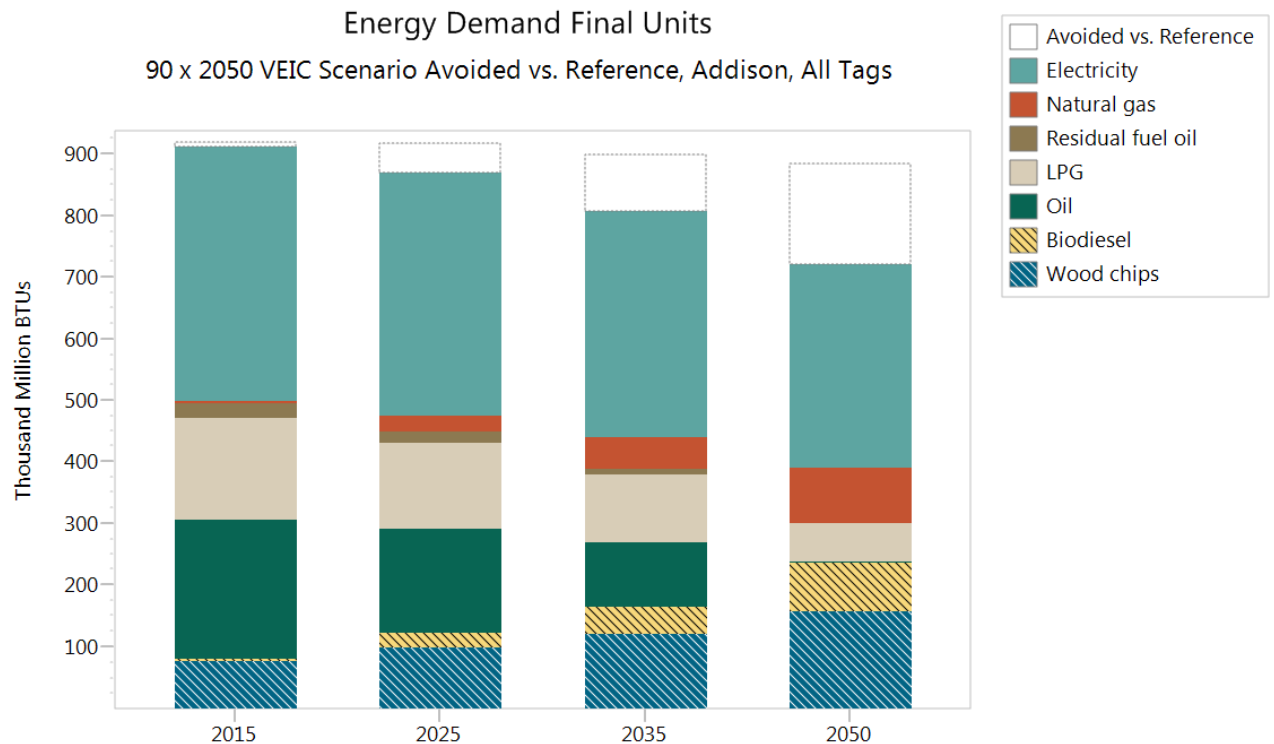


Figure 4 illustrates the projections for the Regional Commercial Energy Consumption, a subset of Figure 3. It depicts an overall reduction in total energy use. Efficiency savings are shown in white. It also depicts the following increases/decreases in fuel use:

- a. Electricity use decreases because of efficiency gains;



- b. Natural Gas use increases because of the new infrastructure available in the Region as it replaces other fossil fuel sources;
- c. Residual fuel oil use decreases;
- d. Liquid propane gas (LPG) use decreases;
- e. Oil use decreases;
- f. Bio-diesel use increases as it is adopted as a fuel for heavy commercial vehicles; and
- g. Wood chips/pellet use for domestic heating and power plant fuel increases.

The PSD's "determination standards", or the standards required to achieve "enhanced energy plans", require that regional plans establish 2025, 2035 and 2050 targets for renewable energy production. ACRPC worked with PSD guidelines, and the Northwest Regional Planning Commission, to produce targets for new renewable generation, based on the LEAP model and the 2016 Vermont Comprehensive Energy Plan (CEP). These targets are listed in Table 10 below.

Table 10: Renewable Electricity Generation Targets

<u>Renewable Electricity Generation Targets</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
New Solar (MWh)	36,412.3	71,897.7	107,310
New Hydro (MWh)	2,312.6	4,625.28	7,008
New Wind (MWh)	19,527.35	39,054.71	59,173.8
Total Renewable Generation Targets (MWh)	57,252.29	114,504.59	173,491.8

These generation targets represent only one possible pathway to derive 90% total energy from renewable sources by 2050. The purpose of these targets is only to provide an idea for planning the future electricity generation in our Region based on our estimated demand. Other potential electricity generation combinations do exist and could be better suited for our Region. **For instance, this model represents a generation mix which almost certainly would require industrial scale wind. Depending on individual municipalities' planning, this may not be practical, and a model with more solar and less wind generation would be more appropriate.**

The targets this analysis developed for new annual generation by 2050 total 173,492 MWh, and are broken out between the following generation sources: 107,310 MWh from 87.5 MW of new solar, 59,174 MWh from 19.3 MW of new wind, and 7,008 MWh from 2 MW of hydro (Table 10). The solar and wind generation targets are based on the estimated needs to cover the Region's energy use in 2050 within the context of the 90 by 50 goal. The new hydro generation is based on a study from Community Hydro and the PSD, and models enhancement of production from existing dam facilities, rather than new dam construction.



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As summarized previously, on page 7-31 of this Plan and explained in more detail in Table 13 on page 7-69, the Region currently produces roughly 136,306.46 MWh of electricity annually with renewable generation. The target of annual new generation 173,492 MWh of electricity, added to the existing renewable generation of 136,306.65 MWh, equals 309,798.65 MWh (if we assume that the existing renewable sources continue to produce at their current level for the next 30 plus years). Since the models assume the Region's 2050 consumption will be roughly the same as it is now, 266,553.7 MWh, these targets roughly represent a 16% overshoot of the Region's projected need¹⁴. It is highly likely that the data and targets will change over the coming decades. If the reduction of industrial electrical demand were to prove overly optimistic, this additional generation might well be needed. On the other hand, if most targets were being met, the targets for generation could be adjusted down. Additionally, technological developments in the energy sector are progressing rapidly and many modeling assumptions may be adjusted along the way. ACRPC supports continuing work to expand the Region's renewable generation capacity in support of the 90 by 2050 goals. The Commission will continue to evaluate the impacts of new generation to determine both the feasibility of the targets, and how they relate to the Region's ongoing demand.

Electrical Pathways to Implementation

Goals, Policies and Recommended Actions

Given the significant changes that the Region and its residents and businesses will need to make in conservation and efficiency in order to make its targets, ACRPC promotes the following Goals, Policies and Recommended Actions for itself and its citizens.

Goal A.

Conserve renewable and non-renewable electrical energy resources.

Policies and Recommended Actions

1. Support energy conservation efforts and the efficient use of energy by installing efficient electric equipment:
 - a. Help municipalities explore funding opportunities and capital budgeting to implement energy efficiency in all municipal buildings;
 - b. Discourage the use of “always on” lighting in parking lots and other indoor and outdoor lighting in public places. Encourage the use of technology like motion sensors to light areas when needed;
 - c. Plan for and install electric vehicle charging infrastructure on municipal property;

¹⁴ ACRPC looked at VT Community Energy Dashboard numbers and conducted the same analysis. Those numbers estimated we would overshoot the Region's needs by 34%. ACRPC chose to use VEIC's estimation in order to remain consistent with the rest of the State.



- d. Educate consumers regarding efficiency and energy conservation;
 - e. Advocate for the availability of smart meter technology to help consumers understand and regulate their electricity usage.
2. Promote energy efficiency in all buildings, including retrofits and new construction:
- a. Promote improved compliance with the residential and commercial building energy standards by distributing code information to permit applicants and working closely with the Region's Zoning Administrators;
 - b. Encourage municipalities to consider requiring new construction to comply with the "stretch energy code" (http://publicservice.vermont.gov/sites/dps/files/documents/Energy_Efficiency/code_update/2015%20CBES%20Proposed%20Stretch_2015-2-3.pdf).

Goal B.

Shift energy use from non-renewable energy sources, like oil and gasoline, which emit greenhouse gasses and cause acid rain, to electricity from renewable sources using technologies like electric heat pumps and electric vehicles.

Policies and Recommended Actions

- 1. Work with municipalities, electric utilities and community groups to lead and support the transition:
 - a. Help the Regions municipalities investigate and install, or purchase, cost-effective municipal solar and /or wind net-metered facilities to power municipal energy use;
 - b. Help the Region's municipalities, their Energy Committees, and community groups, such as ACORN, install community funded and owned renewable energy projects, and allow local citizens to participate in the economic benefits of local energy generation;
 - c. Work with utilities serving the Region to ensure that during the transition to distributed electric generation and increasing consumer reliance on electricity for power, that the distribution and transmission grid improves regularly to continue to provide cost effective, reliable service and opportunity for growth to all communities in the Region;
 - d. Support utilities globalizing the cost of improving local distribution and sub-station infrastructure necessary to support residential scale distributed generation;
 - e. Advocate for the retention of the current State policy that requires commercial and industrial generators to fund the cost of improvements



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to the distribution system necessary to accommodate their proposed projects;

- f. Share info with VELCO, GMP and VECOOP to ensure that targets for generation in the Region and across the state are optimized to enhance the cost effectiveness of the transmission and distribution system for the State of Vermont; and,
- g. Require systems 500 kW or greater to follow the IEEE1547 standard for connection to the grid.



D. Transportation Uses, Targets and Strategies

Summary

The largest portion of energy used in the Region is for transportation. Virtually all of it comes from petroleum products imported into the Region. In Vermont more than one-third of all energy consumed is for transportation, and 75% of that energy is consumed by passenger vehicles alone¹⁵.

As referenced throughout this plan, transportation's impact on the environment is first among all sectors in Vermont in terms of both energy use and greenhouse gas emissions. As such, transportation simultaneously presents a great challenge and opportunity. In pursuit of the goal of 90% renewables by 2050, the Vermont Comprehensive Energy Plan sets forth ambitious goals which include:

1. Reducing single occupancy vehicle (SOV) trips;
2. Increasing bicycle and pedestrian trips;
3. Increasing public transit and the number of park-and-ride locations and spaces;
4. Increasing the use of rail for freight and passengers; and
5. Promoting fuel transition from fossil fuels to cleanly generated renewable energy.

Achieving progress in these areas to the extent necessary to meet statewide goals requires significant planning and action at all levels of government. In the Region, we must reduce the need and demand for transportation and create new infrastructure required to reduce energy usage and increase the use of renewables. In particular, we need to continue to develop infrastructure supporting public transit, carpooling, biking, walking, and aiding the transition toward renewable fuels such as electricity and biodiesel.

According to the Census Bureau, Region residents owned 26,464 vehicles in 2015 or approximately .7 vehicles per person. That is up from around 24,000 vehicles in 2000 and 15,000 vehicles or .5 vehicles per person in 1980.

¹⁵ Jonathan Dowds et al., "Vermont Energy Transportation Profile," (2017)



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Table 11: Current Regional Transportation Energy Use

<u>Transportation Data</u>	<u>Regional Data</u>
Total # of Vehicles (ACS 2011-2015)	26,464
Average Annual Miles per Vehicle (VTrans 2017 Energy Profile)	11,680
Total Miles Traveled	309,099,502
Realized MPG (VTrans 2017 Energy Profile)	18.9
Total Gallons Use per Year	16,354,472
Transportation BTUs (Billion)	1,969
Average Cost per Gallon of Gasoline (RPC)	\$2.63 ¹⁶
Gasoline Cost per Year	\$43,012,261

Table 11, above, depicts the Region's fuel usage for passenger vehicles (it does not include heavy trucks or farm vehicles). Based upon the number of registered vehicles in the Region, assumed average vehicle miles travelled, gas mileage per vehicle and assumed gas prices at their current level, the table shows the Region's residents spend over \$43 million dollars per year on residential vehicle trips. While some money will go to local gas stations, the majority of the cost per gallon leaves the local economy. Reducing vehicle miles by transforming local infrastructure to provide for other choices than single family vehicles can aid conservation and efficiency savings for individuals. Converting to different, locally produced generation sources of energy for transportation could help reinvest some that money locally.

Breaking the numbers down further, since we know the Region has 14,336 households (Census), this shows that on average, the Region's citizens average nearly two cars per household. If we divide the \$43,000,000 dollars spent by the number of households, it shows the average household with two cars spends approximately \$3,000 per year on just gasoline. Never mind other expenses associated with the cost of owning a vehicle. When one includes maintenance and depreciation on the vehicle, Triple AAA estimated that in 2014 the cost per year of owning a single vehicle was nearly \$9,000. Since the average household has two cars, that adds up to an average of \$18,000 per household, per year.

¹⁶ Average price per gallon of gas (regular unleaded) as of February 2018 (AAA)



Transportation Targets

The costs quoted above should provide some incentive to move towards the proposed targets in Tables 12 A, 12 B and 12 C below.

Table 12: Transportation Targets

<u>Table 12 A. Use of Renewables – Transportation</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
Renewable Energy Use – Transportation	2.7%	18.2%	83.5%

<u>Table 12 B. Transportation Fuel Switching Target – Electric Vehicles</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
Electric Vehicles	2258	15,376	29,986

<u>Table 12 C. Transportation Fuel Switching Target – Biodiesel Vehicles</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
Biodiesel Vehicles	493	841	1208

As the Tables show, to meet the proposed targets, by 2050, assuming growth, nearly all residential vehicles in the Region will need to run on renewably generated electricity. Additionally, most commercial vehicles and farm equipment will need to switch from diesel to bio-diesel or electricity, if it is available for application in heavy commercial vehicles.

ACRPC's policies regarding transportation targets as they relate to reducing energy demand and single-occupancy vehicle use, and encouraging the use of renewable or lower-emission energy sources for transportation, are outlined below. These targets are consistent with those presented in the updated Addison County Regional Transportation Plan. For more detailed information on transportation related energy use goals and actions for Region, please see the Addison County Regional Transportation Plan by visiting our website or our office:

(<http://acrpc.org/programs-services/transportation/>)

- Ridesharing/Carsharing/Ride-hailing section, pages 6-36 to 6-37;
- Public Transit, SOV trip reduction, park-and-rides, etc. pages 6-34 to 6-36;
- Pedestrian & Bicycle Facilities, pages 6-39 to 6-46;
- Energy Efficiency and Conservation section, pages 6-48 to 6-49; and,
- Electric Vehicles, page 6-50.



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Transportation Pathways to Implementation

Goals, Policies and Recommended Actions

Given the significant changes that the Region will need to adopt to meet statewide targets, ACRPC promotes the following Goals, Policies and Recommended Actions for itself and its citizens.

Goal A.

Reduce reliance on nonrenewable fossil fuels, and shift reliance to renewable energy sources.

Policy and Recommended Actions

1. Create infrastructure and policies supporting electric vehicle use within the Region:
 - a. Plan for and install electric vehicle charging infrastructure on municipal property;
 - b. Incorporate EV ready standards into building code. (This can be as simple as requiring 220v outlets in garages);
 - c. Encourage major employers in the Region, to install (additional) EV charging stations for employees;
 - d. Identify strategic locations where EV charging stations should be added or expanded including existing service stations;
 - e. Promote the Drive Electric Vermont website.

Goal B.

Maintain or reduce vehicle miles traveled per capita to 2011 levels by reducing the amount of single occupancy vehicle (SOV) commute trips.

Policies and Recommended Actions

1. Support regional efforts to increase access to safe, every day walking and cycling within and across municipal borders:
 - a. Review municipal road standards to ensure that they reflect all “complete streets” principles applicable to our rural roads;
 - b. Provide walking and biking paths connecting population densities with critical infrastructure, like in and between villages and elementary schools;
 - c. Promote municipal membership on the *Walk-Bike Council of Addison County* to foster safe and accessible opportunities for walking and cycling as an alternative to SOVs;
 - d. Help municipalities find and apply for funding sources for building walk/bike infrastructure;
 - e. Help the Walk-Bicycle Council of Addison County work with municipal road foremen and select boards to plan for incremental development of critical bicycle infrastructure within their municipalities as road work is completed annually.

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2. Support public transportation programs serving the Region. Bus routes, car and vanpools, and elderly and disabled services all fall under the umbrella of public transit:
 - a. Work with ACTR (TVT) to explore creative approaches to expanding service in rural areas of the Region, including small capacity ride-share, ZipCar style micro-leases, and even self-driving EVs for a connecting service between small villages and major arterial corridors;
 - b. Encourage additional municipal representatives on the Tri-Valley Transit (“TVT”) Board¹⁷ and the Addison County Transit Resources Regional Operating Committee (“AROC”) to bring issues facing smaller, more isolated towns to the table;
 - c. Support the use of a Park and Rides in the Region and encourage the Region’s residents to consider ride-sharing programs;
 - d. Help municipalities without park and rides to find a convenient location and apply for funding to create lots from Vermont’s small park and ride program;
 - e. Plan and advocate for enhanced access to public transit, particularly during relevant Act 250 proceedings;
 - f. Promote better utilization of existing state and municipal park-and-ride lots;
 - g. Work with ACTR to create better connectivity between public transit and park-and-ride locations. Support employer programs to encourage telecommuting, carpooling, vanpooling, for employees’ commute trips;

Goal C.

Increase the use of rail for freight and passenger services.

Policy and Recommended Actions

1. Support improvements to the Western Rail Corridor that improve safety and the ability of the corridor to carry additional freight and passengers:
 - a. Support Amtrak’s expansion on the Ethan Allen line from Rutland to Burlington with stops in Middlebury and Vergennes;
 - b. Support construction of a rail platform in Middlebury and completion of the rail station in Vergennes/Ferrisburgh;
 - c. Encourage local businesses to explore the opportunity to use rail for freight.

¹⁷ On July 1, 2018 Addison County Transit Resources, the transit provider in the Region merged with Stagecoach, the Transit provider for Windsor and Orange County. The new entity was re-named Tri-Valley Transit but kept the names ACTR and Stagecoach for its regional operating divisions.



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Goal D.

Encourage citizens and businesses to transition from oil and gasoline to cleaner products and technologies and/or to renewable, non-fossil-fuel transportation options.

Policy and Recommended Actions

2. Encourage options for cleaner fuel availability:
 - a. Work with Clean Cities Coalition to encourage large fleets to switch to natural gas use where transition to biodiesel is impractical;
 - b. Encourage use of renewable natural gas through Vermont Gas's forthcoming renewable natural gas green pricing program;
 - c. Support the agricultural industry as it investigates growing, processing and using biofuels for on farm and other commercial and heavy vehicle use.



E. Land Uses, Targets and Strategies

Summary

Land Use

The Region currently constitutes a largely rural area of working farms and forests, interspersed with small villages, rural residential single-family homes, and three larger growth centers where most of the commercial and industrial development in the Region lies. Because of its existing settlement patterns, many residents in the Region are probably more dependent on their cars, and the energy they use, than many Vermont residents. While the Region desires to retain its rural feel, it can adopt land use policies that encourage more densely settled areas that have the capacity to allow for more transportation alternatives within those areas, potentially saving energy and promoting healthier options, like walking or biking. As with other conservation goals, conserving energy by reducing the need for cars can be more cost effective for its citizens than fuel-switching to electric or other alternatively powered vehicles discussed in the previous chapter. Therefore, the Land Use Section of this Plan promotes greater density and housing options in the Region's villages. Other Land Use policies to limit energy use including the conservation of forest and farmland for biofuels and local food systems are listed in the Policy Section below.

Energy Infrastructure and Growth Patterns

Infrastructure such as electricity distribution lines, gas pipelines and sewer systems can lead to new or intensified development. Development is easier, less expensive and therefore more likely to occur in places served by infrastructure. So, decisions regarding infrastructure extensions or improvements should consider the impacts on growth and development patterns in the area.

In the Region, there are areas, especially in the mountain towns, that do not currently have access to electric lines. As with roads, whenever a distribution line is extended into a place that previously did not have service, over time additional development is likely to occur along the length of the line.

Current Energy Consumption and Fossil Fuels

1. Fuel oil and propane

There are a number of companies in the Region delivering propane and fuel oil to retail, commercial and industrial customers, used primarily for space heating and cooking. Most of these fuels are shipped into the region by truck. There is also a rail facility located in Leicester Junction where fuel is delivered and stored. Retail distribution of these fuels is available throughout the Region.

This plan supports phasing out the use of these fuels within the Region. However, it also recognizes that these businesses have been a very necessary part of the community for a long time. This Plan envisions supporting these businesses to transition to become energy service



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suppliers or some other ongoing type of business to minimize the negative impacts the transition may have.

2. Gasoline

Gasoline distribution in the Region is primarily through individual stations affiliated with major oil companies. In the Region's rural towns, many stations are small, locally-owned convenience stores with franchises. Along the major highways, gasoline stations are more likely to be corporate-owned chain stores.

This distribution network has historically served the Region well and fuel for gasoline engines is readily available. During the past 30 years, changes to the economic climate, consumer purchasing patterns and regulations on underground storage tanks have affected the gasoline distribution system. Smaller stores with limited sales volumes are finding it increasingly difficult to justify the expense associated with gas sales. Consequently, residents in more rural parts of the region have been gradually losing local access to fuel and must drive increasing distances for a fill up.

Like fuel oil and propane, this plan envisions reducing the Region's dependency upon gasoline and other petroleum-based fuels in favor of renewably generated electricity. However, it also recognizes that the distribution infrastructure for an effective transition to electric vehicles does not exist. One logical place to explore is transitioning the fuel distribution network to a network that can also supply electric vehicles. This Plan supports that transition. Building electric vehicle charging infrastructure should include all reasonable places for electric charging stations, including existing service stations.

There are health and safety risks associated with both the storage and transport of petroleum products in the Region. Throughout the past 30 years, electronically monitored, double-walled tanks have replaced older single-walled underground storage tanks. Unfortunately, many of these older tanks had already leaked and some of the region's groundwater has been contaminated. To date, the costs associated with groundwater contamination in the Region have been limited to small-scale clean up and supplying alternative drinking water supplies to homes affected. Given that most commercial tanks have been replaced, the possibility for large-scale widespread contamination has been substantially reduced. Small residential systems will continue to pose a localized threat.

Above ground storage and transport of highly flammable petroleum products also carry fire and explosion risks to communities. In the 1980s, transport of petroleum products to the Region shifted modes from a combination of Lake Champlain barge, rail and truck to primarily truck transport with limited rail use. A 2003 study of the Region's major highways indicated that more than three-fourths of all hazardous materials transported within the Region fall within the petroleum category. Additionally, all of the Region's local roads also have some risk associated with the transport of petroleum products to customers for heating and cooking fuels.



3. Natural Gas

Vermont Gas has recently completed a 41-mile natural gas pipeline extension into the Region and continues to build out secondary distribution. The line serves or will serve commercial or residential customer's in up to 7 communities in the Region, including the three Regional employment centers of Vergennes, Middlebury and Bristol, the village areas in Monkton, New Haven and portions of Weybridge and Ferrisburgh. This pipeline has been a contentious issue for the Region. When proposed, the cost of fuels was significantly higher. However, many in the community objected to investment in new long-term infrastructure for a fossil fuel. After significant debate, the Addison County Regional Planning Commission supported the project with conditions. Those conditions were included in an MOU it executed with Vermont Gas. Conditions included provisions like service to the villages that the pipeline passed through to provide infrastructure to support planned, denser growth within those villages, training for the Region's first responders and working to incorporate renewable natural gas, made from composting agricultural waste, mainly cow manure and/or food waste into its fuel mix. Vermont Gas is working to make this opportunity available to the Region's farmers and food manufacturers.

Nonrenewable natural gas will serve as a short-term fuel for the Region. Whether consumers and businesses choose to convert to natural gas will be their own choice. ACRPC will continue to work with Vermont Gas to utilize the infrastructure it offers to promote economic development for manufacturing and to incorporate it into our farm economy to offer a renewable natural gas option.

Regional Renewable Energy Generation

The Region's energy supply is largely consistent with statewide patterns. This includes a number of alternative energy installations that tap local energy resources. The Region was historically developed with hydropower. The Middlebury River, New Haven River and Otter Creek powered the first mills in Middlebury, Bristol and Vergennes respectively. Several of these hydropower sites still exist and are discussed in the sub-section later in this chapter dealing with Hydropower. More recently, the relatively flat and open topography of the Champlain Valley in portions of the Region has attracted a number of large scale solar developments. Also, a growing number of homes have photovoltaic systems that supply a portion of their electrical energy. Finally, community members, either lacking good solar orientation or interested in a community system for other reasons, have created community energy systems where they have pooled resources with other like-minded citizens to develop an offsite community energy project. Thanks to Vermont's net-metering law, owners of these systems can purchase grid power when needed and sell excess power back to the grid during periods of high solar production up to the point at which their annual cost zeroes out. In order to qualify for net metering, an electrical utility customer must obtain a Certificate of Public Good (CPG) from the Public Utilities Commission ("PUC"), a process similar to an Act 250 land use permit. Projects that receive a CPG do not have to go through the local permit process.



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Table 13: Total Existing Regional Renewable Generation

<u>Renewable Generation Sources</u>	Generation Capacity (MW)	Total Annual Generation (MWh)
Solar	34.75	41,792.8
Wind	0.4	961.78
Hydro	23.92	83,815.68
Biomass	2.38	9,736.39
Other	0.00	0.00
Total Existing Generation	60.91	136,306.65

As of October 2017, roughly 1,498 sites generate 136,306.65 MWh of solar, wind, hydro and bio-methane power annually within the Region (Table 13)¹⁸. The discussion below encompasses all of the types of renewable generation potentially available to the Region's residents and how they might harness it to meet statewide generation targets for the community.

The following table displays a summary of renewable generation capacity in the Region organized by municipality as of May 2018. The data below comes from several sources and should be considered an estimate as new renewable generation sites may emerge, and existing sites may expand or close in the Region. Additionally, Map 2 shows the location of net metered generation sites in the Region. Sites generating greater than 15 kW have their capacities listed on the map. For other maps showing the location of the existing renewable generation facilities in the Region, please visit the Vermont Energy Dashboard's website (listed above).

¹⁸ Existing renewable generation data came from the Community Energy Dashboard (2017), Green Mountain Power (2018), Middlebury College (2018), and The Low Impact Hydropower Institute (2018).



Table 14: Total Existing Regional Renewable Generation Capacity by Municipality¹⁹

Municipality	Solar Sites	Solar Generation Capacity (MW)	Wind Sites	Wind Generation Capacity (MW)	Hydro Sites	Hydro Generation Capacity (MW)	Biomass Sites	Biomass Generation Capacity (MW) ²⁰
Addison	62	1.17	3	.028	0	0	1	.45
Bridport	45	2.5	2	.103	0	0	1	.68
Bristol	114	1.11	0	0	0	0	2	.45
Cornwall	89	.666	4	.033	0	0	0	0
Ferrisburgh	140	4.79	4	.044	0	0	0	0
Goshen	4	.024	1	.0014	0	0	0	0
Leicester	30	.328	1	.0138	1	2.2	0	0
Lincoln	93	.725	2	.01	0	0	0	0
Middlebury	235	5.71	1	.0095	1	2.25	1	.65
Monkton	102	1.0	0	0	0	0	0	0
New Haven	115	7.97	3	.015	1	5.85	0	0
Orwell	23	.826	1	.0095	0	0	0	0
Panton	30	6.05	0	0	0	0	0	0
Ripton	42	.216	1	.0095	0	0	0	0
Salisbury	31	.506	0	0	1	1.3	0	0
Shoreham	53	1.34	0	0	0	0	0	0
Starksboro	77	.628	1	.0025	0	0	0	0
Vergennes	71	1.63	2	.115	1	2.6	0	0
Waltham	39	.662	1	.0025	0	0	0	0
Weybridge	47	.243	2	.004	2	9.725	1	.15
Whiting	14	.699	0	0	0	0	0	0

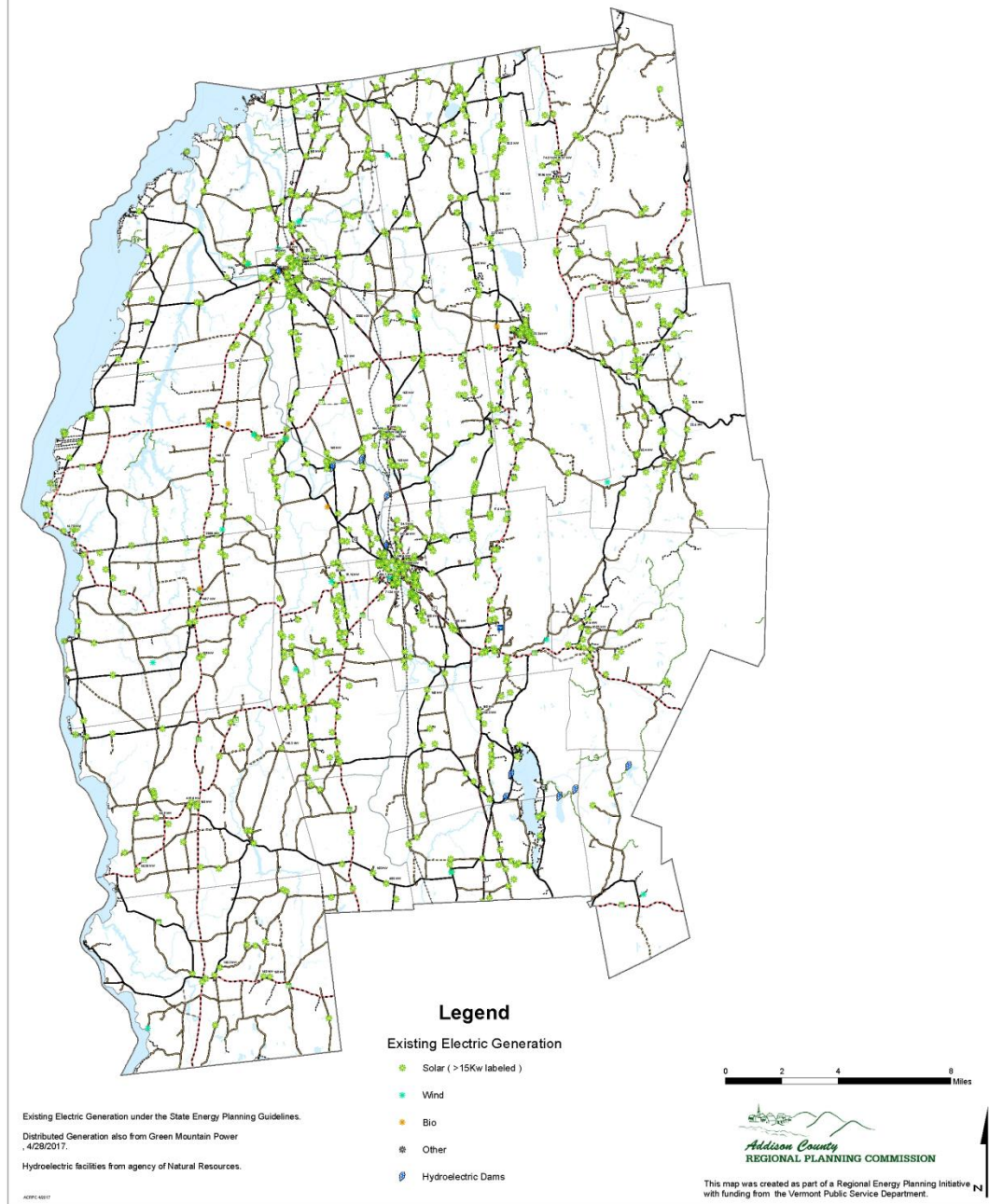
¹⁹ Existing renewable generation data came from the Community Energy Dashboard (2017), Green Mountain Power (2018), Middlebury College (2018) and The Low Impact Hydropower Institute (2018).

²⁰ This data only includes biomass used for electric generation or combined heat and power, for commercial or industrial use. It does not include biomass used solely for heat or electricity in individual homes or businesses.



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Renewable Energy Potential: Existing Electric Generation



Map 2. Renewable Energy Potential: Existing Electric Generation

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Solar Energy

Globally, the sun supplies energy to Earth at some 10,000 times the rate at which humankind currently uses energy. However, this energy is not distributed equally, geographically or temporally; the Region's location and climate mean our share of solar energy is less than the continental U.S. average, and considerably lower in the winter than in summer. However, the average monthly solar energy available to a fixed solar array tilted optimally for its latitude in the Region is still over 70% of that for its equivalent in Albuquerque, New Mexico—an excellent place for solar energy-- according to NASA data available at <https://eosweb.larc.nasa.gov>.

The Region's total electrical energy consumption currently stands at approximately 266,553,670 kWh (267 GWh) per year, according to Efficiency Vermont estimates (Table 8, page 7-52). If we already generate close to 90 GWh of that with renewable hydro (page 7-90), that leaves 177 GWh. This means that the Region could meet that entire remaining current energy demand with solar photovoltaic generation, using cumulative generation and usage averaged over the year, with about 136 MW of PV occupying around 1650 acres of the Region's 516,895 acres, or about one third of 1% of our land. (This rough calculation uses conservative empirical figures from our Region of about 1.3 GWh of annual production for a nominal 1 MW of photovoltaics, which occupy about 12 acres/MW. This is for fixed arrays using current technology.) Since this plan predicts total electrical consumption within the Region will remain relatively flat, on balance, it's clear that the solar resource alone is more than adequate for our entire current and future energy needs. That is if we were willing to devote a sufficient amount of land to it; according to Map 6 (page 7-87) the region has 12,459 acres of primary solar siting area, and an additional 118,405 acres of secondary solar siting area. However, the intermittent and seasonally variable nature of solar PV generation means that without significant advances in the technology and economics of energy storage, it could not be relied on as baseload generation. The diminished production of PV in winter months, coupled with peak heating demands (transitioning to electric heat pumps) makes this problem particularly acute.

Photovoltaics represent only one of several useful ways to harvest solar energy. The simplest use of sunlight is passive use for lighting and heating. Many of Vermont's one-room schoolhouses provide historic examples of how buildings can be oriented, and windows can be used to take advantage of passive solar energy for lighting and heating. Properly insulated buildings oriented so that their long axis is within 30 degrees of true south with unobstructed south facing windows can offset their space heating costs by 15 to 50 percent.²¹ Taking this one step further floors and walls can be built of materials that will capture and store warmth from the sun. In many cases, passive solar buildings can be constructed at little or no extra cost, providing free heat and light – and substantial energy cost savings – for the life of the building. Solar water heating is another cost-effective solar application for buildings in the

²¹ Information from the *1997 Vermont Comprehensive Energy Plan*, prepared by the Vermont Department of Public Service.



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Region. Water heating is one of the largest energy costs for the Region's households. A water heating system that utilizes solar energy can reduce energy costs by up to 65 percent. A solar water heater cannot generally supply all the hot water needed year-round because of the climate and weather, so a back-up system is required.

New developments in photovoltaic cell (PV) technology, which converts solar energy into electricity, have led to PVs that are smaller, less expensive and more consumer-friendly – trends that should continue into the future. Although these technologies exist to convert solar energy into heat and electricity, at this point in time, it is impractical to supply all of the Region's energy with in-Region solar installations, for reasons cited above. However, use of solar energy for electricity and/or heat in individual homes and for charging electric vehicles is technologically feasible and ranges from solidly economical to marginally so.

Solar energy facilities ranging from 150 kW to 5 MW have been constructed within the Region with varying visual and other impacts. From that process the Region has learned how project siting standards and mitigation can work to integrate large solar developments with the Region's rural aesthetic character. The Section entitled, "Regional Standards for Siting Energy Generation and Transmission Projects" contains the standards the Region will apply when testifying regarding generation and/or transmission, and sub-station projects proposed for the Region.

A 2010 regional study to site solar facilities in municipalities in the Region can be found at the Addison County Regional Planning Commission's office (14 Seminary Street in Middlebury, Vermont). This study evaluates the potential for new photovoltaic electricity generation in Ferrisburgh and Middlebury, and provides recommendations for future research. The regional solar study can also be accessed online here:

http://acrpc.org/files/2012/04/COUNTY_FINAL_small.pdf

Biomass

1. Biomass Resources

Biomass consists of renewable organic materials, including forestry and agricultural crops and residues, scrap wood and food processing wastes, and municipal solid waste. All these products or waste products can be used as energy sources. The benefits of these resources are that they are local, affordable, sustainable and often waste materials. Some biomass materials, such as cordwood, have been traditionally burned to provide heat. However, these materials can also be used in other ways, such as producing gas that can then be burned to generate heat or power. The considerable energy savings and reduced electrical consumption from the grid modeled in this Plan clearly rest on commercial/industrial use of wood chip biomass energy.

The Agency of Agriculture, Food and Markets (AAFM) works in conjunction with the USDA Animal and Plant Health Inspection Service (APHIS) to protect Vermont from
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invasive insects that can harm Vermont forests and trees. This Plan understands the threat of invasive pests and supports the practices and strategies presented by the AAFM for managing biomass resources in a way that inhibits the spread of pests in daily operations.

Generally, AAFM believes that all biomass and cogeneration facilities should use technologies and procedures designed to limit the possibility of invasive species movement into un-impacted areas. Examples of this include screening of storage and processing areas, limitations on the length of time unprocessed material can remain on-site before use, chipping logs at the harvest site rather than at the facility, careful selection of harvest areas and species used, timing of harvests to target periods when pests are less likely to be mobile heat treatment, and other safeguarding practices. Any of these or other procedures should be employed as appropriate to help limit the introduction and spread of regulated (and unregulated but nonetheless potentially devastating) plant or insect pests.

2. Wood

Wood has historically been an important energy source in the Region. When colonial settlers arrived in the region, it was forested. Trees were felled to clear farmland and the byproducts of that clearing, including timber and potash, were a primary component of the region's early economy. The Region's residents used wood as their primary heat source into the 20th century. As fossil fuels became available, one of the Region's primary energy sources, local wood, was largely replaced by imported oil.

During the oil embargo of the early 1970s, many of the region's residents returned to using wood as a renewable and cost-effective fuel. Most of this use was initially in the form of split or chunk wood for use in traditional woodstoves. However, once oil prices declined and residents were faced with the inconvenience of putting up wood several seasons in advance, many returned to the ease of oil heat. Several new residential wood heating alternatives have begun to be used in the Region over the past decade. In rural areas of the Region, outdoor wood furnaces have seen a rise in use allowing for much of the mess associated with indoor wood stoves to be left outside. Wood pellet burning stoves and furnaces have offered consumers another option. These stoves and furnaces use a processed wood pellet for fuel that can be automatically fed into the burner and delivered in bulk.

In addition to use for residential heating, wood is being used in Vermont to generate energy on a large scale. There are two wood chip fired electrical generation facilities located in Burlington and Ryegate. The McNeil Generating Station located in Burlington has a nominal capacity of 50 MW and has operated since 1984.

Between residential use and industrial-scale generating plants, there are a number of applications for wood as an energy source. Small-scale commercial electrical generation with wood fuel is possible and is most common at forest products manufacturing plants where waste material can be converted to energy. Over half of Vermont's mill waste is currently used as an energy source



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Over 20 Vermont schools operate boilers fired by wood chips. This technology has the potential to co-generate electricity in addition to providing heat. The technology used in a number of these schools was developed by a local business, Chiptec. In the Region, Middlebury College has displaced one million gallons of oil per year—half the oil consumption of its heating plant—with local biomass in the form of wood chips.

The Region and Middlebury College foresters agree that each acre of the Region's forest might sustainably yield about one-third of a cord of firewood each year. The Region overall contains about 230,000 forested acres, equal to roughly 45% percent of the Region's overall land area of 516,895 acres. This rough calculation suggests that the Region's forest land might supply up to 76,000 cords per year — enough to serve as a heating source for nearly all of the Region's 14,336 households. If each house were assumed to burn 5 cords per year, that would amount to approximately 71,680 cords of wood. While the complete use of this resource is unlikely, it does illustrate the potential of using sustainably harvested wood to heat structures in the region.

In 2009 ACRPC, the Town of Bridport and the Bio Energy Resource Center (BERC) investigated whether the Region had sufficient biomass from both its farms and forests to support a local pellet mill facility. The result extensively studies sustainable yields of both wood and agricultural sources of fiber and concluded that the Region's forests, could not solely support a mill, but could if combined with other parts of the State. A link to that study is attached here.

http://acrpc.org/files/2012/04/BERC_Pellet-Mill_Report_2009.pdf.

The region's forest and farming resources are a renewable energy source that could be used sustainably for generations if properly managed. However, a number of issues associated with burning large quantities of wood have surfaced over the years, including increased air pollution levels and concerns about over harvesting of available wood sources. Biomass should be considered in the context of public health impacts in addition to whether supplies are sustainable and effective to meet short and long term demands for renewable heat source energy.

In general, wood products do not burn as cleanly as petroleum products and produce even more air pollutants when fires are contained within airtight stoves. However, newer wood stoves are required to burn more cleanly and many are now equipped with catalytic converters or other pollution control devices to remove pollution from wood smoke. New woodstoves for residential use are more energy efficient, produce less air pollution and are safer than older models. One theoretical benefit of burning wood is that there is little net production of carbon dioxide (CO₂), a major greenhouse gas, because the CO₂ generated during combustion of wood equals the CO₂ consumed during the lifecycle of the tree. This logic necessarily requires that the resource is harvested sustainably, so that the baseline of conversion of CO₂ to O₂ through photosynthesis in the forest is maintained.

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Concerns about over harvesting of forests have arisen in recent years in connection with large consumers of wood chips, such as wood fired electric generation plants. The economics of chip harvesting preclude the ability to effectively harvest in a selective manner and some public resistance has surfaced over even aged forest management techniques. Because of this resistance, the large-scale users of wood chips have taken an active approach to managing forests and have hired full-time foresters to ensure the harvesting is done in a sustainable manner for years to come with the least aesthetic impact possible.

Wood continues to be underutilized in the region as an energy source with far more biomass production grown in a single year than is harvested. The ability to market the former waste products from sawlog production allows wood to be grown much more as a crop, similar to grain, than ever before.

3. *Bio-diesel*

Biodiesel is an emerging technology for creating energy from biomass. Biodiesel is a fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant greases. The fats and oils are chemically reacted with an alcohol, such as methanol, to produce chemical compounds known as fatty acid methyl esters. Biodiesel is the name given to these esters when they are intended for use as fuel. Glycerol is produced as a byproduct. Biodiesel contains no petroleum, but it can be blended with petroleum products to create a biodiesel blend, which can be used to fuel unmodified diesel engines and to replace fuel oil for heating systems. If they become economically viable at scale, Biodiesel technologies could provide an opportunity for the Region's farmers to create new demand for locally grown crops. Since most farm equipment runs off diesel engines, biodiesel could also provide an alternative fuel supply for farm vehicles.

4. *Biogas Power Generation*

As discussed above, cow manure is another source of biomass in the Addison Region. Other potential biomass resources in the region include food waste, cheese whey, slaughterhouse waste and brewery residuals.

During the energy crisis of the late 1970s, the Foster Brothers Farm in Middlebury started producing electricity from cow manure. This electricity was used to provide power for the farm and the excess could be sold back into the power grid. To produce the electricity, an anaerobic digester uses bacteria to break down the manure into methane gas. The methane gas is used as a source of fuel for an internal combustion engine connected to an electrical generator. Methane produced from other sources, such as landfills or composting of food waste, could also be used to produce power in the same manner. As of this Plan, a number of the larger farms in the Region have invested in biodigesters to produce energy from methane generated by manure and food waste. Most then convert the gas to electricity to power the farm. They also use the heat generated in the digestion process and use the composted manure as bedding, producing a number of useful byproducts. One farm has recently invested with Middlebury



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College and Vermont Gas in using methane for heating. In 2012 ACRPC worked with Integrated Energy Systems to produce a study looking at the vehicle market for a biogas project proposed to serve Middlebury College and the potential of also using a portion of the gas created for fuel for large commercial vehicle fleets. The bio-gas project to heat the college is moving forward, but without the vehicle fleet fueling station. A link to that study of biogas and its potential is here:

http://acrpc.org/files/2012/04/COUNTY_FINAL_small.pdf

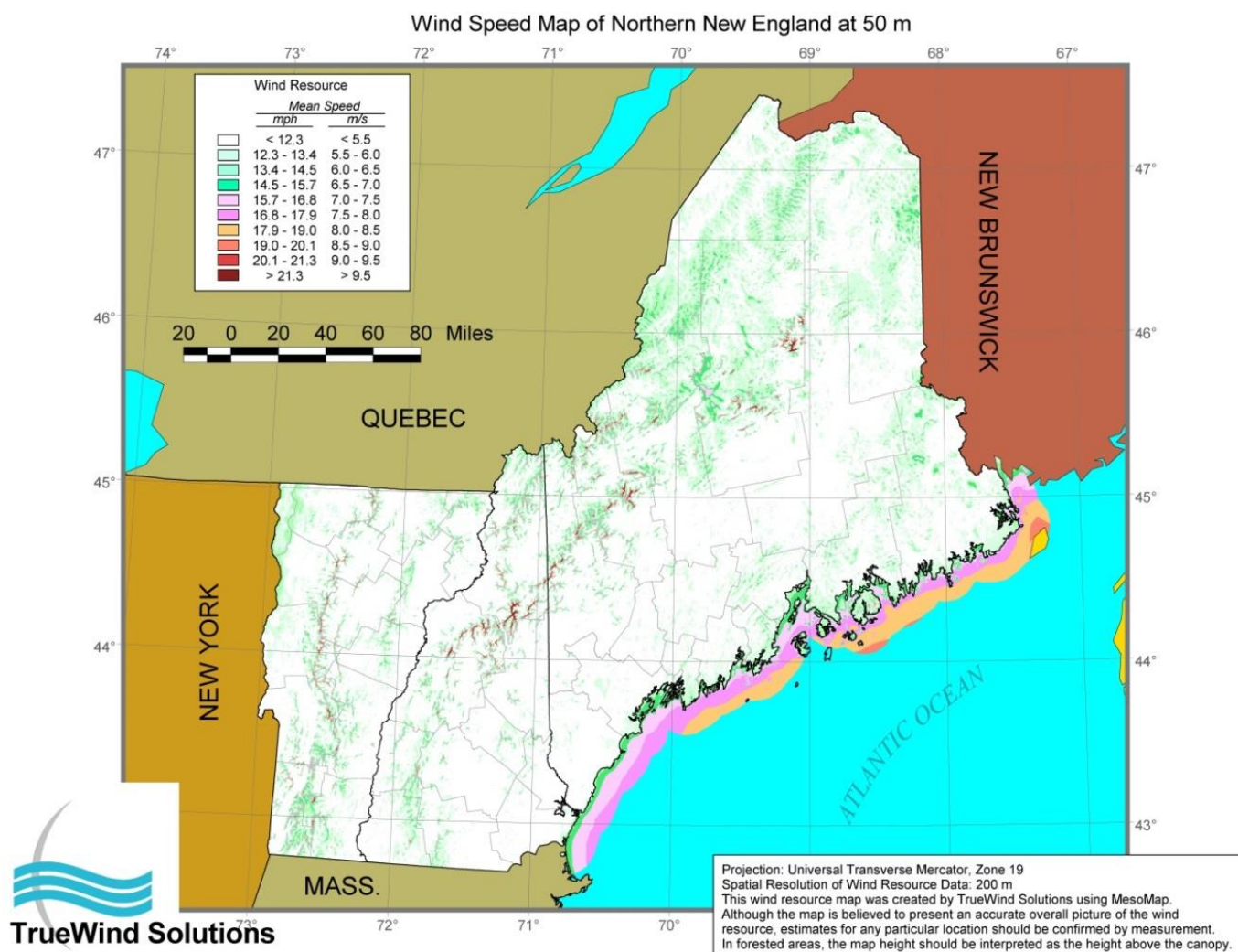
Some have expressed concern that we would be better off reducing food waste by using food before it spoils, through gleaning or other conservation practices, rather than recycling it. Others have questioned the long-term sustainability of the large-scale dairy operations necessary to support manure-based energy systems. However, in the near term, this plan supports the continued use of manure and other by-products of its agricultural and food industries to produce clean, renewable power.

Wind

Mapping of New England wind resources by the National Renewable Energy Laboratory shows that most of the Region has average winds in the Class 1 category (speeds below 12 miles per hour). This is the lowest class and is unsuitable for commercial-scale wind power (See map 3 below).

A small portion of the Region—appears to have class 3 winds and above (around 12 miles/hour at 100 meters above the ground), considered marginally suitable for large-scale wind installations. However, the entire Region is likely capable of producing significant wind energy at the smaller scales of individual or multiple-home wind turbines. Experience with wind installations in the Region and surrounding communities confirms this.





Map 3. Wind Speed Map of Northern New England at 50m²²

Wind power can be harnessed for both large and small-scale power generation. In recent years, several studies have shown that Vermont's wind resource is abundant enough to meet a significant portion of the state's electric energy needs. Ridgelines provide the best location for wind generation facilities, with elevations between 2,000 and 3,500 feet above sea level being ideal for maximum power production. In the Region, locations primarily in the towns of Starksboro, Lincoln and Ripton, were identified as having a Wind Power Class of 3 or greater, making large-scale generation feasible. However, much of the land in this area lies in the Green Mountain National Forest, and a significant portion of that has been designated as Wilderness

²² TrueWind Solutions, "Wind Energy Resource Maps of New England," available through Massachusetts Technology Collaborative at:

<http://www.mass.gov/anf/docs/itd/services/massgis/wind-finalreport-northernnewengland.pdf>



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area. This Plan opposes any commercial development within the “Known Constrained” areas located on Map 4, including the wilderness area discussed above.

Beyond prohibiting wind in areas mapped with “Known Constraints” (See Map 4) and supporting the current State policy that any commercial renewable developer pay for the total cost of their projects, including the transmission infrastructure improvements required to the grid to accommodate or serve their project, this Plan does not set any further restrictions with regard to commercial or industrial scale wind generation. Instead, it will incorporate and support the wind policies of its member municipalities as contained within their plans.

Small wind turbines, designed for individual residential or business use, usually generate under 15 kW. They have two or three blades usually with a diameter of eight to 24 feet. They are often mounted on a guyed monopole or a freestanding lattice tower ranging in height from about 80 to 120 feet. Turbines need to be 40 to 60 feet above nearby trees or other obstructions for optimum efficiency. Small to mid-sized turbines operate at lower wind speeds and can be more flexibly located. This Plan supports small residential scale wind development, provided the applicant provides sufficient setbacks to property lines and sites the facilities pursuant to the guidelines contained in the PSD’s handbook for residential wind siting, “Siting a Wind Turbine on Your Property”.

Geothermal Energy

Energy trickles from Earth’s interior to the surface at a modest average rate of about 350 watts per acre, far less than the solar input. For the Region, far from major geological activity, that number is almost certainly significantly lower. In addition, solar energy warms the Earth, especially in the summer, and some of that energy is stored as heat in the upper layers of soil and rock. Year-round, soil temperatures just a few yards deep in Vermont average around 45°F to 50°F year-round. Unlike the case in seismically active areas like Iceland or even Yellowstone in Wyoming, this temperature is too low for direct (conductive) heating. It can however, help with summer cooling, and there are simple designs to affect that, with, for instance, fan-driven air circulation through buried outside duct pipes, or attic and whole house fans pulling cooler air up from basement spaces.

Latent Heat--The Special Case of Heat Pumps

Air to Air cold climate heat pumps are becoming quite popular in the Region, and for good reason. They are actually able to make more energy available for heating and cooling than they consume; they perform this quasi-magical feat in the same way that an ordinary refrigerator does, by using an energy source called the latent heat of vaporization and the latent heat of condensation of a chemical refrigerant. In reality, they do not create or harvest heat so much as move it from one space to another. A refrigerator removes heat from its inside to its outside using an evaporator on the inside converting the refrigerant to a gas, and a condenser on its outside turning the refrigerant from a gas back to a liquid. The evaporation phase absorbs heat from its surroundings and the condensation phase releases heat to its surroundings. In the case

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of a cold climate heat pump in heating mode, the condenser is inside and the evaporator is outside, so heat is removed from the air outside and delivered to the air inside. It can also perform as an extremely efficient air conditioner, evaporating refrigerant in the interior and condensing it on the outside. Cold climate heat pumps generally available for residential use tend to be economic down to around 12-15 degrees below 0° F using common refrigerants, so a secondary heating system is required for very cold periods. That may be a fossil fuel fired system, wood heat, or electric resistance heat, though widespread use of the latter can cause winter peak generation issues for electric utilities. Special air to air heat pumps using CO2 as a refrigerant are useable down to around -30°F, but are not effective in reverse mode as air conditioners.

Distinct from air to air heat pumps, so called geothermal heat pumps can be more accurately referred to as ground source heat pumps. Rather than moving heat to or from outside air, they exchange heat with the ground or groundwater. There exist a wide variety of design types, including direct-coupled, closed loop and open loop. Open loop systems, which generally use an “open loop” of pumped groundwater to exchange heat with the refrigerant loop are most popular in the Northeast because of the relatively high availability of groundwater. The economics of this kind of system are best with relatively shallow and high flow drilled wells; they often can utilize a building’s potable water well meeting those conditions. The initial cost of these types of system is higher than other HVAC systems, and they are best suited to new construction. On the other hand, they are typically more efficient than even air to air systems because the temperature differential between the inside and the ground or groundwater, is significantly less than the differential for air to air systems, and the payback is generally well under a decade. To date, few property owners in the Region have installed ground source heat pump systems, but their number can be expected to grow.

Hydropower

The Region possesses some relatively significant hydro resources. Hydropower has been used as an energy resource in the Region since colonial settlers built the first mills along the region’s streams. Throughout the 1800s most of the region’s industrial activity was focused around locations with access to hydropower, such as the Marble Works in Middlebury. Some of those same locations are still being used to generate power today.

There are seven hydropower generation facilities operating in the Region, five of which are located on Otter Creek. One other facility is powered by Sucker Brook from the Sugar Hill Reservoir in Leicester and the Goshen Dam in the town of Goshen. In Salisbury, there is a facility that generates hydropower from the Leicester River. All of these facilities are owned by Green Mountain Power (GMP).

There are two basic types of hydroelectric facilities: run-of-the-river and ponding facilities. Run-of-the-river plants hinder the flow of water only minimally, with the volume entering the powerhouse equaling the amount leaving the plant immediately. Ponding systems store water



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behind a dam to be released through the turbines on demand. Most of the hydropower plants in the region are run-of-the-river facilities. However, the Sugar Hill generator in Goshen can store water in a reservoir and release it on demand.

The size of these facilities ranges from the Sucker Brook facility (or Silver Lake Project), which produces less than 7,000 MWh annually to Huntington Falls, which generates more than 22,000 MWh. Altogether the region's hydro plants currently produce close to 85,000 megawatt hours of electricity annually. That figure represents approximately 33 percent of the electricity consumed in the Region annually.

The environmental impacts associated with hydropower, the Region's main source of electricity generation, can be significant. The physical character of a power-producing stream is usually markedly changed upstream, downstream and at the dam location. Water chemistry and biology are also altered. Even run-of-river plants can still cause impacts on the riverine system. At a minimum there is often a dam limiting the mobility of fish and blocking passage to spawning areas. The level of water in the reservoirs used in ponding systems can fluctuate greatly, causing shoreline erosion and degrading plant communities and animal habitat. However, properly scaled and managed hydro systems can significantly reduce impacts and present fewer negative environmental impacts relative to other energy sources. Partly because of the questions of environmental impact, the development of hydropower facilities, even smaller projects, can be impeded by an extremely difficult and expensive permitting process, especially at the federal level.

Energy Storage

As the Region permits commercial or industrial scale generation in its jurisdiction, the Region should also advocate to include an associated storage facility to supplement the power generated to improve its short-term resiliency and replace expensive peak power purchases. Battery storage, while expensive, is decreasing in price, both at the industrial and the consumer level, and can provide similar benefits at both. There is a brief description of storage at the commercial level in the subsection on Electrical Infrastructure on page 7-51. At the homeowner level viable offerings such as the Tesla Powerwall have made an appearance. In fact, GMP offers a Powerwall and software to homeowners for a reasonable one-time purchase or a \$15/month payment plan with an agreement to let GMP draw power from the unit, aggregated with others, during peak demand periods. In the event of an outage, the homeowner has backup power capable of several hours of typical use.

Emerging Technology

As new technologies, such as hydrogen fuel cells, become viable, ACRPC will be open to learning about and distributing information on the wise use of those resources for sustainable economic development.

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Renewable Generation Resource Mapping

As part of its efforts to discover energy generation potential within the Region, ACRPC created a series of maps depicting generation resources and also potential constraints. These maps show data as required by the Department of Public Service Determination Standards and are a required element of enhanced energy planning. The maps show areas that are potentially appropriate or inappropriate locations for future renewable generation facilities. The maps are a planning tool only and may not precisely indicate locations where siting a facility is acceptable. When proposing a generation facility, applicants must verify the presence or absence of the natural resources and other specific characteristics of the site as a part of the application.

Map 1 depicts the current transmission and distribution resources and constraints within the Region (page 7-50). Construction of new transmission facilities to support renewable energy generation can be a substantial driver for the total cost of the power the facility will generate. Knowing what infrastructure is available, and where, is an important planning component for renewable power development. Map 3 on page 7-78, depicts the places with the best potential wind speed for development in New England.

The map displaying “Known Constraints” (Map 4) within this plan on page 7-84 depicts natural resource layers that preclude renewable energy development. These “Known Constraints” depict places where, because of the natural resources located in the area, it would be prohibitive to secure a permit for energy development. A full description of each type of known constraint included on Map 4 is located in Table 15.

Map 5, entitled “Possible Constraints” depicts places where natural resources exist, but may not prohibit development. A full description of each type of possible constraint included on Map 5 is located in Table 16. Forest blocks are an example of a possible constraint (page 7-85). A lot of forest resources exist within the Region. However, they may or may not prevent wind or solar development.

The remaining maps show the location of where solar resources exist, and where wind resources and biomass resources exist in quantities that would support generation. These maps are depicted below as Map 6, Solar Resources, Map 7 Biomass Resources and Map 8, Wind Resources (pages 7-87-7-89). These maps depict where resources exist and where no known natural resource constraints exist. They also depict baseline resources, not necessarily the “best” resources in the area. For example, the Wind Resource Map depicts where the wind blows at the minimum velocity necessary to support wind power and where no known natural resource constraints exist. As noted in the wind discussion above, while many places may meet the minimum criteria for wind development, the best area in the Region is probably the spine of the Green Mountains, which appears to have class 3 winds (around 12 miles/hour at 100 meters above the ground) and is considered to be marginally suitable for larger-scale wind installations. Accordingly, users are cautioned to read the maps in this context.



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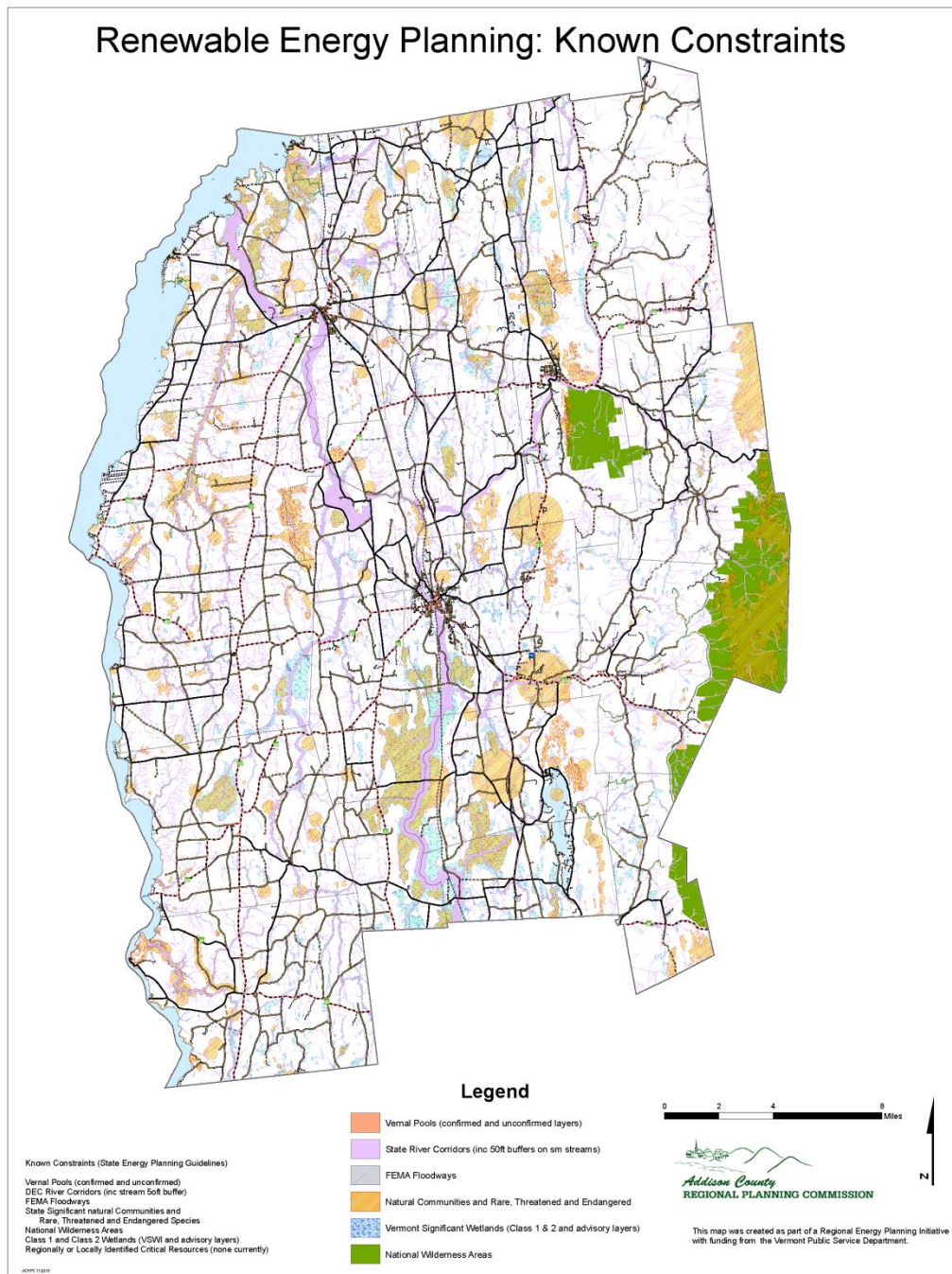
The maps contained in this plan are also available in a searchable format at ACRPC's website. The "scalability" of the digital version of the maps makes them a much more valuable tool for those desiring to understand resources or constraints within a small area of the Region. (http://54.172.27.91/public/energysiting/regional_maps_sm/)

Mapping Constraints

Table 15: Mapping Known Constraints

<u>Solar, Wind and Biomass Maps - Known Constraints</u>		
<u>Constraint</u>	<u>Description</u>	<u>Source</u>
Confirmed and unconfirmed vernal pools	There is a 600-foot buffer around confirmed or unconfirmed vernal pools.	ANR
State Significant Natural Communities and Rare, Threatened, and Endangered Species	Rankings S1 through S3 were used as constraints. These include all of the rare and uncommon rankings within the file. For more information on the specific rankings, explore the methodology for the shapefile.	VCGI
River corridors	Only mapped River Corridors were depicted. It does not include 50-foot buffer for streams with a drainage area less than 2 square miles.	VCGI
National wilderness areas	Parcels of Forest Service land congressionally designated as wilderness.	VCGI
FEMA Floodways	FEMA Floodways display the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.	VCGI/ ACRPC
Class 1 and Class 2 Wetlands	Vermont Significant Wetland Inventory (VSWI) identified class I or II wetlands. These wetlands provide significant functions and values that are protected by the Vermont Wetland Rules. Any activity within a Class I or II wetland or buffer zone which is not exempt or considered an "allowed use" under the Vermont Wetland Rules requires a permit.	VCGI





Map 4. Renewable Energy Planning: Known Constraints (2017)



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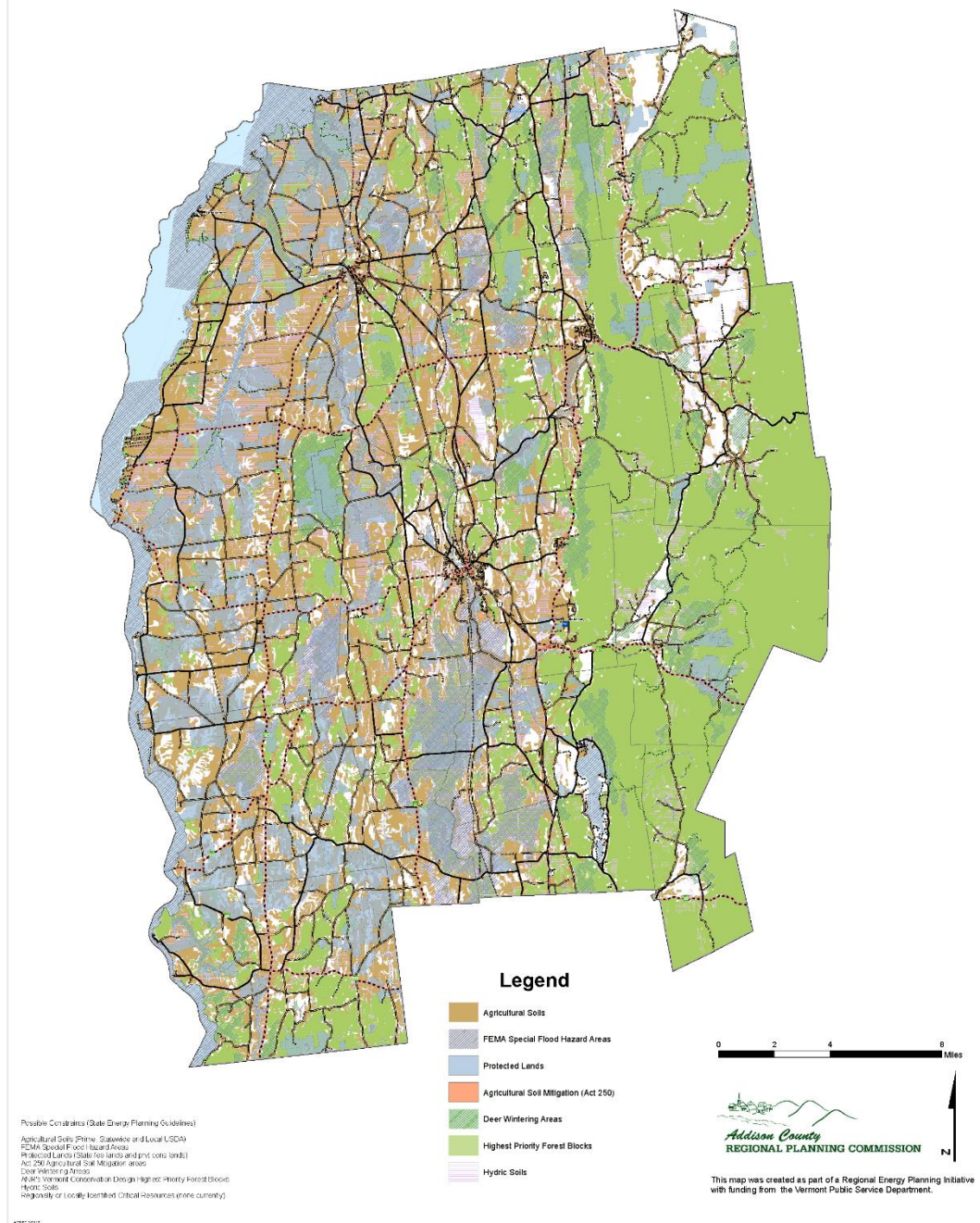
Table 16: Mapping Possible Constraints

<u>Solar, Wind and Biomass Maps - Possible Constraints</u>		
<u>Constraint</u>	<u>Description</u>	<u>Source</u>
Protected lands	This constraint includes public lands held by agencies with conservation or natural resource oriented missions, municipal natural resource holdings (ex. Town forests), public boating and fishing access areas, public and private educational institution holdings with natural resource uses and protections, publicly owned rights on private lands, parcels owned in fee simple by non-profit organizations dedicated to conserving land or resources, and private parcels with conservation easements held by non-profit organizations.	VCGI
Deer wintering areas	Deer wintering habitat as identified by the Vermont Agency of Natural Resources.	ANR
Hydric soils	Hydric soils as identified by the US Department of Agriculture. ²³	VCGI
Agricultural soils	Local, statewide, and prime agricultural soils are considered.	VCGI
Act 250 Agricultural Soil Mitigation Areas	Sites conserved as a condition of an Act 250 permit.	VCGI
FEMA Flood Insurance Rate Map (FIRM) special flood hazard areas	Special flood hazard areas as digitized by the ACRPC were used (just the 100-year flood plain; 500-year floodplain not mapped).	ACRPC
Vermont Conservation Design Highest Priority Forest Blocks	The lands and waters identified here are the areas of the state that are of highest priority for maintaining ecological integrity. Together, these lands comprise a connected landscape of large and intact forested habitat, healthy aquatic and riparian systems, and a full range of physical features (bedrock, soils, elevation, slope, and aspect) on which plant and animal natural communities depend.	ANR

²³ The U. S. Department of Agriculture defines hydric soils as any soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part.



Renewable Energy Planning: Possible Constraints

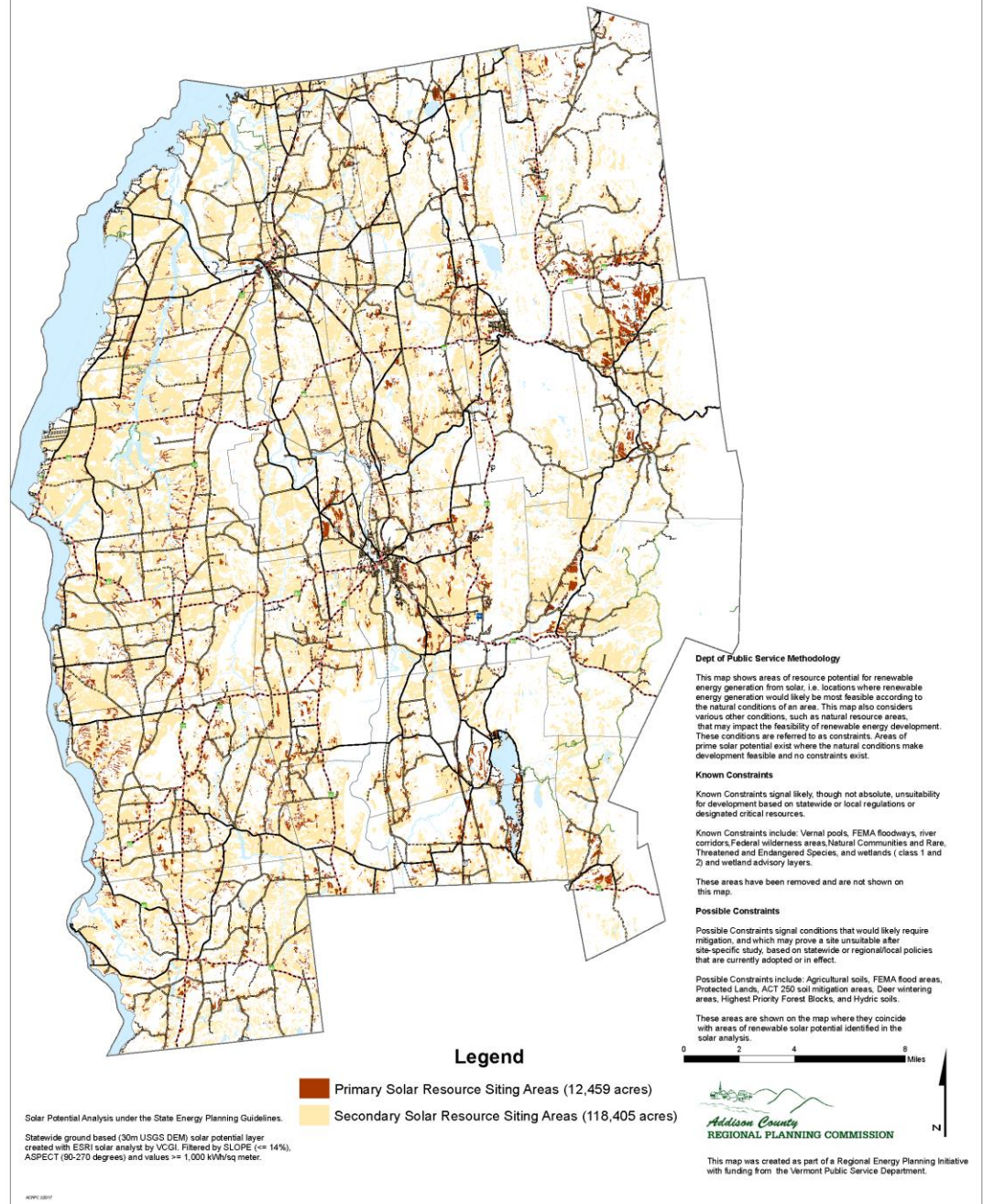


Map 5. Renewable Energy Planning: Possible Constraints (2017)



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Renewable Energy: Potential Solar Resource Siting Areas

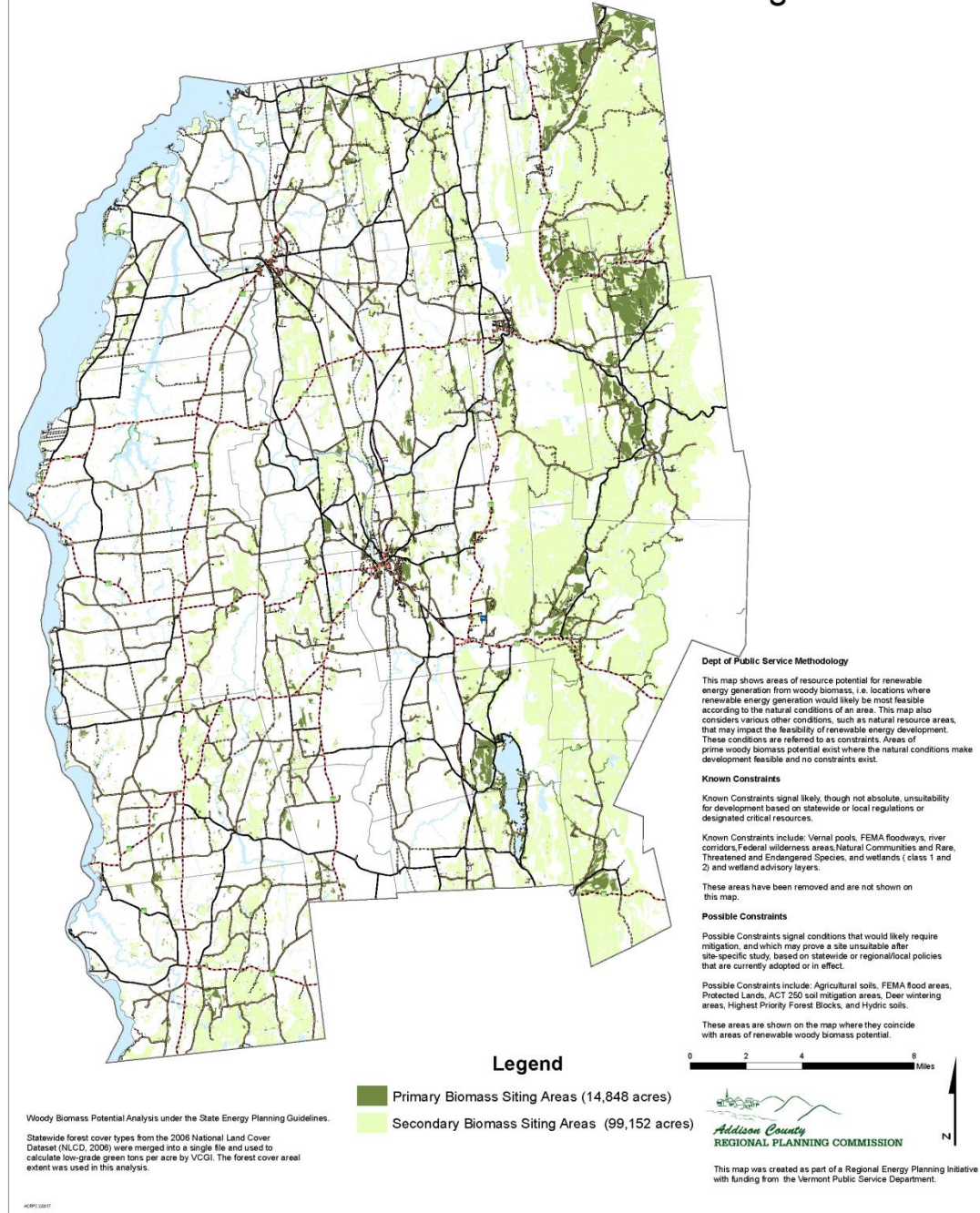


Map 6. Renewable Energy: Potential Solar Resource Siting Areas (2017)

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Renewable Energy: Potential Woody Biomass Resource Siting Areas

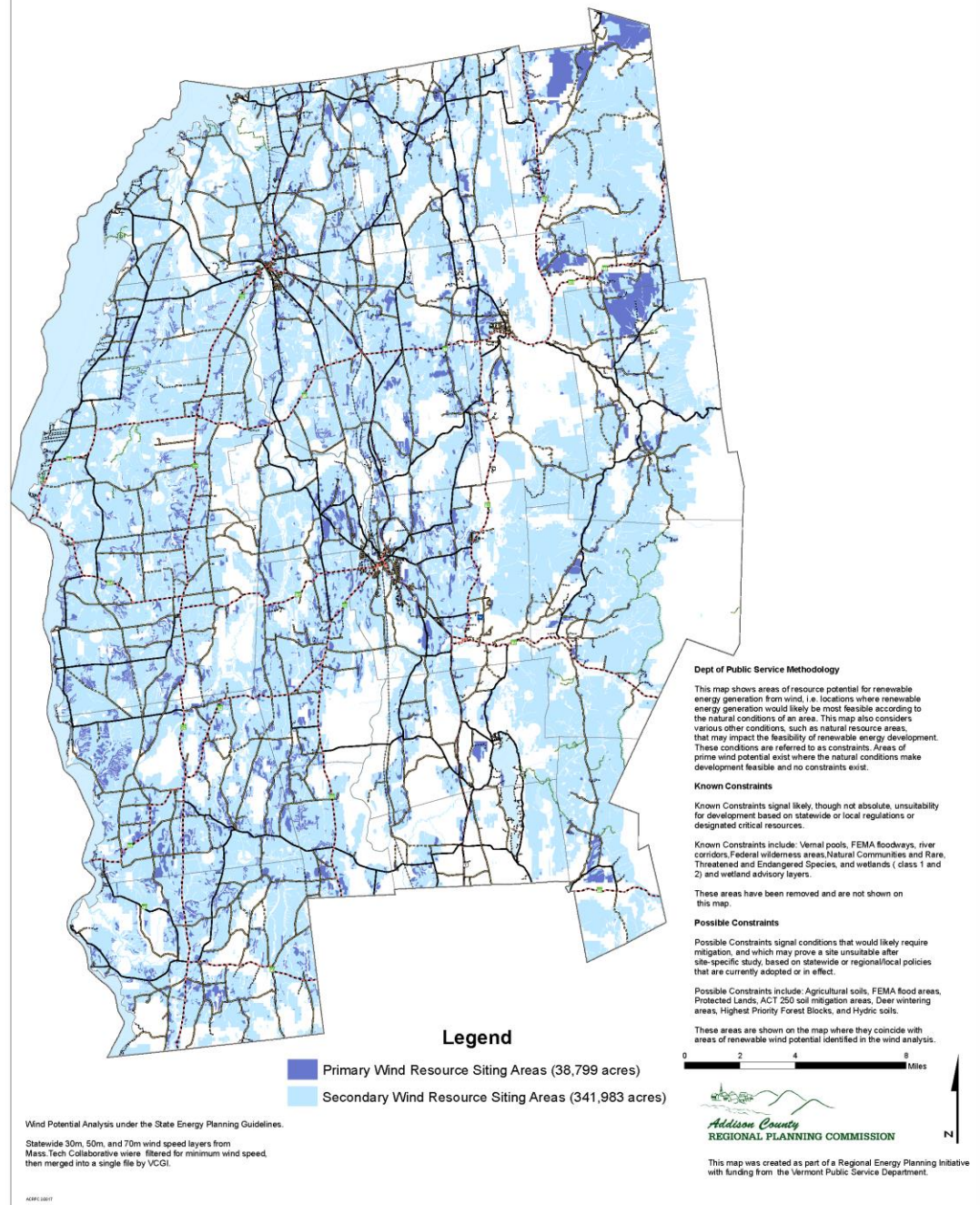


Map 7. Renewable Energy: Potential Woody Biomass Resource Siting Areas (2017)



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Renewable Energy: Potential Wind Resource Siting Areas



Map 8. Renewable Energy: Potential Wind Resource Siting Areas (2017)

At the end of the mapping exercise, ACRPC calculated the amount of renewable resource generation the Region could theoretically produce based upon the maps and some assumed values for the amount of land it took to produce specified amounts of solar and wind

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energy. The results of this analysis are depicted in Table 17, Renewable Generation Potential. As the Table demonstrates, the amount of renewable generation potential is substantial, especially when compared to existing generation in the Region, displayed in Table 13 (page 7-69).

Table 17: Renewable Generation Potential²⁴

<u>Renewable Generation Sources</u>	<u>MW</u>	<u>Annual MWh</u>
Rooftop Solar	99	121,414
Ground-mounted Solar	16,358.1	20,061,549
Wind	95,195.6	291,869,740
Hydro	3.6	12,614 ²⁵
Other	0	0
Total Renewable Generation Potential	111,655	312,065,317

The table below identifies the total resource potential for renewable energy generation from woody biomass (acres of land), i.e. locations where renewable energy generation would likely be most feasible according to the natural conditions of an area. This resource was mapped with the consideration for various other conditions, such as natural resource areas, that may impact the feasibility of renewable energy development. These conditions are referred to as constraints.

Table 18: Woody Biomass Resource Potential

<u>Renewable Generation Source</u>	<u>Total Acres</u>
Woody Biomass	114,000.68

Table 17 shows that the Region has the theoretical capability of producing 312 million megawatt hours of renewable electrical power. While that number is only theoretical and is certainly more than ever could practically be built, it dwarfs the 173 Thousand megawatt hours of renewable electrical generation the Region's targets set for 2050 (See table 10) or the 2050 Regional electrical energy demand of 266 Thousand megawatt hours projected in 2050. Since the Region has the luxury of having significantly more area for generation potential than it needs to meet its renewable generation goals, ACRPC has chosen to use the following Regional land use standards to help guide the location of energy projects in areas it, and its member municipalities, deem acceptable and to prohibit them in other areas. ACRPC and its members

²⁴ All figures concerning Renewable Generation Potential in this Plan include areas with possible resource constraints and areas that are commercially feasible, but not necessarily ideal for development. As such, ACRPC believes Tables 17, 18 and 19 dramatically overstate the generation potential of the Region.

²⁵ Renewable hydro potential is based on a study conducted by Community Hydro, which evaluated generation potential at existing dam locations in the region that could be retrofitted to produce electricity. Information was also provided by the Middlebury Energy Committee.



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shall apply these standards on a case by case basis as applications come before the Public Utilities Commission. Accordingly, these policies shall reduce the total area of generation potential noted above. However, neither ACRPC nor its member municipalities may apply these standards so strictly so as to eliminate their ability to meet the generation targets set for either the Region as identified in Table 10 or the municipality as identified below.

The following table displays a summary of renewable generation potential in the Region organized by municipality in Megawatts (MW) ²⁶.

Table 19: Renewable Generation Potential by Municipality

<u>Municipality</u>	<u>Rooftop Solar (MW)</u>	<u>Ground- mounted Solar (MW)</u>	<u>Wind (MW)</u>	<u>Hydro (MW)</u> ²⁷	<u>Woody Biomass (acres)</u>	<u>Total (MW)</u>
Addison	1	1,559.63	7,273	0	702.5	8,833.63
Bridport	6	1,456	6,598.5	0	2520.3	8,060.5
Bristol	10	638	3,949.5	0	1,046.9	4,597.5
Cornwall	1	848	3,649	0	2,338.9	4,498
Ferrisburgh	7	1,410	7,584	0	3,072.3	9,001
Goshen	0	320	3,936	0	7,408.97	4,256
Leicester	1	426	1,146.5	0	3,613.3	1,573.5
Lincoln	1	750	6,916.8	0	14,760.32	7,667.8
Middlebury	44	1,032.6	5,559.8	1.6	5,375.51	12,243
Monkton	1	644.4	3,917.3	0	7,498.45	4,562.7
New Haven	5	1,229.5	5,464.8	0	4,476.79	6,699.3
Orwell	1	1,149.1	4,961.8	0	6,126.75	6,111.9
Panton	0	569.4	3,160.3	0	699.85	3,729.7
Ripton	0	828	7,683.3	0	14,552.96	8,511.3
Salisbury	2	531.1	2,706.5	2	4,367.45	3,241.6
Shoreham	1	1,313.7	5,885.2	0	35,28.07	7,199.9
Starksboro	1	504	9,406.8	0	19,141.52	9,911.8
Vergennes	14	79.8	542.3	0	66.8	636.1
Waltham	1	235	1,624.5	0	1,682	1,860.5
Weybridge	1	431	1,877.5	0	1,207.5	2,309.5
Whiting	1	402.5	1,352.75	0	398.5	1,756.25

²⁶ To convert Megawatts (MW) to MegaWatt hours (MWh), ACRPC used the following formula,

$$\text{MWh} = \text{MW} \times 8,760 \text{ hours/year} \times \text{Capacity Factor}$$

and the Capacity Factors: Solar = 0.14, Wind = 0.35, Hydro = 0.40, Biomass = 0.467

²⁷ Renewable hydro potential is based on a study conducted by Community Hydro, which evaluated generation potential at existing dam locations in the region that could be retrofitted to produce electricity. Information was also provided by the Middlebury Energy Committee.

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Table 20: Renewable Energy Generation Targets (MWh)²⁸

<u>Municipality</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
Addison	2,126.431	4,252.862	6,443.73
Bridport	2,761.965	5,523.929	8,369.59
Bristol	4,463.138	8,926.276	13,524.66
Cornwall	2,242.885	4,485.769	6,796.62
Ferrisburgh	3,567.98	7,135.96	10,812.06
Goshen	728.5707	1,457.141	2,207.79
Leicester²⁹	2,845.646	3,378.65	8,623.17
Lincoln	3,476.943	6,953.885	10,536.19
Middlebury	8,318.369	16,636.74	25,207.18
Monkton	2,637.941	5,275.882	7,993.76
New Haven	2,959.028	5,918.055	8,966.75
Orwell	2,727.615	5,455.23	8,265.50
Panton	1,164.227	2,328.454	3,527.96
Ripton	1,424.531	2,849.062	4,316.76
Salisbury	2,968.066	8,248.77	8,994.14
Shoreham	3,526.585	7,053.169	10,686.62
Starksboro	4,009.682	8,019.363	12,150.55
Vergennes	2,161.741	4,323.482	6,550.73
Waltham	708.5034	1,417.007	2,146.98
Weybridge	1,486.528	2,973.056	4,504.63
Whiting	945.9219	1,891.844	2,866.43
TOTAL	57,252.30	114,504.59	173,491.8

²⁸ The new generation per town will need to be added to each towns' existing generation to create total generation targets. The DPS guidelines for creating Renewable Energy Generation targets in Town energy plan include projections for only wind and solar generation. Towns, if they have the resource, may use biomass, hydro, or other renewable sources to satisfy their targets. However, town targets only include wind and solar. In particular, this impacts the targets for the towns of Leicester and Salisbury in their respective plans.

²⁹ Table 20 in the regional plan includes approximately 2 Megawatts (7,008 MWh) of new hydro allocated to Leicester and Salisbury. Removing that hydro-electric allocation for town planning purposes means Leicester and Salisbury should plan for the following targets:

<u>Municipality</u>	<u>2025</u>	<u>2035</u>	<u>2050</u>
Leicester	1,689.33	3,378.65	5,119.17
Salisbury	1,811.75	3,623.49	5,490.14



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Regional Standards for Siting Energy Generation and Transmission Projects

The Addison County Regional Planning Commission supports responsibly sited and developed renewable energy projects within its boundaries. It desires to maintain the working landscape, adopted conservation and habitat protection measures and scenic rural views important to its tourism economy and rural cultural aesthetic. Not all industrial or community scale generation or transmission projects proposed can meet this standard. In order to not unduly impact the community values and aesthetics of the Region this Plan intends to protect, projects must meet the following Regional Standards in order to be considered “orderly development” supported by this Plan:

SOLAR

1. Siting:

Where a project is placed in the landscape constitutes the most critical element in the aesthetic siting of a project. Poor siting cannot be adequately mitigated. Accordingly, all energy generation and transmission projects proposed in the Region must evaluate and address the proposed site’s aesthetic impact on the surrounding landscape.

Good sites have one or more of the following characteristics:

- Building and roof-mounted systems;
- Systems located in close proximity to existing larger scale, commercial, industrial or agricultural buildings;
- Proximity to existing hedgerows or other topographical features that naturally screen the proposed array from view from at least two sides;
- Reuse of former impacted property or brownfields that have qualified for and are listed in the State of Vermont Brownfield program.
- Sites designated as “preferred” areas by member municipalities.

Poor Sites have one or more of the following characteristics:

- No natural screening;
- Topography that causes the arrays to be visible against the skyline from common vantage points like roads or neighborhoods;
- A location in proximity to and interfering with a significant viewshed. The Addison County Regional Plan has chosen not to include any viewsheds at the Regional level. However, it recognizes that many of its member municipalities have defined locally significant viewsheds. Where that has occurred, this Plan should be read to incorporate those significant local viewsheds;
- The removal of productive agricultural land from agricultural use;
- Sites that require public investment in transmission and distribution infrastructure in order to function properly;



- **Mass and Scale:** The historical working landscape that defines the Region is dominated by viewsheds across open fields to wooded hillsides and eventually the Green Mountains or Lake Champlain and the Adirondacks. Rural structures like barns fit into the landscape because their scale and mass generally do not impact large tracts of otherwise open land. Industrial scale solar arrays may need to be limited in mass and scale, and/or have their mass and scale broken by screening to fit in with the landscape in any given municipality. The Addison County Regional Plan has chosen not to include any cap on the size of solar facilities. However, this Plan recognizes that many of its member municipalities have capped the size of solar arrays to fit within the aesthetic context of that municipality. Where that has occurred, this Plan incorporates and supports those municipal caps in size.

2. Mitigation methods:

In addition to properly siting a project, solar developers must take appropriate measures from the list below to reduce the impact of the project:

- Locate the structures on the site to keep them from being “skylined” above the horizon from public and private vantage points;
- Shorter panels may be more appropriate in certain spaces than taller panels to keep the project lower on the landscape;
- At a minimum, all solar arrays must observe the setback restrictions contained in Act 56 governing solar installations. However, developers are encouraged to increase setbacks to at least those listed in the Municipal Zoning Regulations within the Zoning District in which it lies;
- Use the existing topography, development or vegetation on the site to screen and/or break the mass of the array;
- In the absence of existing natural vegetation, the commercial development must be screened by native plantings beneficial to wildlife and pollinators that will grow to a sufficient height and depth to provide effective screening within a period of 5 years. Partial screening to break the mass of the site and to protect public and private views of the project may be appropriate;
- When installing pollinator plantings other than for screening purposes, the development should follow the voluntary pollinator-friendly solar standards as defined by the Solar Site Pollinator Habitat Planning & Assessment Form available on the UVM website at:
https://www.uvm.edu/sites/default/files/Agriculture/Pollinator_Solar_Scorecard_FORM.pdf
- The siting of solar equipment shall minimize view blockage for surrounding properties. As an example, a landowner may not site an array on his or her property in a location calculated to diminish the visual impact of the array from his or her residence but places the array immediately within their neighbor’s or the public’s viewshed. Locating solar equipment in a manner designed to reduce impacts on neighbors or public viewsheds constitutes reasonable mitigation;
- Use black or earth tone materials (panels, supports fences) that blend into the landscape instead of metallic or other brighter colors).



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WIND:

A. Siting:

Where a project is placed in the landscape constitutes the most critical element in the aesthetic siting of a project. Poor siting cannot be adequately mitigated. Accordingly, all energy generation and transmission projects proposed in the Region must evaluate and address the proposed site's aesthetic impact on the surrounding landscape.

Good sites have one or more of the following characteristics:

- Systems located in close proximity to existing larger scale, commercial, industrial or agricultural buildings;
- Proximity to existing transmission system to minimize the new infrastructure required to serve the project;
- Reuse of former impacted property or brownfields that have qualified for and are listed in the State of Vermont Brownfield program.
- Significant isolation distances from existing residential uses to allow the noise from the turbine to dissipate to a level of at least the State decibel standard before it reaches the property line.
- Sites designated as “preferred” areas by member municipalities.

Poor Sites have one or more of the following characteristics:

- A location in proximity to and interfering with a significant viewshed. The Addison County Regional Plan has chosen not to include any viewsheds at the Regional level. However, it recognizes that many of its member municipalities have defined locally significant viewsheds. Where that has occurred, this Plan should be read to incorporate those significant local viewsheds.
- Sites that require public investment in transmission and distribution infrastructure in order to function properly.

B. Mitigation methods:

In addition to properly siting a project, wind developers must take appropriate measures from the list below to reduce the impact of the project:

- At a minimum, all wind turbines must observe setback restrictions such that if a tower falls, the entire structure will land on property owned or controlled by the tower's owner. Developers are encouraged to increase setbacks to mitigate noise and shadowing impacts.
- Use white or other colored materials (tower, hub blades) and earth tones for ground infrastructure or fences that blend into the landscape instead of metallic or other brighter colors).



TRANSMISSION:

A. Siting:

Good sites have one or more of the following characteristics:

- Systems located in close proximity to existing larger scale, commercial, industrial or agricultural buildings;
- Proximity to existing hedgerows or other topographical features that naturally screen the proposed corridor from view from at least two sides;
- Shared or neighboring ROW with other transmission or transportation infrastructure

Poor Sites have one or more of the following characteristics:

- No natural screening;
- Topography that causes the lines to be visible against the skyline from common vantage points like roads or neighborhoods;
- A location in proximity to and interfering with a significant viewshed. The Addison County Regional Plan has chosen not to include any viewsheds at the Regional level. However, it recognizes that many of its member municipalities have defined locally significant viewsheds. Where that has occurred, this Plan should be read to incorporate those significant local viewsheds;
- The removal of productive agricultural land from agricultural use;
- Height and Scale: The historical working landscape that defines the Region is dominated by viewsheds across open fields to wooded hillsides and eventually the Green Mountains or Lake Champlain and the Adirondacks. Rural structures like barns fit into the landscape because their scale and mass generally do not impact large tracts of otherwise open land. Industrial scale transmission lines may need to be limited in height and scale, and/or have their height and scale broken by screening to fit in with the landscape in any given municipality. At the Regional level, Commercial transmission projects with tower heights greater than 72 feet are higher than the tree line and nearly all other structure within the Region. They cannot be adequately screened or mitigated to blend into the Region's landscape and are therefore must be designed to travel underground or to limit the total height of the structures to 72 feet.

B. Mitigation methods:

In addition to properly siting a project, transmission developers must take appropriate measures from the list below to reduce the impact of the project:

- Consider burying the transmission infrastructure in sensitive areas;
- Locate the structures on the site to keep them from being “skylined” above the horizon from public and private vantage points;
- Shorter towers may be more appropriate in certain spaces than taller towers to keep the project lower on the landscape;



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- Developers are encouraged to increase setbacks away from public roads to reduce the views of the infrastructure;
- Use the existing topography, development or vegetation to screen and/or break the mass of the transmission facility;
- In the absence of existing natural vegetation, the commercial development must be screened by native plantings beneficial to wildlife and pollinators that will grow to a sufficient height and depth to provide effective screening within a period of 5 years. Partial screening to break the mass of the site and to protect public and private views of the project may be appropriate;
- Use black or earth tone materials that blend into the landscape instead of metallic or other brighter colors.

SUBSTATIONS

A. Siting:

Where a project is placed in the landscape constitutes the most critical element in the aesthetic siting of a project. Poor siting cannot be adequately mitigated. Accordingly, all energy generation and transmission projects proposed in the Region must evaluate and address the proposed site's aesthetic impact on the surrounding landscape.

Good sites have one or more of the following characteristics:

- Systems located in close proximity to existing larger scale, commercial, industrial or agricultural buildings;
- Proximity to existing hedgerows or other topographical features that naturally screen the proposed array from view from at least two sides;
- Reuse of former impacted property or brownfields that have qualified for and are listed in the State of Vermont Brownfield program;

Poor Sites have one or more of the following characteristics:

- No natural screening;
- Topography that causes the sub-station to be visible against the skyline from common vantage points like roads or neighborhoods;
- A location in proximity to and interfering with a significant viewshed. The Addison County Regional Plan has chosen not to include any viewsheds at the Regional level. However, it recognizes that many of its member municipalities have defined locally significant viewsheds. Where that has occurred, this Plan should be read to incorporate those significant local viewsheds;
- The removal of productive agricultural land from agricultural use;
- Mass and Scale: The historical working landscape that defines the Region is dominated by viewsheds across open fields to wooded hillsides and eventually the Green Mountains or Lake Champlain and the Adirondacks. Rural structures like barns fit into the landscape because their scale and mass generally do not impact

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large tracts of otherwise open land. Industrial scale substations may need to be limited in mass and scale, and/or have their mass and scale broken by screening to fit in with the landscape in any given municipality.

B. Mitigation methods:

In addition to properly siting a project, substation developers must take appropriate measures from the list below to reduce the visual of the project:

- Locate the structures on the site to keep them from being “skylined” above the horizon from public and private vantage points;
- Shorter structures may be more appropriate in certain spaces than taller structures to keep the project lower on the landscape;
- Developers shall meet setbacks equal to those listed in the Municipal Zoning Regulations within the Zoning District in which it lies;
- Use the existing topography, development or vegetation on the site to screen and/or break the mass of the substation;
- In the absence of existing natural vegetation, the substation must be screened by native plantings beneficial to wildlife and pollinators that will grow to a sufficient height and depth to provide effective screening within a period of 5 years. Partial screening to break the mass of the site and to protect public and private views of the project may be appropriate;
- Practice a “good neighbor policy”. Site the sub-station so that it creates no greater burden on neighboring property owners or public infrastructure than it does on the property on which it is sited;
- Use black or earth tone materials (panels, supports fences) that blend into the landscape instead of metallic or other brighter colors).

Projects found to have poor siting characteristics pursuant to the Regional Standards contained in Section 1 above and/or other poor siting characteristics that a municipality clearly defines in their plan, including, but not limited to mass and scale, that cannot be mitigated by the mitigation methods contained in the policy, violate the municipalities’ and the Region’s standards regarding orderly development.

As noted previously, neither the Region nor any member municipality may apply the siting standards so strictly so as to eliminate the opportunity to meet the electrical generation targets for the Region or any given municipality.

Finally, the siting policy above identifies the attributes of “good” sites for development. Generally, these “good” sites include the description of “preferred” areas as defined by Public Utilities Commission Rule 5.100 governing net metered sites. “Preferred” sites as defined by Rule 5.100 entitle solar developers to additional financial compensation per kWh of power produced from a site meeting the definition of “preferred” sites. ACRPC’s plan does not locate or define “preferred” sites for the purposes of Rule 5.100. However, since the areas it encourages for development as “good” in many cases are the same types of sites as the



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“preferred areas” as defined by Rule 5.100, ACRPC intends the policies will work harmoniously. This Plan also recognizes areas member municipalities designate “preferred” as appropriate sites for development.

DECOMMISSIONING AND RESTORATION:

All projects shall be decommissioned at the end of their useful life pursuant to the requirements contained in Rule 5.900 of the Vermont Public Utility Commission rules. In the Region, the requirements of section 5.904 (A) shall apply to commercial scale solar installations greater than 100 kW.

Land Use, Generation and Transmission Pathways to Implementation

Goals, Policies and Recommended Actions

Given the significant changes, noted above, that the Region will need to adopt to generate and transport renewable energy and resources in order to meet statewide targets, ACRPC promotes the following Goals, Policies and Recommended Actions for itself and its citizens.

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Goal A.

Plan for increased electric demand in partnership with Green Mountain Power and Efficiency Vermont.

Policies and Recommended Actions

1. Lead by example. Encourage the use of renewable energy production in town buildings, schools and residences:
 - a. Investigate and support the installation of additional municipal solar and/or wind net-metering facilities that are compliant with the standards enumerated in this plan to off-set municipal electric use.
2. Support the development and siting of renewable energy resources in the Region that are in conformance with the goals, strategies, and mapping outlined in this Plan.
 - a. Support responsibly sited and responsibly developed renewable energy projects, which shall include solar panels, wind turbines and all associated supporting infrastructure;
 - b. Work closely with the Municipal Planning Commissions and Select boards from municipalities impacted by proposed energy development projects within the Region;
 - c. Investigate and support installation of community-owned renewable energy project(s) that are compliant with the standards enumerated in this plan to allow the Region's citizens to participate in the economic benefits of local energy production;
 - d. Expand regional and local energy storage and promote local microgrids to improve energy resiliency and efficiency;
 - e. Support local on-farm or residential scale renewable distributed generation projects;
 - f. Encourage GMP to develop distribution systems to support increased local, residential generation;
 - g. Support and retain current State policy requiring developers of proposed commercial generation projects to fund all upgrades to the distribution system necessary to support their projects;
3. Favor the development of generation utilities in identified preferred locations over the development on other sites.



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Goal B.

Promote Land Use planning that supports reducing energy usage and conserving resources

Policies and Recommended Actions

1. Encourage settlement patterns that reduce travel requirements for work, services, and recreation by helping member municipalities to create plans and zoning that:
 - a. Encourage development of compact neighborhoods within the Region's Neighborhood Commercial, High Density Residential and Medium Density Residential Planning Areas;
 - b. Support general stores and other businesses in municipal village areas;
 - c. Allow infilling of existing large-lot development where higher density development is desirable and appropriate;
 - d. Provide opportunities for appropriate home occupations and telecommuting;
 - e. Support continued improvements in broadband connectivity and encourage telecommuting;
 - f. Encourage applications to State Designated Downtown, Village Center and New Neighborhood programs to support infill growth and economic development.
2. Continue to encourage and support local food systems and farmers' markets
3. Conserve forest land as a renewable energy resource and promote the responsible and efficient use of wood for biomass energy production.
4. Conserve viable agricultural lands for potential use in local food system production, and/or potential use in raising biofuel crops.



F. Conclusion

This Plan contains a broad vision for the Region's energy usage. It envisions how the Region can transition away from fossil fuels and toward more locally produced renewable power generation. As such, the vision will need the work of many hands to implement. Significant parts of the vision extend beyond things within the control of ACRPC.

Since the amount of unconstrained land with potential for siting renewable generation assets far exceeds the amount necessary to meet the stated generation targets for the Region, the Region should be able to attain its energy generation goals while protecting important natural and scenic resources. However, since all Region's goals and strategies rely heavily on the choices of individual consumers and businesses in the Region, ACRPC will not be able to achieve the goals it sets for the Region solely through its own actions. ACRPC will collaborate and aid the efforts of other organizations to increase conservation, efficiency and renewable generation in the Region.

Other challenges include:

- Environmental constraints that prohibit the development of new generation, especially hydro generation;
- The need to balance “baseload” and “intermittent” electricity generation to ensure grid reliability and challenges related to the infrastructural capacity of the regional grid;
- Insufficient biofuel or ethanol technologies and research;
- Limits on the quantity of sustainably harvested wood the Region can produce for heating;
- The limits of regional planning commissions' jurisdiction to implement the Plan;
- Individual preferences and liberties;
- Local economic and environmental costs;
- Equity issues related to how the costs of the changes necessary to implement these goals will be shared among various stakeholders;
- Collective reliance on resources beyond the Region's and nation's control;
- Capital costs of technology and lack of individual incentives to invest in new technology and conservation.

Despite the challenges noted above, ACRPC believes it must plan for the Region's energy future. This Plan emphasizes the work and actions that all need to do to reduce our reliance on burning fossil fuels, which contribute to climate change. It also quantifies the energy security and economic opportunities generating local renewable power creates.



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Recommended Actions

The Addison County Regional Planning Commission shall incorporate the following actions into its annual work plans, and, as funding permits, shall work to implement each action.

1. Maintain the Energy Section of the Addison County Regional Plan to provide education, data and mapping for those desiring to conserve or generate electricity within the Region;
2. Participate in Section 248 reviews of energy projects in the Region;
3. Work with Addison County Economic Development Corporation and member municipalities to support local energy generation as an economic development tool for the Region;
4. Work with local officials to draft municipal plans and regulations that support land use patterns promoting energy efficiency, appropriately sited and scaled renewable generation and the conservation of the Region's air quality, water quality and natural resources;
5. Work with local and state entities to plan the Region's transportation system to promote complete streets, resiliency and alternative transportation infrastructure in a context sensitive to the rural nature of the Region;
6. Work with partner organizations to promote educational opportunities with respect to the need for and opportunities available for thermal and motor-based conservation and efficiency.



7.3. Communications Technology

A. Summary

Television, Radio and Print Media

Several public access television stations, funded by cable companies and local fundraising, serve areas within the Addison Region. Two stations are located in the region: Middlebury Community Television and Northeast Addison Television out of Bristol. These are the only local cable television stations operating within the Addison Region.

There are several commercial FM and AM radio stations in the Addison Region. Vermont State Police utilize UHF frequencies for dispatch, while most local fire and ambulance services are on VHF. The Middlebury College Amateur Radio Club operates a ham-radio repeater on 147.36 MHz. There is also the Addison County Amateur Radio Association made up of licensed amateur radio enthusiasts from throughout the region.

The Addison County Independent was established in 1946. Originally published weekly, the Addison County Independent began publishing twice weekly in 1987. The paper covers all of Addison County and has a website with a searchable archive of articles going back to the late 1990s. There are two other weekly papers in the region, the Addison Eagle and the Valley Voice. The Five Town News is a monthly newspaper in Bristol. The monthly Vermont Magazine has offices in Middlebury. Two daily newspapers, the Burlington Free Press and Rutland Herald, circulate in the Addison Region.

Telecommunications Infrastructure and Services

There are 16 telephone exchanges and three local phone service providers in the Addison Region. Shoreham Telephone Company provides service in the southwestern portion of the region. Most of the remaining lakeshore and northern part of the region with the exception of an area around Vergennes is the territory of Waitsfield and Champlain Valley Telecom. Verizon serves the rest of the Addison Region. Several cellular providers serve the Addison Region, including Verizon, CellularOne and Nextel. Sprint PCS has coverage in the region, primarily along Route 7. There are approximately 60 public payphones located throughout the Addison Region, although there are towns with no service.

Internet Technology and Access

Increased attention and utilization of the world wide web began in the early 1990s at the dawn of the dot-com era. In a decade, internet technology has proliferated throughout our society and changed the ways we communicate, learn, work, shop and recreate. DSL (Digital Subscriber Lines) offer a broadband internet connection over a standard copper phone line, which also includes a voice line. DSL is available in some portions of the Addison Region, but at this time there are no plans to extend service to all areas. Most Shoreham Telephone Company and Waitsfield-Champlain Valley Telecom customers have access to residential DSL and some areas serviced by Verizon do as well.



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B. Goals and Objectives

The Addison County Regional Planning Commission establishes the following goals and objectives for the Addison Region through this plan.

Goal A.

To have adequate, affordable communications systems that meets the needs of all Addison Region residents and businesses.

To meet this goal, it is our objective:

1. Access
 - a. For the communications system in the Addison Region to be interoperable with systems on a global basis.
 - b. For the region's telecommunication system to allow local businesses to interact with national and world markets.
 - c. To continue to have access to education on using new communication technologies.
2. Affordability
 - a. For basic telecommunications service to be available at affordable prices to all the region's consumers.
 - b. For competitive telecommunications providers, including locally-owned enterprises, to offer service in the Addison Region.
 - c. To continue to have public access to telecommunications services, such as conveniently located payphones and internet access at libraries, throughout the Addison Region.
 - d. To continue to support telecommunications services – such as Lifeline, Linkup and TTY – that meet special needs, allowing groups such as the elderly and physically impaired access to assistance within their homes.
3. Reliability
 - a. To have dependable and reliable communications systems, which are capable of functioning under difficult conditions such as inclement weather.
 - b. To have back-up systems in place to ensure that basic needs and services can be met in case of serious disruptions in the telecommunications system.
 - c. To continue to be maintain important records in paper format so that as technology changes those records will remain accessible.
4. Infrastructure
 - a. To fully utilize existing structures for telecommunications before building new infrastructure.
 - b. To integrate any new infrastructure into the region's natural and built environment.
 - c. To minimize the visual impacts of communications towers through design and siting when new infrastructure is required.
 - d. For telecommunications infrastructure built in the region not to impact the health and safety of residents or environmental quality.

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Goal B.

To continue to have access to a range of local news and information sources throughout the Addison Region.

To meet this goal, it is our objective:

- a. To continue to have non-subscription based access to news and entertainment media such as broadcast television and radio.
- b. For a variety of media owners to represent a range of editorial views and the diversity of opinion in the Addison Region.
- c. To continue to have local ownership of some news and information sources in the region.
- d. To utilize communications technology – such as municipal newsletters, websites or email lists – to increase public awareness, interest and involvement in municipal decisions.

Goal C.

For the emergency communications systems in the Addison Region to function to protect the health, safety and property of residents and businesses.

To meet this goal, it is our objective:

- a. For emergency response organizations to have the ability to communicate with each other.
- b. For E-911 to continue to provide timely emergency assistance.



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C. Recommended Actions

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plans, as issues or opportunities arise, to move towards accomplishing objectives and meeting the goals outlined above.

1. Assist municipalities in developing plans and zoning bylaws that encourage the use of existing structures for communications infrastructure.
2. Assist the efforts of organizations to provide inexpensive, publicly available access to communications technology in the region.
3. Encourage appropriate placement or retention of public payphones throughout the region.
4. Continue cooperative efforts with the Addison County Economic Development Corporation to seek development of communications infrastructure that meets the needs of the region's businesses.
5. Assist in the dissemination of information to member municipalities relating to current communications services and infrastructure.
6. Support efforts to mitigate the effects of disasters on communications infrastructure.
7. Support efforts of local emergency response organizations to develop a regional communications strategy
8. Continue to assist E-911 efforts through work with local road identification and mapping
9. Continue to support local providers of news and information by using them for ACRPC's advertising and publicity.



D. Documentation and Analysis

Television, Radio and Print Media

Television

1. Broadcast Stations

There are no broadcast television stations based out of the Addison Region. However, region residents can receive a number of stations, mainly from Burlington including Channel 3 WCAX (CBS), Channel 5 WPTZ (NBC) and Channel 22 WVNY (ABC). Vermont Public Television, Channel 33 WETK (PBS) also broadcasts from Burlington. Reception of these channels varies around the region, mainly due to terrain.

2. Cable Service

Cable television is not widely available in the Addison Region. Currently the centers of Bristol, Middlebury and Vergennes have service. The geographic area with cable service is increasing as additional lines are installed.

3. Satellite Service

As in many rural areas, satellite television is much more common in the Addison Region than cable. There are a number of companies offering installation in the region and service is available from several national companies. With the development of small dishes, approximately 18 inches in diameter, the region's households quickly adopted the technology and began phasing out use of the older, large dishes.

4. Digital Television

The broadcast television industry is moving to a new digital transmission standard that will offer a sharper, high definition picture than currently available from analog systems. In 2006, by FCC mandate, television stations are expected to shut down their analog broadcasts. This change will require consumers to purchase new equipment that can receive the digital signal, probably as add-on digital tuners at first, until all televisions in use have built in digital receivers. This transition is significantly behind schedule and as 2006 draws closer, it is uncertain whether the timeline will be extended.

5. Public Access

Public access TV is a system that provides television production equipment, training and airtime on a dedicated local cable channel, so members of the public can produce and televise their own shows. Several public access television stations, funded by cable companies and local fundraising, serve areas within the Addison Region. Two stations are located in the region: Middlebury Community Television and Northeast Addison Television out of Bristol. These are the only local cable television stations operating within the Addison Region and are a primary source of local information. Local governments, schools and community organizations can broadcast meetings and special events on public access channels, also referred to as PEGs (Public-Education-Government channels).



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6. Vermont Interactive TV

Currently, there are 14 Vermont Interactive Television (VIT) sites throughout the state, one of which is located at the Hannaford Career Center in Middlebury. The Middlebury VIT site began operation in 1994 and enables the region's residents to participate in classes and videoconferences from around the state or the world. Each VIT studio is staffed by technicians and is outfitted with equipment such as VCRs, computers with Power Point software, overhead cameras, fax machines and an internet connection to support presentations, public hearings, conferences and distance learning courses.

7. Vermont Interactive Learning Network

The Vermont Interactive Learning Network (VILN) is a videoconferencing network that connects the state's high schools for course sharing, professional development, curriculum resources, technical assistance, professional meetings and special events. Participating schools are connected by special T1 broadband lines into a high-speed communications network, which is being provided by Verizon at no additional cost until June 2005. The VILN is available to students at all the region's high schools. The system offers students additional choices in foreign language classes, advanced placement classes and other specialized curriculum.

Radio

There are several commercial FM and AM radio stations in the Addison Region. Vermont Public Radio operates out of Colchester. The local stations are WXAL-FM "The Arrow" (93.7 MHz) and WFAD AM (1490 kHz) in Middlebury, owned by Addison Broadcasting Company, and WCLX FM (102.9 MHz) and WIZN FM (106.7 MHz) of Vergennes. WSYB FM and AM (92.1 MHz and 1380 kHz) and WGTK FM (100.9 MHz) also broadcast from Middlebury, although the WSYB FM tower is in Port Henry, New York. A low-power FM station, WMUD LP, operates out of Bridport at 89.3 MHz, with a tower in Moriah, New York. WRMC FM (91.1 MHz) is the independent, student-operated station at Middlebury College. A number of other stations transmitting from outside the region can also be picked up from within the Addison Region.

Print Media

The Addison County Independent was established in 1946, taking over the Middlebury Register, which was founded in 1831. Originally published weekly, the Addison County Independent began publishing twice weekly on Mondays and Thursdays in 1987. The paper covers all of Addison County and has a website that provides a limited number of current stories and a searchable archive of articles going back to the late 1990s.

The weekly Addison Eagle of Middlebury is owned by Denton Publications of Elizabethtown, New York, after having been started as a local enterprise. The Middlebury Valley Voice is a feature-oriented weekly. The Five Town News is a monthly newspaper in Bristol. The monthly Vermont Magazine has offices in Middlebury. Two daily newspapers, the Burlington Free Press and Rutland Herald, circulate in the Addison Region.

Media Ownership

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In recent years, there have been concerns across the country about the consolidation of media ownership. While the Addison Region still has a diverse range of media sources available for news and information, it is not unaffected by this national trend.

Telecommunications Infrastructure and Services

Wired Telephone Service

There are 16 telephone exchanges and three local phone service providers in the Addison Region. Shoreham Telephone Company provides service in the southwestern portion of the region. Most of the remaining lakeshore and northern part of the region with the exception of an area around Vergennes is the territory of Waitsfield and Champlain Valley Telecom. The rest of the Addison Region is served by Verizon.

1. Public Payphones

There are approximately 60 public payphones located throughout the Addison Region, although there are towns with no service. As cell phone coverage has improved, payphone usage has declined. Regulatory changes at the federal level have also contributed to making payphones less profitable for phone companies spurring further reduction in service. Between 2001 and 2003, Verizon, the state's largest phone company, removed around 800 payphones in Vermont.

According to the 2000 Census, approximately 225 households in the Addison Region had no phone service and more than 75 percent of those without phone service were below the poverty line. Many of these households rely on public phones as their chief means of communications. Additionally, payphones serve a wider population including area residents and travelers without cell phones.

2. Lifeline and Link Up Phone Services

Vermont has participated in the nationwide Lifeline program, which is designed to help low-income households maintain telephone service, since 1985. Participants receive a credit offsetting the cost of basic phone service. Link Up Vermont is a program designed to make installation of phone service more affordable for Vermont residents with limited income. Link Up Vermont pays half the cost of phone installation for eligible households.

Wireless Telephone Service

Several cellular providers serve the Addison Region, including Verizon, CellularOne and Nextel. Sprint PCS has coverage in the region, primarily along Route 7.

Cell companies use several methods of delivering a digital signal that are not compatible with each other, principally GSM, TDMA and CDMA. That means a Verizon phone can transmit through or "roam onto" CellularOne towers, but not on Cingular, and so on. There are two main frequency bands, 900 MHz for analog and 1,300 to 1,800 MHz for digital.

Radio Communications



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Vermont State Police utilize UHF frequencies (in the 460 MHz range) for dispatch, while most local fire and ambulance services are on VHF (in the 150 MHz range). A central communications center for emergency services is located in Shelburne, although some towns have their own radio dispatch stations.

The Middlebury College Amateur Radio Club operates a ham-radio repeater on 147.36 MHz with call letters W1RMC. There is also the Addison County Amateur Radio Association made up of licensed amateur radio enthusiasts from throughout the region. Amateur radio operators assist during disasters, relaying information.

Vermont Telecommunications Relay Service

The Vermont Telecommunications Relay Service connects deaf, hard-of-hearing and speech-disabled individuals with users of regular telephones. 7-1-1 is a statewide relay number that connects standard (voice) telephone users with deaf, hard-of-hearing, and speech-disabled people who use text telephones (TTYs). This service is available statewide, 24 hours a day.

Internet Technology and Access

Increased attention and utilization of the world wide web began in the early 1990s at the dawn of the dot-com era. In a decade, internet technology has proliferated throughout our society and changed the ways we communicate, learn, work, shop and recreate. The internet has provided almost infinite possibilities for users and as the technology continues to rapidly develop its potential uses seem endless. According to the Center for Rural Studies Vermonter Polls between 1993 and 2003, the percentage of Vermont households with a computer has increased from 43 to 79 percent. In 2003, 92 percent of households with a computer had internet access.

Dial-Up Service

About 70 percent of internet connections in Vermont are through standard dial-up phone lines. A number of ISPs (Internet Service Providers) provide internet service over standard phone lines in the Addison Region. ISPs include both companies that provide service nationwide like AOL (America On-Line) and regional companies like Sover.net or Shoreham Telephone Company that provide service in a limited geographic area. Connection speed is limited by line quality, which lessens the further the connection is from the phone company's central district office.

DSL and Other High Speed Lines

DSL (Digital Subscriber Lines) offer a broadband internet connection over a standard copper phone line, which also includes a voice line. DSL currently costs about twice regular phone service, but that has been coming down. DSL is available in a large portion of the Addison Region. Most Shoreham Telephone Company and Waitsfield-Champlain Valley Telecom customers have access to residential DSL and some areas serviced by Verizon do as well. DSL is generally limited to locations less than three miles from a central district office.

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Telephone companies also offer industrial-quality high-speed trunk lines from T1 to T3 and fiber-optic lines OC-1 to OC-3 that are even faster and more expensive. These lines can be run just about anywhere there is phone service, but at significant cost. In addition to use by large businesses and organizations, these types of high-speed lines are used to connect ATM machines, lottery sales terminals, pay-at-the-pump gasoline stations, etc.

Cable Service

High-speed internet access can also be delivered through cable television lines instead of phone lines. Currently, this service is not widely available in the Addison Region, since most of the region does not have access to cable television. However, as cable service is expanded in the region, the digital cable required for cable modems is being installed. The speed of internet connection through cable is dependent on how many customers are connected as part of a loop. The more connection in one loop, the less bandwidth and therefore speed available to each.

Satellite Service

High-speed internet access can also be delivered through satellite. This technology has not yet reached the consumer stage. However, given the number of satellite television customers in the region and the limited areas served by cable, once the technology is priced for the consumer market it might become a popular choice for area residents.

Communications Technology Issues

Provision of Service to Rural Customers

In the early 1930s, most urban areas of the United States had had electric service for at least 50 years. However, the country's rural residents were still without electricity. Private power companies had decided that providing service in rural America would simply not be profitable. Private power companies believed rural residents could not afford electricity and really had no need for it; so many of the conveniences taken for granted in American cities were unknown to rural families. It was President Roosevelt's New Deal that initiated rural electrification and within a decade much of rural America had access to electricity.

Rural communities across the country have faced this same issue with each wave of technology that has followed – phone service, cable television service, wireless phone service, broadband internet access. Service providers can make the larger profits more quickly by focusing on smaller geographic areas with dense populations. While the lag in availability of service between urban and rural areas has shortened considerably, the pace of change in technology continues to quicken making it impossible for rural customers to catch up to their urban counterparts.



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The Digital Divide

While the so-called “Digital Divide” is not as wide in Vermont as elsewhere in the United States, there are still concerns that some groups do not have equal access to these new technologies. Public libraries have tried to fill the gap by offering the use of computers with free internet access. Schools have offered courses teaching basics like receiving e-mail and finding information on the world wide web.

Telecommunications Technology and Economic Development

Access to telecommunications technology is becoming increasingly important for the region’s existing businesses and for the region’s ability to attract new businesses. Telecommunications is essential to more than high-tech companies and a wide variety of entrepreneurs in the region rely on their ability to buy and sell products and conduct business around the world through internet, phone and fax connections.

Telecommuting

Improved telecommunications has brought a new type of resident to the region in recent years – people whose jobs allow them to do their jobs from anywhere in the world. These new residents have chosen to live in the Addison Region for a variety of reasons, many related to quality of life and the character of the region’s communities.

Impacts of Infrastructure

Like energy infrastructure, telecommunications infrastructure can have significant impacts – especially visual impacts – on the region. Towering telecommunications towers with a multitude of antennas and arrays are a common feature in many parts of the country. The Addison Region has been spared most of the negative impacts of that type of infrastructure largely due to its rural nature and low population density. These factors have not made the region an attractive market for telecommunications companies. Most of the region’s cell phone coverage comes not from large towers, but from antennas mounted on existing structures like silos and steeples. ACRPC fully supports this approach since the infrastructure is largely invisible to the average viewer and provides extra revenue for its hosts.



7.4. Health and Safety

A. Summary

Healthcare

Porter Medical Center in Middlebury is the major institutional provider of healthcare in the Addison Region with its 45-bed community hospital. Fletcher Allen Healthcare in Burlington and the Rutland Regional Medical Center also serve the region. A significant percentage of the region's medical practices are owned or managed by Porter Medical. There are approximately 15 to 20 physicians with independent practices in the region and there are other organizations, such as the Open Door Clinic, providing healthcare services.

The region as a whole is well supplied with medical providers according to state measurements. However, most of the medical services are located in Middlebury and access to healthcare services in the outlying towns continues to be more difficult. The towns of Orwell and Shoreham are still designated as Medically Underserved Areas by the federal government.

Home healthcare is a growing segment of the healthcare system. The Addison County Home Healthcare Agency provides skilled care and other support services to region residents. Other providers of healthcare services in the region include the Vermont Department of Health and school nurses.

There is a shortage of dental care providers in the region. This shortage is especially acute for region residents without dental insurance. There is a local community mental health center located in Middlebury operated by the Counseling Service of Addison County.

The Helen Porter Healthcare and Rehabilitation Center is a 118-bed nursing home facility located in Middlebury. There are also a number of smaller residential care facilities in the region. There is currently no assisted-living type of residential facility for seniors in the region.

Human Services

There are numerous organizations in the Addison Region that provide a broad range of services to the region's residents. Nonprofit organizations provide services such as public transit services, rental housing, eldercare and childcare. These human service organizations are actively working to meet the needs of region residents, but there continue to be unmet needs especially for affordable housing and quality childcare. As the population of the Addison Region continues to grow older, there will likely be an increased need throughout the region for services that meet the needs of an elderly population.

Law Enforcement and Criminal Justice

The Vermont State Police, the Addison County Sheriff's Department and three municipal police departments are the main law enforcement entities in the Addison Region. The Vermont State Police have primary responsibility for law enforcement in all parts of the Addison Region



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outside the areas covered by the region's three municipal police departments. All the region's municipalities have an elected town constable who is typically responsible for enforcing local ordinances.

In the early 1990s, Vermont recognized that emergency dispatch radio system used by the state was severely outdated and in need of modernization. In 1998, emergency dispatch in the Addison Region was consolidated into the newly built Public Safety Answering Point in Williston and the E-911 system became operational statewide.

In 1995, the Addison County Courthouse moved to the newly constructed Frank Mahady Courthouse, a 39,500-square-foot facility behind the former courthouse. The Addison County Family, District, Superior and Probate courts are located in the courthouse. Addison County also has a 21-cell Addison County Jail co-located with the sheriff's department.

Fire and Rescue Services

There are 17 fire departments in the Addison Region. Additionally, the Brandon Fire Department, which is outside the region, serves the towns of Goshen and Leicester. The Vergennes Department serves the towns of Panton and Waltham, in addition to the City of Vergennes. The remaining municipalities have local departments. Most of the fire departments in the region are composed entirely of volunteers. The region's fire departments are funded through a combination of appropriated municipal funds, fundraising efforts, grants and donations.

There are four emergency transport squads that serve Addison Region residents; the Bristol Area Rescue Squad, the Middlebury Volunteer Ambulance Association and the Vergennes Area Rescue Squad are located within the region. The Brandon Rescue Squad, located outside the region, serves the towns of Goshen and Leicester. Additionally, there are five first response teams located in the outlying towns that provide emergency medical services in the region.

Emergency Management

There have been intermittent emergency planning efforts in the Addison Region throughout the past 25 years, but during the past several years emergency management has become an increasingly important issue. Recent disastrous weather and the newly recognized threat of terrorism all point to a need for increased vigilance and planning to prevent and lessen the human suffering and property damage associated with these events.



B. Goals and Objectives

The Addison County Regional Planning Commission establishes the following goals and objectives for the Addison Region through this plan.

Healthcare Goal A.

To have the facilities, services and workers needed to provide high quality, accessible and affordable healthcare to all the region's current and future residents and visitors.

To meet this goal, it is our objective:

- a. To continue to improve the quality of the region's healthcare system.
- b. To support the viability of community-based healthcare services in the region.
- c. For all the region's residents to have access to and be able to afford healthcare.
- d. To continue to have a medical facility located within the Addison Region that provides a full range of healthcare services.
- e. To have access to a broad range of healthcare services, including alternative healthcare, in the region.
- f. To encourage respect and cooperation among traditional and alternative healthcare professionals.
- g. To attract, and retain, needed healthcare professionals to the region.
- h. To have healthcare services that will allow people in the region with chronic health problems, the disabled and the elderly to remain in their communities, and if possible, in their homes.
- i. To provide convenient access to healthcare facilities and services to residents of the region's outlying, rural communities.
- j. To encourage the location of new healthcare facilities and other community service facilities within or adjacent to existing settlement areas so as to maximize their accessibility and contribute to the vitality of the region's communities.

Human Services Goal B.

For a variety of human service organizations to provide needed services, assistance and support to improve the quality of life for the region's current and future residents.

To meet this goal, it is our objective:

- a. To ensure that the basic human needs of the region's residents are met through community-based services.
- b. To encourage volunteerism in all community services.
- c. To develop elder care and housing throughout the region to allow residents to remain in their communities as they age.
- d. To encourage the development of elderly housing within or adjacent to existing settlement areas in order to provide convenient access to needed services and transportation, and to effect community integration.
- e. To develop quality, affordable childcare services throughout the region.

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- f. For the region's employers to join together and improve access to childcare services by supporting high-quality and affordable childcare.
- g. To develop additional and alternative housing, such as transitional or supported housing, to assist families and individuals who are homeless or likely to become homeless.
- h. To have a vital system of public transportation to serve the needs of all the region's residents.
- i. To connect existing settlement areas through a system of public transportation.

Law Enforcement and Criminal Justice Goal C.

For the region's law enforcement entities and criminal justice system to serve the region's residents in a manner that ensures public safety, actively works to prevent crime, dispenses justice fairly and protects the rights of all citizens.

To meet this goal, it is our objective:

- a. To increase the level of cooperation and coordination among the region's law enforcement personnel and other response organizations.
- b. For law enforcement entities to continue to increase their participation in joint training exercises with other response agencies.
- c. For law enforcement entities to continue their public outreach and community policing efforts to reduce crime and make the region's communities and schools safer.
- d. For the region's municipalities to support and encourage their municipal constables to participate in on-going training.
- e. To strive for a balance between public safety and civil liberties.
- f. To encourage the location of new law enforcement or criminal justice facilities within or adjacent to existing settlement areas so as to maximize their accessibility and contribute to the vitality of the region's communities.

Fire and Rescue Services Goal D.

For the health and safety of the region's residents and the integrity of the region's property to be protected by capable, well-trained and affordable fire and rescue services.

To meet this goal, it is our objective:

- a. To have a high level of community involvement in local fire and rescue services.
- b. To maintain a strong and effective response system that is built on the concept of cooperation and mutual aid.
- c. To further strengthen the level of cooperation and coordination among the region's response personnel and volunteers.
- d. For response organizations to work together to develop shared regional response equipment and resources where feasible.
- e. For municipalities and local response organizations to undertake capital planning and budgeting to ensure that funding will be available to



affordably meet the future need for equipment and facilities to serve the Addison Region.

- f. To construct and maintain all driveways and roadways in the region to allow for emergency vehicle access and use, while remaining appropriate in scale and character to their surroundings.
- g. To encourage municipalities to adopt and enforce building codes that could prevent loss of life or property.
- h. For students in the region's high schools to have access to emergency training and opportunities for involvement in local fire and rescue units.
- i. To foster basic fire prevention and public safety efforts in the region.
- j. To encourage the location of new fire and rescue facilities within or adjacent to existing settlement areas so as to maximize their accessibility and contribute to the vitality of the region's communities.

Emergency Management Goal E.

To reduce frequency and impacts of emergencies and disasters through mitigation and planning.

To meet this goal, it is our objective:

- a. For all the region's municipalities to develop local emergency plans encompassing all phases of emergency management – preparedness, response, recovery and mitigation.
- b. For municipalities to consider hazards and hazard mitigation when developing land use plans and regulations.
- c. For municipalities to recognize the dangers posed by hazardous materials and to minimize hazards to area residents through appropriate land use regulation.
- d. For all the region's municipalities to participate in the National Flood Insurance Program (NFIP).
- e. To have properly equipped emergency shelters throughout the region, and plans for their activation, to provide temporary shelter and services to residents affected by storms or other disasters.
- f. For the region's municipalities to develop stormwater management plans for snowmelt that will reduce the severity of spring flooding and improve water quality in the region.
- g. To have appropriate water sources, such as hydrants or ponds, accessible to fire departments throughout the region.
- h. For roadside vegetation to be maintained in manner that reduces the likelihood of property damage or injury as a result of high winds or erosion and that enhances the scenic character of the region's roads.
- i. To have incentives for retrofitting existing public buildings with hazard resistant features and for incorporating such features into any newly constructed public buildings.



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C. Recommended Actions

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plans, as issues or opportunities arise, to move towards accomplishing the objectives and meeting the goals outlined above.

Healthcare and Human Services

1. Provide information in support of attracting healthcare providers to the region.
2. Continue to participate in the Addison County Continuum of Care, a consortium of human service providers in the region.
3. Assist local human service providers with data collection and support in grant writing.

Law Enforcement, Criminal Justice, Fire and Rescue

1. Assist local organizations with data collection and support in grant writing.
2. Continue to support and promote the E911 system and provide mapping services for local first response organizations.
3. Facilitate greater coordination and cooperation between law enforcement, fire and rescue services.

Emergency Management

1. Assist municipalities in developing and regularly updating local emergency plans.
2. Assist municipalities interested in undertaking land use planning based on known hazards.
3. Assist municipalities interested in developing all-hazards building codes.
4. Assist municipalities interested in developing driveway and roadway standards that will accommodate emergency vehicle access.
5. Assist municipalities interested in developing stormwater management plans for snowmelt.
6. Continue to participate and support the activities of the Addison County Emergency Planning Committee (LEPC #8).
7. Map vulnerable areas and widely distribute information about hazard mitigation strategies and projects in the region.
8. Identify sites where hazardous materials are stored and used in the region.
9. Seek funding for and conduct watershed geomorphic assessments throughout the region.
10. Provide information to municipalities that can be distributed to contractors and homeowners on the risks of building in hazard-prone areas and strategies for mitigating those hazards.
11. Organize and conduct professional training opportunities regarding hazards and hazard mitigation.

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D. Documentation and Analysis

Healthcare³³

State Health Plan

Vermont has had a state health plan since 1970. In 1992, the legislature consolidated the state's health planning and regulatory programs into Act 160. Under this legislation, the Vermont Health Plan is designed to guide development of the healthcare facilities and services in the state. The plan is also part of a broader strategy to contain healthcare costs and provide universal access to services for all Vermonters.

In 1997, the legislature instructed the Agency of Human Services and the Department of Health to adopt a new state health plan that would take a broader view of health. The new plan was to include healthcare, but also take into account biological, behavioral, environmental and social issues related to health. The resulting 1999 Vermont Health Plan focused on community and social change. The plan called for people to take greater responsibility for improving their own health. It also placed more emphasis on cost-effective prevention measures within the healthcare system. The Department of Health interviewed Vermonters to gather input for the plan. In the Addison Region, concerns raised during those interviews were the ability to get to a doctor, transportation to healthcare, the cost of insurance and the cost of prescription drugs.

Hospitals

Porter Medical Center (PMC) is the major institutional provider of healthcare in the Addison Region. PMC's main facility is a full-service, 45-bed community hospital with 24-hour emergency services located in Middlebury. The hospital was founded in 1925 and currently has a medical staff of more than 60 physicians offering primary care and specialty medical care. Porter does not currently have an intensive care unit; patients needing such a facility are usually sent to Fletcher Allen in Burlington.

The hospital completed a series of major capital construction and renovation projects during the 1990s including renovation of the Medical and Surgical Unit and construction of a new Emergency and Radiology Unit. Porter Hospital has also introduced other new diagnostic services, including mobile MRI and CT scanning, in recent years.³⁴ Porter has had a \$14 million expansion project in the planning stages for the last several years. The "North Project" would add over 26,000 square feet to the hospital. A new surgical suite and a birthing center are proposed, as well changes in use to the current surgical and maternity areas. Porter officials have raised \$4 million for the project. In early 2003, Porter Medical Center officials decided to postpone applying for a state permit for the project due to financial constraints. They plan to resume work on this project when the hospital's economic situation improves.³⁵

Addison Region residents also have access to hospital services at Fletcher Allen Healthcare (FAHC) and Rutland Regional Medical Center (RRMC). Fletcher Allen, in Burlington, is the largest healthcare facility in the state. It is a 500-bed, Level 1 trauma care center and is a



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teaching hospital affiliated with the University of Vermont Medical School. RRMHC in Rutland is a 188-bed community hospital and is the second largest hospital in Vermont.

Primary Healthcare

Primary healthcare in the Addison Region is provided by a variety of organizations. There are nine medical practices owned and managed by Porter Medical Center located in Middlebury, Vergennes and Brandon. The PMC practices include five family practices, as well as Porter OB/GYN, Porter Internal Medicine, Porter Ear, Nose and Throat, and Middlebury Pediatric and Adolescent Medicine. PMC also contracts with Green Mountain Urology to provide a clinic in Middlebury.

Between 15 and 20 other physicians maintain independent practices around the region. There are also other clinics providing healthcare services in the region. Planned Parenthood of Northern New England operates a clinic in Middlebury. The Open Door Clinic is a free clinic for uninsured and under-insured Addison Region residents providing primary care in Middlebury and Bristol. Residents in the southern part of the Addison Region may seek medical services in Brandon or the Rutland area. To the north, region residents may choose to see practitioners in Chittenden County.

While according to the state's measurements the Addison Region is well supplied with medical providers, the towns of Orwell and Shoreham are still designated as Medically Underserved Areas by the federal government.³⁶ Generally, access to healthcare services is more difficult for those in the outlying towns since most of the providers are located in Middlebury. The Shorewell Clinic, which provides primary care from an office in Shoreham, was created as a response to the need for medical care that was more accessible to rural residents. Given the rural nature of the Addison Region, it has traditionally been and continues to be more difficult to attract and retain primary care providers.

Home Healthcare

Home healthcare has become a growing component of the healthcare delivery system over the past decade. Homecare services have expanded in scope and intensity as insurers, doctors and hospitals look for ways to control healthcare costs by caring for patients in their homes whenever possible. Patients are being discharged from hospitals sooner and need greater care at home. The number of frail elderly who wish to remain in their homes is growing, thus increasing demand for homecare services.

Addison County Home Healthcare Agency (ACHHCA) provides skilled care services such as nursing, physical therapy, occupational therapy, social work and nutrition consultation. ACHHCA also offers other support services through home health aides who provide personal care and homemakers who assist with basic housework. The agency also provides special services such as hospice care and mother-child health services. Since its founding in 1968, ACHHCA has grown from a handful of employees to 145 employees in 116 full-time

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equivalent positions in 2002. ACHHCA made nearly 60,000 home visits to over 2,600 patients in 2002.³⁷

Vermont Department of Health

The Vermont Department of Health (VDH) has a district office in Middlebury that serves the region's municipalities. VDH provides health promotion and disease prevention services in partnership with local healthcare providers, voluntary agencies, schools, businesses and community organizations. Public health nurses, nutritionists and outreach workers carry out VDH's programs locally. Services available through VDH's office in Middlebury include programs for Dr. Dynasaur-eligible children, the region's childcare providers, pregnant woman and young children, as well as cancer screening for at-risk populations. The region's municipal health officers also receive support from VDH's district office.

Healthcare at Education Facilities

Elementary and secondary schools in the Addison Region vary in the level of healthcare services they provide on-site. The region's larger schools have full-time registered nurses, while the smaller schools have a nurse on-site only part-time. School nurses are responsible for health screenings, immunizations and general health issues for students. In some schools, nurses are also involved in classroom teaching.

Middlebury College has its own health center, Parton Health Center (PHC), which serves the basic healthcare needs of its students. PHC has a staff of around 20 full- and part-time employees. PHC has two inpatient beds and one observation bed. The college also provides psychological support through its Center for Counseling and Human Relations.

Dental Care

There are approximately 11 dental practices in the Addison Region, most in Middlebury with one in Bristol and several in Vergennes. There is one orthodontics practice, while the others provide general dentistry. In the Addison Region, there is a lack of available, accessible dental healthcare services, particularly for low-income residents and those without insurance for preventive care. Many people go out of the region for dental services.

Mental Health

The Counseling Service of Addison County (CSAC), a local community mental health center located in Middlebury, serves Addison Region residents. The Counseling Service offers a range of professional mental health and developmental services. In addition to providing direct services, CSAC focuses on prevention, early intervention and outreach services by working collaboratively with other community agencies. The Counseling Service also provides a full-range of support services to people with severe mental illness including a supervised residential setting, an eating disorders program, a sex offender treatment program and a 24-hour emergency crisis hotline. CSAC's main offices are in Middlebury with satellite offices in Bristol and Vergennes.



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Additionally, there are more than 15 private counselors, psychologists and licensed social workers in the region with a variety of specialties. There are a number of organizations in the region, such as Women in Crisis and Alcoholics Anonymous, which provide support and mental health services.

Nursing Homes and Residential Care Facilities

As the baby-boom generation ages, there will be an increasing demand for healthcare services in general and long-term care services in particular. In the Addison Region, residents in need of residential care have access to nursing homes and residential care homes both in the region and in the Burlington and Rutland areas.

The largest nursing home facility in the region is the Helen Porter Healthcare and Rehabilitation Center (HPHRC), which is part of Porter Medical Center, in Middlebury. HPHRC is a 118-bed facility. The facility is evolving from a traditional nursing home to a facility that offers residential long-term care and other services such as short-term rehabilitation services. Other new services recently added include a Respite Program for families in need of a place for someone to stay on a short-term basis, as well as a new Hospice Program in concert with Addison County Hospice and the Addison County Home Health Care Agency. HPHRC is currently planning for a new dementia unit to help address an unmet community need for these services.³⁸

There are a number of smaller residential care facilities in the region as well. Residential care homes are state-licensed, group-living arrangements designed to meet the needs of people who cannot live independently and usually do not require the type of care provided in a nursing home. Residential care homes are categorized depending upon the level of care they provide. Level IV homes do not provide nursing overview or nursing care. Level III homes provide nursing overview, but not full-time nursing care. The Enhanced Residential Care (ERC) program allows residential care homes to house a specified number of residents that need a higher level of care.

There are three Level III residential care facilities in Vergennes: the 17-bed Clark Nursing Home, which has 15 ERC beds; Briarwood Manor, which can house 19 residents; and Jim Ringer Home Care with six beds, two of which are ERC. In Middlebury there is the Addison House, which is a Level III facility with room for 16 residents including three ERC beds. Bristol has a Level III facility, Bristol House that can accommodate 15 residents. There is also a Level IV facility, the Ann Myrick Community Care Home, in Bristol that can house eight residents. Shard Villa, a Level III facility in Salisbury, can accommodate 15 residents.³⁹

The total number of beds in residential care facilities in the region has decreased during the 1990s. In 1992, there was a total of 77 beds in six Level III facilities and 55 beds in five Level IV homes. In 2003, there were 88 beds in six Level III facilities, but only one level IV facility with eight beds.



There is currently no assisted-living type of residential facility for seniors in the region. This has been identified as an important need. There have been several entities interested in developing such a facility in recent years, however there has not yet been an actual proposal made. It is likely that at least one such facility will be constructed, probably in Middlebury, by the end of the decade.

Healthcare Costs

Over the past several decades, there has been dramatic development in medical science and technology that has led to new and improved diagnostics, procedures and medicines. At the same time, the cost of healthcare has escalated. These rising costs threaten Addison Region residents' access to quality healthcare. This is not a problem that can be addressed locally, but is a growing concern for region residents and businesses.

Human Services

There are numerous organizations that provide a broad range of services to the elderly, those with disabilities, parents, children and other residents of the Addison Region. There are also a number of coalitions or councils, which are working together to better meet the needs and improve the quality of life of the region's residents.

Public Transportation

The main provider of public transportation in the Addison Region is Addison County Transit Resources (ACTR), which began providing transit services in January 1993. Ridership has grown around 30 percent annually since its inception and ACTR now operates nine distinct programs within three service areas and provides over 77,000 rides per year. In addition, many of ACTR's programs focus specifically on disadvantaged populations such as elders, people with disabilities and low-income families and individuals.

ACTR operates two free shuttle bus routes, which are available to the general public, the Middlebury Shuttle Bus and the Tri-Town Shuttle Bus that connects Bristol, Middlebury and Vergennes. ACTR also operates free on-demand programs targeted toward those with special needs such as Medicaid transportation, service to the elderly and people with disabilities. Additionally, ACTR coordinates the region's Rideshare carpooling program.⁴⁰

Housing Providers⁴¹

There are a number of nonprofit and governmental entities that provide housing and related services in the Addison Region including Addison County Community Action Group (ACCAG), Addison County Community Trust (ACCT), Vermont State Housing Authority, Champlain Valley Office of Economic Opportunity (CVOEO) and the Vermont Economic Services Division.

The Addison County Community Action Group (ACCAG) is a community-based nonprofit agency that serves the needs of low-income people, those who have incomes below 150 percent of the Federal Poverty Level (FPL). According to the 2000 Census, around 5,350 people or 15



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percent of the total population in the Addison Region had incomes below 150 percent of the FPL. Since the 1980s, ACCAG has become the primary provider of affordable rental housing in the region. Currently, ACCAG owns and manages approximately 130 units of affordable rental housing in the Addison Region.

ACCAG owns the recently constructed Community Services Building in Middlebury. The building provides administrative space for ACCAG, ACTR and other community organizations. It also houses a food pantry, second-hand store and a facility that repairs and resells furniture, appliances and electronics. ACCAG also maintains a 17-bed emergency shelter in Vergennes that provides temporary housing for the region's homeless. This facility has seen a dramatic increase in usage during the last five years. ACCAG has stated that another facility, preferably in the southern part of the region, would be desirable in the future.

Addison County Community Trust (ACCT) provides opportunities for affordable homeownership in the region. ACCT owns and operates six mobile home parks where residents own their homes and the trust owns the land. ACCT also offers the Homeland program that allows residents to own a home and lease land from the trust. In the region, ACCT manages 265 mobile home lots and 25 homeland lots.

The Champlain Valley Office of Economic Opportunity (CVOEO) is a federally-designated Community Action Agency incorporated in 1965, which serves Franklin, Grand Isle, Chittenden, and Addison counties. Vermont's five Community Action Agencies (CAAs) receive their basic funding through annual Community Services Block Grants from the federal Department of Health and Human Services. CVOEO's Housing Assistance Program aids low-income residents, including renters, homeowners and the homeless, with security deposits, back rent or mortgage assistance, housing searches, home buying and repair information, advocacy, landlord/tenant and fair housing issues. CVOEO also provides assistance with weatherization and energy bills for income-qualified homeowners in the region.⁴²

Other organizations and agencies provide assistance such as housing vouchers, programs for first-time homebuyers and funds to keep people from becoming homeless. There are also services aimed at specific populations such as the elderly, disabled, teens or mentally ill. The Vermont State Housing Authority manages 63 units of affordable rental housing for the elderly in Middlebury and the Counseling Services of Addison County has some housing for its clients.

Childcare

There are currently around 10 daycare centers in the Addison Region that can care for about 300 infants through preschoolers. There are around another 20 preschool programs that can serve nearly 600 children age three to five. Many of these are associated with elementary schools and some also provide after-school programs for school-age children. Additionally, there are around 80 registered daycare homes in the region. There are an unknown number of home daycare providers that are neither licensed nor registered.⁴³

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The region's three largest childcare centers, Mary Johnson's, Otter Creek and Bristol Family have early childhood programs that are accredited through the National Association for the Education of Young Children. The State of Vermont's Agency of Human Services Childcare Division also licenses these centers.

Surveys have indicated that parents believe the quality of childcare in the region is good, but there is not sufficient quantity especially for infants. There are waiting lists at most childcare centers and some home-based daycares in the region. According to the 2000 Census, there were approximately 1,300 two working parent families with children under age six and another 500 single working parent families with children under age six.

While there is a general shortage of childcare in the Addison Region, for those parents at lower wage levels or working non-standard hours the challenge to find safe and affordable childcare is much greater. Only one daycare center in the region has weekend hours and most operate from around 7 a.m. to 6 p.m. Many of the region's childcare facilities are closed during school holidays and most will not care for sick children, requiring parents to make other arrangements or miss work. (See discussion of childcare in the Economic section.)

The Addison County Parent-Child Center (PCC), based in Middlebury, is a local service provider addressing parenting needs in the region. It was the first such center in the state when it opened in 1979. Funded originally to address the problems of adolescent pregnancy and parenthood, the center gradually expanded to offer services to families of all ages. Over the years, the work of the PCC has addressed the most basic issues of encouraging responsible parenthood, providing young parents with the capacity, skills and knowledge to support their families and helping to prevent premature parenthood. The Parent-Child Center offers services such as childcare, health services, parenting classes, support groups, counseling and vocational training. Based largely on the results of the Addison County Parent-Child Center, the State of Vermont created a network of 15 such centers across the state starting in the late '80s. Currently, the PCC serves around 300 families a year and about half their clients are teen parents.⁴⁴

Services for the Elderly

There are a number of organizations that provide a range of services to the region's elderly. The Champlain Valley Area Agency on Aging (CVAA) is a regional community-based coalition that serves as a clearinghouse, referral service and service provider. CVAA serves anyone age 60 or older in Addison, Chittenden, Franklin and Grand Isle counties. CVAA coordinates programs like Meals on Wheels, which provides home delivery of hot meals, and Senior Companions, who are older adults who help other seniors live independently. CVAA also offers assistance like health insurance counseling, a help line and programs that provide caregiver support.⁴⁵

Elderly Services, a nonprofit agency founded in 1981, operates several projects in the region to help older people stay active, independent and in their own homes and communities. Elderly Services operates Project Independence, an adult daycare center that provides

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transportation, meals and activities to elders needing care or supervision. That program is located in the Charter House in Middlebury. Project Independence is currently the largest such program in the state and has won national recognition for the quality of its services. The program operates from 7:30 a.m. to 7 p.m. Monday through Saturday. Currently there are around 60 participants total in the center's two daily sessions. The program has outgrown its space, as demand for this service has increased. Elderly Services has currently raised about 85 percent of \$4.5 million for a new center through a combination of grants and donations. The new center will allow the program to care for 80 participants in each session, more than double the number they can currently serve.⁴⁶

The region is also served by the Russ Sholes Senior Center in Middlebury, which is a meals and activity center. Some Addison Region residents may also use the Brandon Senior Citizen Center. The Retired and Senior Volunteer Program provides the region's seniors with the opportunity to put their skills and life experience to work in their communities. These and other providers offer a range of services to the region's elderly.

Other Services and Service Providers

There are numerous other organizations working to provide a broad range of services to the Addison Region. There are regional associations of religious leaders and congregations that both raise funds for other service providers and directly provide services. The People of Addison County Together (PACT) is another community coalition that seeks grants and other funding for a variety of community projects. The United Way of Addison County is a nonprofit fundraising organization that supports the work of other community organizations and service providers.

Law Enforcement and Criminal Justice

State Police

The Vermont State Police (VSP) have primary responsibility for law enforcement in all parts of the Addison Region outside the areas covered by the region's three municipal police departments. The Middlebury Station is part of VSP's Troop C, headquartered in Shaftsbury.

In addition to responding to calls, the VSP in Middlebury provide other programs and services to the Addison Region. In 2000, the state police in Middlebury assigned one trooper to patrol the region's roads with an emphasis on the apprehension of alcohol-impaired drivers. In 2001, they assigned another trooper to patrol the region's major roads looking for traffic violators. Additionally, the Middlebury State Police office has a certified instructor who teaches basic self-defense to women and children.

Currently, the state police operate out of a leased facility on Route 7 south of downtown Middlebury. Since the early 1990s, the state police have been interested in relocating to a larger facility, preferably to the north of Middlebury since that is where the majority of their calls occur. The police have considered sharing space with the Middlebury Town Police Department

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in a future facility and have looked at sites along Route 7 in New Haven to build their own barracks. Given that the Town of Middlebury has not yet been able to construct a shared facility, the state police are now actively pursuing relocation to New Haven.

Addison County Sheriff's Department and County Jail

The Addison County's Sheriff's Department (ACSD) has the jurisdiction to provide police services throughout the county. However, it does not have the resources to fully function in that capacity. ACSD provides transport of prisoners and security at the county courthouse. It is the primary agency responsible for civil service process throughout the county and provides other public safety services, such as crowd control, as needed. Towns in the Addison Region without municipal police departments may contract with the ACSD to provide local law enforcement patrols. ACSD also patrols the Green Mountain National Forest's recreation areas within the county on a contractual basis.

ACSD has occupied its location on Court Street in Middlebury for over 150 years. The building was built in 1845 as the sheriff's residence, sheriff's department and county jail. In need of major repairs, the jail closed during the early 1970s. With funding support from the legislature, the jail's original 12 cells reopened in 1984. Since then, the building has been upgraded and the lockup capacity increased to 21 cells. With nearly \$900,000 in grant money from the federal Department of Justice, new cells, extensive renovations and a 4,000-square-foot addition, including a garage for secure unloading of prisoners, were constructed.

Currently, most of the lockup's prisoners are in federal custody through the United States Marshall's Office, which pays for the cell space. The ACSD lock-up can only house male prisoners. Due to its close proximity to the Mary Hogan Elementary School and concerns stemming from a recent prisoner escape, the ACSD is considering installing a fence along its border with school property.⁴⁷

Municipal Police Departments

In the Addison Region, Bristol, Middlebury and Vergennes have municipal police departments. In their coverage areas, these departments are the primary law enforcement entity.

1. Bristol Police Department

The Bristol Police Department was formed in 1903 with one officer who patrolled the two-block business district. Currently, the department employs four full-time officers, including the chief. The district covered by the Bristol Police Department is basically the former village, approximately one square mile in size. The district includes Bristol's downtown business district, most of the center's residential areas and public areas including the elementary school. The Mt. Abraham Union High School is not within the department's district.

During the 1990s, the Bristol Police Department has changed its focus, adopting a community-based policing philosophy and implementing a DARE (Drug Abuse Resistance Education) program in the elementary school. A bicycle patrol and safety program began in 1991. Members of the department are also active in Addison County Crime Stoppers, START



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(Stop Teen Alcohol Risk Team), SHARP (Safe Highway Accident Reduction Program) and CVEST (Commercial Vehicle Enforcement Safety Team).

In 2002, the department formed a community advisory board to develop a strategic plan for the department's future. That led to the Bristol Selectboard creating a Police Advisory Board to aid the department in achieving the plan's goals.

The Bristol Police Department is housed in the back corner of the Town Hall in a small and congested space. The department's strategic plan calls for an upgrade in its facilities and identifies a need for better security for officers, prisoners and evidence. The small space holds all the police records, officers' desks, computer equipment, processing equipment and an extremely small holding cell. The department can only be accessed through the common areas of the town office. There is no private location for witness or victim interviews. The town office's hours of operation limit public access to the department. This issue has been somewhat resolved with the installation of an emergency phone outside the office door.

2. Middlebury Police Department⁴⁸

The Middlebury Police Department provides primary coverage within the entire town. The department provides 24-hour coverage with 14 full-time and 13 part-time employees, including the Police Chief and nine uniformed patrol officers. The department also employs part-time special police officers, a detective, dispatchers, parking enforcers, a dog warden and clerical staff. The department is focusing more on community crime prevention and has established neighborhood policing assignments and a neighborhood-based program. Additionally, the department now has officers trained, certified and equipped in bike patrol.

As a regional center hosting various regional facilities, the Town Police are providing a degree of regional police services. The Middlebury Police Department provides services to the union middle and high schools attended by students from Middlebury and six other surrounding towns. The department also sponsors a number of safety events, which, although primarily for Middlebury residents, are often largely attended by people in the region at no charge. As Middlebury College grows, additional police coverage will be needed to maintain the level of service for the rest of the town. Middlebury has negotiated a Traffic and Police Agreement with the college.

The Police Department is currently located in the basement of the Municipal Building and the public must access it via a staircase. There is a clear and pressing need to replace the existing Police Department space. It is especially important that better security, separate from general public reception and office areas, be designed for the temporary holding of arrestees. After years of planning and unsuccessful proposals in May of 2003, Middlebury voters approved construction of a nearly \$1.8 million, 7,600 square foot police station on town-owned land at the site of Middlebury's former wastewater treatment plant.



Middlebury is also planning an improved communications tower on Chipman Hill for the benefit of all emergency services. Middlebury has identified a need to evaluate the dispatch system, which currently uses the VT Department of Public Safety in off-hours and local dispatchers during peak hours and to examine the level of service to the public and accessibility of the police for emergency and non-emergency service calls. Also to be considered is the issue of keeping the police station open and accessible 24 hours a day.

3. Vergennes Police Department ⁴⁹

Vergennes established its own police force in 1980. A full-time chief and four full-time police officers along with trained special police officers provide nearly 24-hours per day on-duty coverage for the City. Police cruisers, as well as communications and office equipment have been recently upgraded. The police office, which is located within City Hall, was expanded and improved in 1984.

Municipal Constables

All the region's municipalities have, as required by state statute, an elected town constable. Additionally, some towns elect a second constable. These municipal constables are typically responsible for enforcing local ordinances, which are often not covered by other law enforcement entities.

The level of training, experience and job description of municipal constables varies greatly among towns. In some municipalities, the constable is the local law enforcement officer, with all powers of search, seizure and arrest within the town. In other communities, the constable has limited power and authority. By state statute, a constable's authority is limited to the municipality, while municipal police have statewide jurisdiction.

Other Law Enforcement Entities

1. Middlebury College Security

Middlebury College has a Department of Public Safety that provides a uniformed security staff 24 hours a day. The department maintains regular foot and cruiser patrol of campus and responds to emergencies. The department's staff includes 11 full-time officers and 9 full-time dispatchers. Campus security officers do not have powers of arrest, but work closely with local law enforcement agencies. The department maintains two fully equipped patrol vehicles. Through the use of these cruisers, foot patrol and seasonal bike patrol, officers maintain continual patrol through the college's buildings and grounds.

2. Forest Service

The Forest Service has a public safety role within the boundaries of the Green Mountain National Forest. Forest Service rangers participate in search and rescue operations and enforce regulations within the forest.

3. Game Wardens

The state Department of Fish and Wildlife Department has a statewide warden force of around 30 officers who each oversee a district of approximately 300-square miles. Wardens enforce fish and wildlife, boat, snowmobile, ATV (all-terrain vehicle) and general criminal

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laws. These officers are trained in compass and map skills and are frequently called in to assist other law enforcement agencies in search and rescue operations. Generally, at least one of the state wardens operates out of the Addison Region.

E-911 and Dispatch Services

In the early 1990s, Vermont recognized that emergency dispatch radio system used by the state was severely outdated and in need of modernization. The state began to explore a system of consolidated dispatch centers and development of a statewide Enhanced 911 system began. In 1998, emergency dispatch in the Addison Region was consolidated into the newly built Public Safety Answering Point in Williston and the E-911 system became operational statewide. The Williston office dispatches some of the region's emergency responders directly, including the state police. Some of the region's fire and rescue organizations continue to have local dispatchers to whom the Williston office transfers the calls.

Enhanced 911 provides everyone in Vermont with 911 service and provides emergency responders with information about the source of the 911 call. Vermont was the first state to use an all-digital, statewide network for public safety emergency response calls. Implementation of E-911 required renaming of some local roads to conform to naming standards. All structures were given new 911 addresses and new structures are addressed following the 911 conventions. The system is also capable of processing calls that originate from cellular service providers. As the technology in the actual phones has improved, the system can now locate where some cell phone calls into the system originate from, which greatly improves the ability to respond to an emergency call from a cell phone.

Addison County Court

Since 1798 three buildings, all in the same vicinity, have served as the Addison County Courthouse. Most recently in 1995, the Addison County Courthouse moved to the newly constructed Frank Mahady Courthouse, a 39,500-square-foot facility behind the former courthouse. The Addison County Family, District, Superior and Probate courts are located in the courthouse.

Correctional Facilities

The 21-cell lock-up at the Addison County Sheriff's Department is the only correctional facility in the Addison Region. Most detainees from the Addison Region who require incarceration are transported either to the Marble Valley Regional Correctional Facility in Rutland or to the Chittenden Regional Correctional Facility (CRCF) in South Burlington.

The State of Vermont has been dealing with overcrowding in its the correctional facilities since the early 1990s. Over the past decade, the number of inmates in the state's facilities has increased far beyond capacity, requiring the state to send prisoners to other jurisdictions, currently in Virginia and New Jersey.

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Vermont's policy has traditionally been to incarcerate only violent or repeat offenders and to deal with lesser offenses with probation, community service and other community-based programs. The vast majority of people in Vermont's corrections system are not incarcerated. There are over 10,000 Vermonters on probation, including over 400 in the Addison Region, with minimal supervision.

Crime Rates

The Vermont Department of Public Safety (DPS) tracks crime committed in the state and produces an annual crime report. The DPS categorizes crimes into two types, Part I and Part II. Part I crimes are more violent or involve larger property damage or loss. Part II crimes are less violent and involve smaller property losses, but are still serious offenses.⁵⁰

During the 1990s, the Part I crime rate experienced a decrease of 50 percent or more in every municipality in the Addison Region with the exception of Bristol, Goshen and Middlebury. Goshen saw a 27 percent increase in Part I crime during the 1990s, while in Bristol and Middlebury the decrease was 6 and 25 percent respectively. In 2000, the most common Part I crime in the region was larceny with over 550 reports, followed by burglary at over 120 reports. The total number of Part I crimes reported in the region in 2000 was 735. The number of Part I crimes per municipality ranged from none in Waltham to 370 in Middlebury in 2000.⁵¹

Approximately 2,100 Part II crimes were reported in the region during 2000 of which around 360 were vandalism. There were about 250 alcohol violations, 200 family or child violations, 160 disorderly conduct crimes, 130 drug offenses and 100 simple assaults. The number of Part II crimes per municipality reported in 2000 ranged from 12 in Goshen and Whiting to nearly 800 in Middlebury. Nine of the region's municipalities experienced percent increases in the Part II crime rate during the 1990s, including a significant 137 percent increase in Cornwall. Part II crime rate declined the most in Panton, a reduction of 56 percent.

Fire Protection and Rescue Services

Local Fire Departments

There are 17 fire departments in the Addison Region. Additionally, the Brandon Fire Department, which is outside the region, serves the towns of Goshen and Leicester. The Vergennes Department serves the towns of Panton and Waltham, in addition to the City of Vergennes. The remaining municipalities have local departments. Most of the fire departments in the region are composed entirely of volunteers. Middlebury and Vergennes have paid volunteer departments with responders who are paid for their time when out on a call. Most of the region's fire departments are nonprofit entities separate from the municipalities. They are funded through a combination of appropriated municipal funds, fundraising efforts, grants and donations.

The Addison County Firefighters Association is a regional organization of the local departments. Member departments have a mutual aid agreement to provide assistance to each



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other as requested. The association also offers a yearly fire training school and a basic training course for new firefighters as needed.

Other Fire Responders

1. Forest Fire Wardens

Each municipality in the region has an appointed Forest Fire Warden. The warden issues burn permits and would coordinate response in the event of a forest fire.

EMS Service

There are four emergency transport squads that serve Addison Region residents; the Bristol Area Rescue Squad, the Middlebury Volunteer Ambulance Association and the Vergennes Area Rescue Squad are located within the region. The Brandon Rescue Squad, located outside the region, serves the towns of Goshen and Leicester. The service areas of the squads in the region do not follow municipal boundaries and there are back-up protocols between the squads to provide coverage when the primary responder is not available. The Emergency Medical Services Division of the Vermont Department of Health licenses these squads and establishes training requirements for rescue personnel.

The region's rescue squads are funded through a mix of billing for service, appropriations from municipalities, fund-raising, and subscriptions or donations.

Additionally, there are five first response teams located in the outlying towns that provide emergency medical services in the region.

Fire and Rescue Calls

Accurate and complete records of fire calls for all the region's departments were not available. However, over the past several years more departments are starting to use the computerized National Fire Incident Response System to report their calls. This information can be valuable for planning purposes, especially if trends in numbers of calls and of personnel can be compared.

In 1998, the three regional rescue squads reported a total of around 2,200 calls on average annually.⁵²

Emergency Management

Municipal Emergency Management Directors

Municipalities appoint a Local Emergency Management Director (LEMD) as required by state statute. The responsibilities of the LEMD include identifying a community's vulnerabilities, planning for emergencies, responding to disasters and conducting recovery operations.

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The level of involvement, training and expertise of the LEMDs in the Addison Region varies. Some LEMDs have attended Vermont Emergency Management sponsored courses. With the purchase of back-up generators for emergency shelters, LEMDs in some municipalities are preparing to respond to future disasters. All LEMDs in the region have participated in the development of a Rapid Response Plan (RRP) for their municipality, which is a four-page emergency operations plan.

Addison County Emergency Planning Committee

The Addison County Emergency Planning Committee (ACEPC) was originally formed as the Local Emergency Planning Committee (LEPC #8) for the Addison Region. LEPCs, created through state legislation as requirement of federal law, were designed to bring hazardous materials (haz-mat) information to local citizens as part of Community Right-to-Know laws. Chartered by the State Emergency Response Commission, these groups were charged with planning for haz-mat incidents in their communities.

Recognizing the need for emergency planning in areas other than haz-mat, ACEPC began taking an all-hazards approach to emergency planning in 1998. The group is actively expanding its mission and has taken on the role of Citizens Corps Council in the Addison Region to assist in the coordination and training of volunteers. In addition, ACEPC is active in disaster exercises and in assisting in the coordination of local first response resources.

Other Organizations

In the event of a disaster or emergency other organizations in the region would be called into service such as the American Red Cross and the National Guard.

Emergency Planning Efforts

There have been intermittent emergency planning efforts in the Addison Region throughout the past 25 years. Remnants of the old Civil Defense system and occasional Vermont Emergency Management (VEM) trainings were the only tools available to the region's municipalities until Addison County Regional Planning Commission (ACRPC) began staffing an emergency planning position in 1997. Since then, renewed emergency planning efforts have resulted in a Regional Hazardous Materials Response Plan, a regional Hazard Mitigation Plan, RRP's for each community and Emergency Operations Plan drafts for each of the region's municipalities.

In 2000, the Federal Emergency Management Agency awarded ACRPC a \$300,000 Project Impact grant for mitigation projects within the region. With the recently completed Regional Mitigation Plan in place, the region's communities will be eligible for future federal funding for their local mitigation projects.

Ongoing efforts to coordinate emergency planning among the region's first response organizations are designed to make effective use of the limited resources available to them. Regional coordination of resources is necessary to allow the region to have access to all types



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of response including confined space rescue, mountain rescue, water/ice rescue and haz-mat response. Current planning efforts envision creation of several regional specialty teams from among the ranks of existing first responders. With increased funding for first responders following the terrorist attacks of 2001, this regional coordination has become even more important to reduce the incidence of blind purchases of regionally significant equipment.

Past Disasters

The Addison Region is currently experiencing a heightened awareness of disaster due to a wave of presidentially-declared disasters in the past five to seven years. The wave began with a huge regional ice storm that left most of the northeast without power for up to two weeks in January of 1998. In the Addison Region recovery grants from this storm led to the purchase of back-up power sources for many of the region's evacuation shelters.

Then in mid-summer of 1998, six to twelve inches of rain fell on already saturated areas of Bristol, New Haven and Lincoln that turned the New Haven River into a raging torrent. This second federal disaster in six months caused millions of dollars in damage and resulted in mitigation projects in both Bristol and Lincoln. In the two towns, numerous homes were purchased and removed from the floodplain to prevent repeated damage during future floods. The Lincoln library, formerly housed in the frequently flooded basement of Burnham Hall, was moved to a new building largely paid for with FEMA post-disaster funds.

In 1999, there was additional flooding in the Town of Ripton when a heavy rainstorm washed out several bridges. Recovery efforts have replaced the damaged bridges and the Ripton Fire Station will be moved out of the floodplain to a more suitable location in the near future, a relocation funded partially through the FEMA Project Impact grant. Since 1999 other disasters have included a severe drought that left 60 residences in Lincoln without potable water and the 2001 blizzard that caused several area towns to have to reschedule Town Meeting.

Recent disastrous weather and the newly recognized threat of terrorism all point to a need for increased vigilance and planning to prevent and lessen the human suffering and property damage associated with these events.



7.5. Education

A. Summary

Elementary and Secondary Education

There are five supervisory districts serving Addison Region municipalities: Addison Northwest, Addison Northeast, Addison Central, Addison-Rutland and Rutland Northeast. There are 18 elementary schools in the Addison Region. Orwell's school is K-8; the rest of the region's elementary schools are K-6. Goshen sends its students to the Neshobe School in Brandon. Panton and Waltham send their students to the Vergennes Elementary School. Seventh and eighth graders from Bridport, Cornwall, Middlebury, Ripton, Salisbury, Shoreham and Weybridge attend the Middlebury Union Middle School.

There are five public high schools that serve students from the Addison Region: Middlebury Senior High School, Mount Abraham High School, Vergennes High School, Otter Valley High School and Fair Haven High School. The Middlebury High School serves grades 9 through 12, while the others include grades 7 through 12.

The region's high school students, as well as adults seeking continuing education, can attend the Patricia A. Hannaford Career Center (HCC) in Middlebury. In 2004, voters in the region's three main supervisory districts approved a separate regional technical school district with its own board of directors to run the center and set curriculum and budgets. HCC provides educational programs to secondary and adult students in agriculture, arts and humanities, business and services, and technology.

Enrollment at most elementary schools increased during the early 1990s. However, during the latter part of the decade, enrollment in many schools leveled off or declined. That trend is expected to continue in the near future as the number of preschool-age children continues to decline. Given the region's current demographic and housing trends school enrollments will not return to the peak figures of the early 1990s in the near future.

However, changes in economic and housing conditions could quickly reverse the declining enrollments. Most of the region's elementary schools are small. Small changes in the number of students can have a large impact on the amount of staff and the size of the facilities needed. Issues related to enrollment and building capacity in the region's high schools are similar to those at the elementary level. However, since the region's high schools serve union districts with larger combined student populations, they are better insulated against sudden shifts in enrollments than the smaller elementary schools.

Post-Secondary Educational Facilities

Middlebury College provides undergraduate and graduate level education to approximately 2,350 students from around the world. The college is a private, co-educational, residential, four-year, liberal arts institution. Middlebury College offers around 40 undergraduate

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programs, as well as four summer programs. The college has a 500-acre main campus in Middlebury and a large summer campus in Ripton.

The Community College of Vermont (CCV) is an accredited two-year college and part of the Vermont State College system. CCV has a site in Middlebury.

Education Funding

Providing and paying for public education has become a central consideration for many Addison Region residents when considering planning for the future of their communities. Public perception in the region is that education costs are continuing to rise at rates exceeding what taxpayers can afford. One solution some property owners in the region see to this problem is to reduce local school enrollments or at least prevent them from rising. This sentiment often forms part of the reasoning for those who are opposed to any further growth or development in their community. However, as student enrollments at schools in the region have started to decline, others are beginning to argue that smaller numbers of students may actually lead to increases in local education expenditures.



B. Goals and Objectives

The Addison County Regional Planning Commission establishes the following goals and objectives for the Addison Region through this plan.

Goal A.

To have the facilities, programs and staff needed to provide high quality and cost-effective public education to the region's residents.

To meet this goal, it is our objective:

- a. To continue to improve the quality of the region's education system.
- b. To attract and retain effective, experienced educators in all the region's schools.
- c. To support the viability of local schools while ensuring an affordable education system.
- d. For the region's public education system to monitor and prepare for changes in population and demographics to ensure provision of adequate facilities and staffing in manner that will be affordable to taxpayers.
- e. To ensure continued local representation on school boards for all the region's municipalities.

Goal B.

To have a range of educational institutions and programs available to support life-long learning for the region's residents.

To meet this goal, it is our objective:

- a. To have access to a broad range of education opportunities including early childhood, vocation, technical and continuing education within the region.
- b. For distance learning facilities and technology to support diverse education opportunities for Addison Region residents.
- c. To continue to have access to higher education at times and in locations convenient to the region's adult students.
- d. For a basic education curriculum to continue to be available to meet the needs of the regions adults including literacy, GED and adult basic education (ABE) programs.
- e. For programs to be available to assist new residents of the region, temporary workers and their children with learning the basic skills needed to fully participate in the region's education, economic and social systems, including English as a second language (ESL) programs.



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Goal C.

To design and operate public school facilities throughout the Addison Region so that they can continue to serve as a hub of community life, providing a wide variety of services to area residents.

To meet this goal, it is our objective:

- a. For the region's public schools to be utilized during non-school hours to provide space for adult education, community meeting, recreation and similar activities.
- b. To promote community involvement in and use of local school buildings and programs.
- c. To foster connections between local schools and their communities.
- d. To promote programs that increase student participation in their communities.
- e. To encourage the location of new educational facilities within or in close proximity to village centers so as to maximize their accessibility and contribute to the vitality of the region's communities.
- f. To encourage citizen participation in local school decision-making processes.



C. Recommended Actions

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plans, as issues or opportunities arise, to move towards accomplishing the objectives and meeting the goals outlined above.

1. Maintain statistical information on the region's population and schools to be incorporated into local plans, to support grant applications, to aid schools in projecting enrollment and anticipating changes, and for similar purposes.
2. Assist local schools with data collection and support in grant writing.
3. Provide information in support of attracting educators to the region.
4. Continue to assist local schools with GIS services as needed.
5. Seek an opportunity to develop a GIS demonstration program for the region's elementary and/or secondary schools.
6. Seek funding and partners to develop planning- and zoning-related programs that can be incorporated into local elementary and secondary school curriculum
7. Continue to partner with educational institutions by offering internship and similar opportunities to students.



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D. Documentation and Analysis

Elementary and Secondary Education

Supervisory Districts

There are five supervisory districts serving Addison Region municipalities: Addison Northwest, Addison Northeast, Addison Central, Addison-Rutland and Rutland Northeast. The first three districts are located entirely within the Addison Region and serve only the region's municipalities. The remaining two districts are located partly in the Addison Region and serve municipalities both in and out of the region.

Public Elementary and Middle Schools

There are 18 elementary schools in the Addison Region. Orwell's school is K-8; the rest of the region's elementary schools are K-6. Goshen sends its students to the Neshobe School in Brandon. Panton and Waltham send their students to the Vergennes Elementary School. Seventh and eighth graders from Bridport, Cornwall, Middlebury, Ripton, Salisbury, Shoreham and Weybridge attend the Middlebury Union Middle School.

Enrollment at most elementary schools increased during the early 1990s. However, during the latter part of the decade, enrollment in many schools leveled off or declined. That trend is expected to continue in the near future as the number of preschool-age children continues to decline. This general trend was evident in all the region's schools, but to varying degrees. Only seven of the region's 20 elementary schools had more students in 2002 than in 1990 and even these schools are experiencing declining enrollments.

Given the region's current demographic and housing trends school enrollments will not return to the peak figures of the early 1990s in the near future. The largest segment of the region's population has passed out of their childbearing years. Many younger people are waiting longer to start having children. In addition, housing trends in the region have limited the availability of the smaller, more affordable homes usually bought by younger, first-time homebuyers who might be preparing to start families.

However, changes in economic and housing conditions could quickly reverse the declining enrollments. Most of the region's elementary schools are small. With the exception of Bristol, Middlebury and Vergennes, these schools average a total of less than 125 students in grades K-6. Small changes in the number of students can have a large impact on the amount of staff and the size of the facilities needed.

Over the past decade the capacity of the region's school buildings has also declined due to a combination of regulatory requirements and reorganization of space in the buildings. So it is likely that if school enrollments started increasing, some school buildings would no longer have the space needed to serve the number of students they did historically.

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Public Secondary Schools

There are five public high schools that serve students from the Addison Region: Middlebury Senior High School, Mount Abraham High School, Vergennes High School, Otter Valley High School and Fair Haven High School. The Middlebury High School serves grades 9 through 12, while the others include grades 7 through 12. The first three are located in the region and the last two are outside of the region.

Enrollment in the region's high schools increased slightly overall during the 1990s. The peak numbers of elementary students seen in the early 1990s are now moving through the region's high schools. Once those large classes graduate, high school enrollments are expected to decline. Issues related to enrollment and building capacity in the region's high schools are similar to those at the elementary level. However, since the region's high schools serve union districts with larger combined student populations, they are better insulated against sudden shifts in enrollments than the smaller elementary schools.

Vocational and Technical Schools

The region's high school students, as well as adults seeking continuing education, can attend the Patricia A. Hannaford Career Center (HCC) in Middlebury. HCC serves some students from outside the region. Additionally, adults and students in the Addison Region can enroll in programs at other vocational-technical schools in the state. In 2004, voters in the region's three main supervisory districts approved a separate regional technical school district with its own board of directors to run the center and set curriculum and budgets.

HCC provides educational programs to secondary and adult students in agriculture, arts and humanities, business and services, and technology. It is located in the Middlebury High School complex. HCC prepares students for college and careers in a wide range of fields including: agriculture and natural resources, video technology, building trades, information technology, pre-engineering, accounting, law enforcement and automotive technology.

Currently, HCC is working with the Vermont Technical College to improve and enlarge its agriculture workforce program. HCC is the only vocational center in the state with an agriculture academy. Additional space is needed for new greenhouses and livestock facilities, as well as an automotive and a power technologies laboratory where students can work on farm and other large equipment. HCC has explored several options including expansions at its existing site and at other locations in Middlebury. Currently, HCC is considering moving some of its programs to a new building to be constructed in Middlebury's industrial park. The existing facility at the high school would also be renovated.

HCC like other vocational-technical schools faces an ongoing challenge to change perceptions regarding their programs and students. HCC plans to offer associate degrees in some of its programs in conjunction with Vermont Technical College. The center also wants to continue working with the region's high schools to improve the academic quality of its class offerings and further strengthen the links between the schools and the center.



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Special Education

In 1975 the federal Education for the Handicapped Act, now known as the Individuals with Disabilities Education Act, made access to special education and related services (physical therapy, counseling, transportation, etc.) a federal entitlement for students with disabilities. The law required that these students be offered a free appropriate public education in the least restrictive environment.

After the law was enacted, the number of students identified as having a disability rose steadily, as did the cost of providing special education. This law authorized federal funding to support special education up to 40 percent of the national average cost of providing education for each identified student. However by 1997, federal support for special education had declined to seven percent.

Throughout the 1990s, special education costs increased at a greater rate than those of general education in many of the region's schools. In the 02-03 school year, the region's elementary school special education costs averaged just over 10 percent of their total budgets. Between fiscal years 1998 and 2000, Addison Region towns paid on average \$67,000 more in special education expenses. During that period, New Haven was the only town that had a decrease in expenditures, while Middlebury's costs rose by nearly \$290,000. Special education costs are highly variable based on the number and needs of qualifying students in a given school year, so the impact on the budgets of the region's small schools can be significant.

Private Schools and Home Schooling

There are a number of private schools that provide elementary or secondary education in the Addison Region, including the Aurora School, the Bridge School, the Champlain Valley Christian School, the North Branch School, the Red Cedar School and St. Mary's School.

According to the 2000 Census approximately 550 Addison Region students were enrolled in private schools. Additionally, approximately 130 students in the region were home-schooled.

Other Educational Facilities

The Northland Job Corp Center in Vergennes provides vocational education to students aged 16 to 21 who have special needs not met in the public school system. The facility operates on a contract with the U.S. Department of Labor and attracts students from throughout the northeastern U.S. The center enrolls approximately 280 students on its 65-acre state-owned campus.



Post-Secondary Educational Facilities

Middlebury College

Middlebury College provides undergraduate and graduate level education to approximately 2,350 students from around the world. The college is a private, co-educational, residential, four-year, liberal arts institution. Middlebury College offers around 40 undergraduate programs, as well as four summer programs. The college has a 500-acre main campus in Middlebury, a large summer campus in Ripton and owns a significant amount of property in Middlebury and other Addison Region communities.

Addison Region residents have access to a variety of cultural, educational and recreational activities at Middlebury College. Most scheduled on-campus activities such as lectures, performances and movies are open to the public. Area high school students may enroll in certain classes, provided that there is space, at no charge. Local residents make extensive use of the college's athletic facilities and are also able to use the college's library.

The student enrollment at Middlebury College is currently capped at 2,350 students as per an agreement between the college and the town. Through that agreement, the college provides housing for nearly all its students and restricts off-campus housing to 125 or fewer. The college is just completing a ten-year expansion plan that began in 1995 and has a master plan that is regularly reviewed and updated. The Town of Middlebury sees the acquisition of houses and the expansion of the campus into the residential neighborhoods that surrounds it as undesirable. If student enrollment were to be increased beyond the current cap, a new agreement regarding student housing, traffic and parking would need to be reached between the town and the college.

Community College of Vermont

The Community College of Vermont (CCV) is an accredited two-year college and part of the Vermont State College system. CCV has a site in Middlebury that serves over 300 students, a significant percentage of which take courses in the evening. CCV is currently located in downtown Middlebury in the Battell Building, although other facilities such as the Hannaford Career Center and high school are also used.

Education Funding

Providing and paying for public education has become a central consideration for many Addison Region residents when considering planning for the future of their communities. The implications of growth and development on school budgets has become a primary topic when public hearings or votes are held on local plans, zoning regulations and development applications. An examination of the history of school financing in Vermont reveals that this is a 150-year-old debate.



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History of Funding Public Education in Vermont⁵³

For over 200 years Vermont has had a goal to provide high-quality public education for its children and has been debating how best to pay for it. The Vermont Constitution of 1777 required the following, “A school or schools shall be established in each town, by the legislature, for the convenient instruction of youth, with such salaries to the masters, paid by each town, making proper use of school lands in each town, thereby to enable them to instruct youth at low prices.”

In 1797 a law was enacted which gave the state the right to create and maintain a school system. This marked the beginning of friction between local communities and the state about textbooks, curriculum, teacher certification, building requirements, length of terms, compulsory attendance, etc. The first State School Fund, established in 1825, raised money with a three percent tax on the grand list of each town and a six percent tax on bank profits and peddlers' licenses. However, the legislature borrowed the entire School Fund to finance the construction of the Capitol Building in 1833.

Throughout the 1800s, the pendulum of control over the education system swung back and forth between the towns and the state. For 125 years, Vermont paid for its schools by means of a statewide minimum property tax, which was distributed equally among its towns. The ebb and flow of economic prosperity caused state funding to expand and contract accordingly. Prosperous times tended to foster statewide education reform, but a downturn in the economy generally resulted in reduced state spending.

As Vermont's population began to grow rapidly in the 1960s, an equitable means of funding public education again became a hotly debated topic. The 1960s saw a formula that set minimum per-pupil expenditures and a minimum property tax rate that had the state defining each town's property values. In the 1980s and 90s, proponents of education finance reform wanted to reduce dependency on local property taxes because they felt that local taxes created inequalities in spending potential for schools. It was hard, however, for them to believe that they could shift the burden to the state, as the state had traditionally reduced its share of education spending whenever the economy faltered.

In early 1997, the Vermont Supreme Court turned its attention to deciding whether the existing funding formula worked for 9-year-old Whiting Elementary School student Amanda Brigham and her counterparts in small, property-poor towns throughout Vermont. Amanda's lawyers argued that such students were not afforded access to the caliber of educational opportunities provided in wealthier towns. The court decided that since the Vermont Constitution guarantees free public education, the state must ensure that equal educational opportunities are provided to all Vermont children.

This court case led to a new funding mechanism, The Equal Opportunity Education Act, better known as Act 60. Act 60 reduced the role of local property taxes by implementing a statewide property tax for the first time in 66 years and redistributing the revenues on a per

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pupil basis by means of a state block grant. Act 60 includes a weighted formula that acknowledges that some students, such as those from low-income families or those speaking English as a second language, require more education funding than others. Another component of Act 60 is the equalized yield, which equalizes the tax rates of every municipality. Therefore each raises the same per-pupil revenue for each penny it increases its tax rate. If a town's tax rate generates more revenue than required by its school spending levels, the excess funds are recaptured into the sharing pool and redistributed throughout the state.

In 2003, the Vermont legislature passed Act 68, which contained substantial changes to Act 60. Act 68 repealed the “sharing pool,” split the education grand list into homesteads and all other property, taxed homesteads at an adjustable rate, adjusted within each district to correspond to the district’s education spending, and taxed nonresidential property at a uniform statewide rate. These changes to the financing system began to take effect with the 2004-05 school year and taxpayers’ summer 2004 tax bills.

Paying for Education in the Addison Region

Given the history of education financing, it is unlikely that Act 68 will be the last formula developed to attempt to equitably fund public education in Vermont. Public perception in the region is that education costs are continuing to rise at rates exceeding what taxpayers can afford. One solution some property owners in the region see to this problem is to reduce local school enrollments or at least prevent them from rising. This sentiment often forms part of the reasoning for those who are opposed to any further growth or development in their community. However, as student enrollments at schools in the region have started to decline, others are beginning to argue that smaller numbers of students may actually lead to increases in local education expenditures.

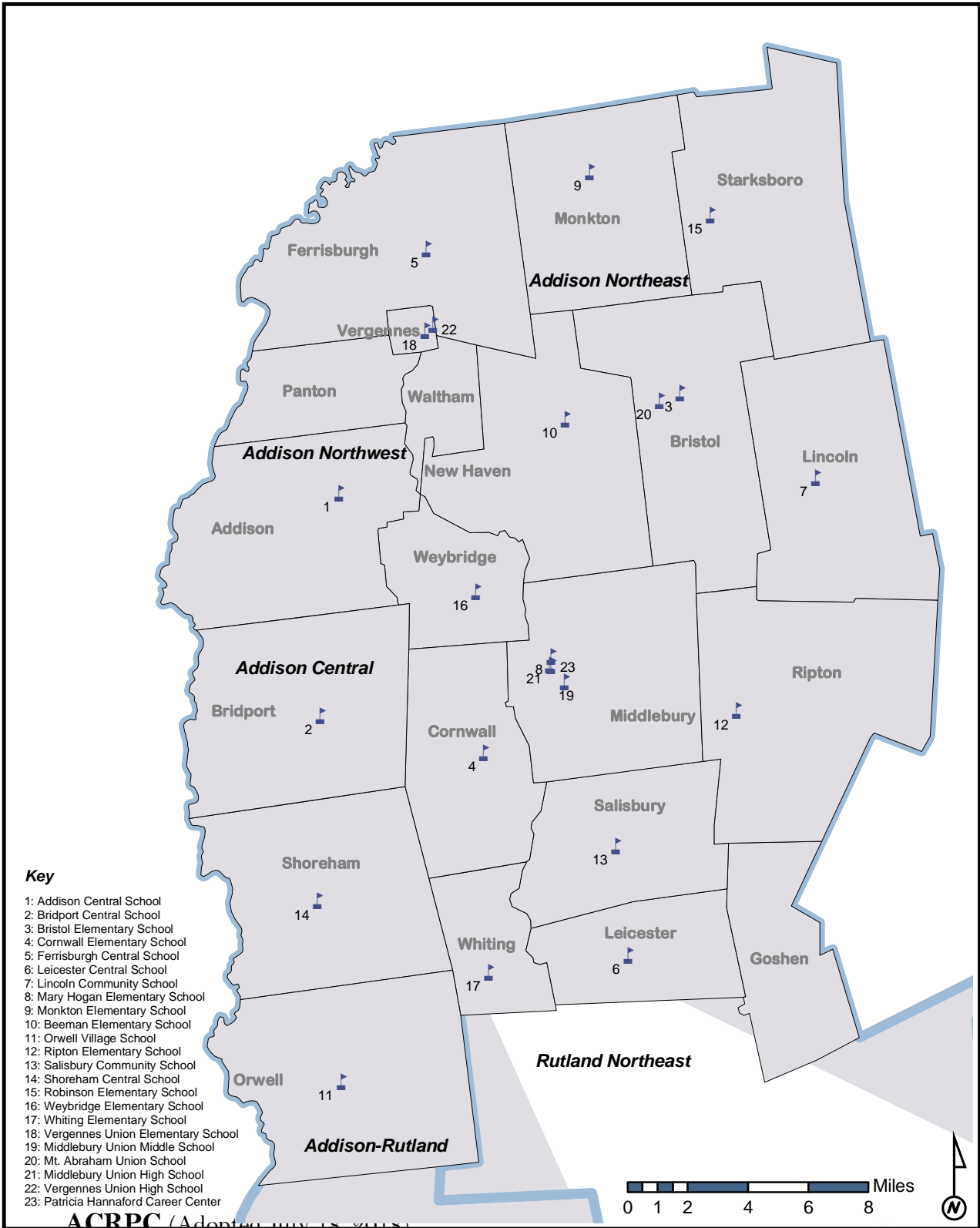
Over the past seven years, per pupil costs in the region’s schools have increased beyond the rate of inflation, but by varying amounts. Salisbury saw its per student costs at the elementary school rise over \$3,600 between the 96-97 and 02-03 school years after adjusting for inflation. While over the same period at Cornwall’s elementary school real per pupil costs increased by about \$500. The factors influencing these rising costs are numerous and vary between the schools.

Given that local schools are the largest single expense to taxpayers throughout the Addison Region, education funding will continue to be central to debate and decisions regarding the future community growth and development.



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Map 7-1 Addison Region Supervisory Districts and Educational Facilities



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Table 7-8 Addison Region Elementary and Secondary School Enrollment

	Grades	96-97	97-98	98-99	99-00	00-01	01-02	02-03
Addison Central School	K-6	144	148	142	135	134	139	136
Bridport Central School	K-8	141	151	153	141	150	127	123
Bristol Elementary School	K-6	459	492	466	447	429	405	368
Bingham Memorial School	K-6	91	94	87	81	82	88	98
Ferrisburgh Central School	K-6	217	209	220	236	232	227	208
Leicester Central School	K-6	113	103	114	112	104	97	88
Lincoln Community School	K-6	111	113	119	123	119	123	109
Middlebury ID #4 (Mary Hogan)	K-6	605	573	545	540	505	497	440
Monkton Central School	K-6	198	198	188	184	180	172	189
Beeman Elementary School	K-6	172	165	169	161	159	152	160
Orwell Village School	K-8	157	160	156	155	159	167	167
Ripton Elementary School	K-6	56	53	55	61	60	61	61
Salisbury Community School	K-6	111	109	108	109	105	87	93
Shoreham Elementary School	K-6	119	119	130	125	115	120	117
Robinson School	K-6	228	218	222	229	233	205	196
Vergennes UESD #44	K-6	390	387	358	359	356	345	331
Weybridge Elementary School	K-6	72	77	86	76	81	82	85
Whiting Village School	K-6	44	44	33	33	30	24	28
Middlebury Union Middle Sch #3	7-8	351	325	351	353	317	308	336
Middlebury Sr. UHSD #3	9-12	734	787	760	743	724	726	735
Mount Abraham UHSD #28	7-12	883	864	841	874	860	891	907
Vergennes UHSD #5	7-12	590	594	574	600	641	637	640
Total		5,986	5,983	5,877	5,877	5,775	5,680	5,615



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7.6. Historic, Cultural, Municipal and Recreation Facilities

A. Summary

Archeological, Historic and Cultural Resources and Facilities

The Addison Region with its varied topography and wealth of natural resources has an equally rich collection of archeological, historic and cultural resources. The character and history of the Addison Region is reflected in the ancient sites, historic structures, events and traditions built or established by residents over more than 250 years. The importance of these cultural and historic resources is reflected in their ability to provide a sense of continuity between generations and a connection to place.

There are a wide range of historic sites and structures in the Addison Region, several thousand of which are listed on the Vermont Register of Historic Places. There are approximately 60 buildings or sites listed on the National Register of Historic Places and three historic districts in Bristol, Middlebury and Vergennes are also nationally recognized.

There are nearly 35 libraries currently operating in the Addison Region, many of which are school libraries. However, most communities in the region continue to have a public library. There are more than ten museums currently operating in the region ranging from large attractions to small local history museums. There are two state historic sites in the region. Middlebury College has a Museum of Art that hosts traveling shows, as well as displaying items from its permanent collection. There are numerous venues for performances throughout the region.

The cultural, artistic and historic resources described above play an important role in the culture of and way of life for residents of the Addison Region. However, there is a wide range of other components that woven together to form the character of the region's communities. These components are incredibly numerous and diverse, ranging from the qualities of the land itself and the economic forces that have shaped the region's communities to the influence of local gathering places and events that create and maintain a sense of community among residents.

Governmental and Administrative Facilities

Each of the 21 municipalities in the Addison Region has a municipal office and a clerk who, among other duties, maintains the records stored in each office's vault. The municipal offices are the repositories for all land records, vital records like birth, marriage and death certificates, and voter registration lists. In addition to the municipal office, most communities have a larger hall-type building that is used for town meeting and other large community events. Most of the municipalities in the region also have a building for storing highway equipment and materials. Several communities have a shared garage facility with the fire department and a couple share space with state highway maintenance facilities.

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There are a large number of historic cemeteries throughout the Addison Region and a smaller number still in use. These cemeteries are administered either by municipalities through a Cemetery Commission with appointed representatives or by private, nonprofit Cemetery Associations. Finding funds to maintain historic cemeteries, no longer actively used and with no income stream is an ongoing struggle for the commissions and associations.

Municipalities in the Addison Region also own a variety of other lands and facilities such as tax sale lands, old school lots, town forests, housing facilities and old road rights-of-way. Many municipal plans provide a detailed inventory of municipally owned structures, land and rights-of-way.

Recreation Resources and Facilities

The Addison Region, bounded on the west by Lake Champlain and on the east by the Green Mountains, is rich in recreation resources. The region's year-round recreation opportunities attract visitors and contribute to the quality of life for residents.

There are a number of trails or trail systems within the Addison Region. In addition to the trails on state or federal land, there are trails on municipal and private land. There are trails in the region for a variety of activities and many trails are shared among different users.

Bicycling is one of the most popular outdoor recreation activities in the region. Bicycles also serve as a mode of transportation for region residents. The Addison Region offers cycling opportunities for those who want to peddle around the gently rolling terrain of the Champlain Valley, to test their endurance biking up one of the mountain gaps or careen down a wooded trail on a mountain bike.

The Addison Region has miles of shoreline on Lake Champlain, Lake Dunmore, Otter Creek, the Middlebury River and the New Haven River, as well as numerous smaller ponds and streams. These water bodies are used for a range of recreation activities including boating of all types, swimming, year-round fishing, hunting and wildlife viewing. Summer camps and second homes line some areas of shoreline, bringing seasonal residents and visitors to the region.

All forms of wildlife-based recreation including hunting, fishing and bird watching have a long history in the Addison Region. These are traditional outdoor activities and are evidence of the region's historic strong land connection and ethic.



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B. Goals and Objectives

The Addison County Regional Planning Commission establishes the following goals and objectives for the Addison Region through this plan.

Historic and Cultural Resources Goal A.

For the historic and cultural resources of the Addison Region to continue to be preserved and strengthened while remaining vital components of the region's economy, its communities and residents' way of life.

To meet this goal, it is our objective:

- a. For the historic, cultural and artistic resources of the region to be open, accessible and welcoming to the region's residents and for residents to partake of those resources to enrich their lives.
- b. For the region's schools to continue to incorporate local historic and cultural resources into their curriculum.
- c. To fully realize the potential of the region's creative, artistic, cultural and historic resources to enhance the character of the region's communities.
- d. To support cultural heritage tourism in the region to the extent that it is welcomed by the region's communities and does not infringe upon the ability of residents to enjoy local places, traditions and events.
- e. To encourage communication and cooperation among the region's historic, arts and cultural organizations.
- f. To preserve and promote adaptive reuse of the region's historic structures.
- g. For the region's farm buildings to serve to provide a vital connection between the region's residents and its agricultural history and traditions.
- h. To continue to have incentives available to encourage public and private property owners to appropriately maintain and improve historic structures.
- i. To support local efforts to designate historic districts and participate in initiatives like the Vermont Downtown and Village Center programs.
- j. For the significant archaeological resources of the Addison Region to be protected and studied so that they can continue to provide a clearer picture of the region's history.
- k. The construction of new structures within historic areas should be consistent and compatible with the historic character of the area.



Municipal and Administrative Facilities Goal B.

For municipalities in the Addison Region to continue to provide local administrative facilities in a manner that is affordable to local taxpayers, that meet the communities' needs and that help build a sense of community among residents.

To meet this goal, it is our objective:

- a. To actively support retention of municipal offices and other municipal facilities within existing village centers.
- b. To encourage the location of municipal service facilities within or in close proximity to village centers while striving to limit adverse impacts on surrounding properties.
- c. For the region's municipalities to use long-term budgeting and planning to meet each community's present and future needs for administrative facilities.
- d. To continue the tradition of maintaining municipal records at the local level, which serves to strengthen resident's connections to their communities.
- e. For the region's communities to explore and participate in mutual aid pacts to provide local services in a cost-effective manner.

Recreation Goal C.

To maintain, improve and ensure access to the recreation resources of the Addison Region for future generations to enjoy.

To meet this goal, it is our objective:

- a. To foster communication and cooperation between schools, municipalities and sports organizations to build a coalition of recreation interests in small communities.
- b. To encourage every municipality in the region with navigable water bodies to create local public access to those resources.
- c. For future improvements to main local roads and state highways to provide for safe bicycle and pedestrian use.
- d. To encourage municipalities to retain control over unused road and railroad rights-of-way, Class 4 roads, trails and similar resources that could provide future opportunities for trail systems throughout the Addison Region.



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C. Recommended Actions

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plans, as issues or opportunities arise, to move towards accomplishing the objectives and meeting the goals outlined above.

Archaeological, Historic and Cultural Resources

1. To increase public awareness of significant archeological resources, the Regional Commission encourages archeologists, local and regional groups, towns and landowners to organize educational programs focused on Vermont.
2. Continue to support initiatives such as the Celebration Champlain and Lake Champlain Bikeways that highlight the region's historic and cultural resources.
3. Assist municipalities interested in developing regulations that promote adaptive reuse of historic structures, establishing historic advisory review boards, or in designating historic, downtown or village center districts.
4. Assist municipalities or organizations in developing GIS maps and data related to historic structures or from historic maps.
5. Support the mapping of the historic fabric of the region's communities.
6. Support and assist municipalities or organizations with grant writing.
7. Advocate that the Division for Historic Preservation to refine its Phase I study criteria to identify locations where substantive evidence beyond mere proximity to physical features demonstrate a "probability" that "significant" archeological resources exist.
8. Advocate that the Division for Historic Preservation define those items that constitute "significant" archeological resources as artifacts with economic and intellectual value providing significant new insight into the archeological record.

Municipal and Administrative Facilities

1. Assist municipalities interested in developing and adopting capital budgets and programs.
2. Support and assist municipalities or organizations with grant writing for community facilities within village centers.
3. Aid municipalities in coordinating and drafting mutual aid pacts.

Recreation Resources

1. Assist municipalities or organizations in developing GIS maps and data illustrating the region's recreation resources.



2. Support municipalities, schools and organizations with grant writing for development, improvement or protection of the region's recreation resources.
3. Aid municipalities and local organizations in developing and linking trail systems in the region.



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D. Documentation and Analysis

Archeological, Historic and Cultural Resources and Facilities

The Addison Region with its varied topography and wealth of natural resources has an equally rich collection of archeological, historic and cultural resources. The character and history of the Addison Region is reflected in the sites, structures, events and traditions built or established by residents over more than 250 years. That period represents only a brief portion of a much longer history of human habitation in the region going back more than 10,000 years.

The importance of these cultural and historic resources is reflected in their ability to provide a sense of continuity between generations and a connection to place. A shared sense of history and cultural pride creates stronger communities and encourages connections between people. Historic and cultural sites, buildings, and events can also provide economic benefits from the reuse of existing structures as unique community gathering places for the enjoyment of music, theater, and other cultural performances.

Archeological sites

Vermont's archeological sites are critical links to our recent and distant past. In many cases these links help us to understand our rich social, economic and technical traditions. The sites range from Native American campsites used by the earliest Vermonters - called the Paleo-Indians, to revolutionary war shipwrecks, from 12th century Native American farming sites (the earliest known in northern New England), to abandoned 19th century mining communities. More typical are the hundreds of long deserted 19th century farmsteads with their telltale cellar holes and stone walls, and the small, largely invisible, Native American seasonal campsites that span both the very long period of prehistory and the shorter period of recorded history. Pre-contact sites in forested landscapes can be especially important since they may be undisturbed by land management and agricultural practices. The archeological record can also provide information about past climate and landscape changes. Although only a few sites in the region have been designated in the Vermont Archeological Inventory, there may be many other areas that were suitable for pre-European settlement.

Some landscapes have a higher potential for containing pre-contact settlement sites; these are archaeologically sensitive lands. These lands exhibit a combination of environmental characteristics that would have attracted pre-European people. Archaeologically sensitive lands generally have less than 8% - 15% slope and are often found in the following landscape settings:

- 200' from a river, stream, lake or pond, wetland, spring or relict (i.e. now dry) drainage
- adjacent to a confluence
- adjacent to falls or rapids

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- on a flood plain or river terrace
- on an elevated knoll in a flood plain
- on the flat at the head of a drainage
- at a natural portage between two watersheds or pass through mountains
- at chert, quartz or quartzite outcrops
- on post-glacial (or “paleo”) landforms (some examples: sandy beach line from the Champlain Sea, edges of former post-glacial lakes and ponds or bays, edges of former post glacial swamps or wetlands)

Winter habitation sites might be located on south facing, sheltered, terraces along a valley edge and summer planting fields may be located in a sunny floodplain.

History of the Addison Region

The long and complex history of the Addison Region cannot be fully captured in these short few paragraphs, but the following history attempts to provide some context for the discussion of the region’s historic and cultural resources.⁵⁴

When the first Europeans came down Lake Champlain and established a temporary presence on the shore at what is now Chimney Point in the Town of Addison, they arrived at a place that had been home to Native Americans for thousands of years. These first residents of the Addison Region farmed, hunted and fished throughout the region. The first European explorers followed their travel routes from the lake up Otter Creek, the Lemon Fair and other streams into what is now the Addison Region.

For much of the next century, the history of the region would be characterized by conflict – between Europeans and Native Americans, between France and England, and between the colonies and England. Lake Champlain and the Addison Region played crucial roles in deciding the outcome of these conflicts. Historic remnants of these conflicts can be found throughout the region – the Crown Point Military Road, Mount Independence and Arnold’s Bay. Although no standing structures remain from before the close of the Revolution, archaeological sites – many not yet discovered – provide evidence of the original inhabitants and the first colonial settlers of the region.

After the Revolutionary War settlement of the Addison Region got underway in earnest and the region’s population boomed. The first communities of the region to be settled were the areas with flat, fertile soil for farming along Lake Champlain and the Otter Creek valleys. Early settlers made use of the abundant natural resources to derive subsistence and soon developed a local economy based on agriculture and water-powered industry. The stately Federal period houses and smaller Cape Cods found throughout the region remain as a vital link to those early settlers. While the remnants of early industrial activity are represented by the mills and their ruins clustered around the falls that generated their power.



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The period of early growth ended about the time of the War of 1812. The war and the earlier embargo forbidding trade with Britain and its colonies stimulated local trade and industry. During this time the patterns for future growth were stamped upon the landscape. By the early 1800s, much of the cultivatable land in the region had been cleared and was being farmed – a significant amount of which remains in agricultural use to this day. Villages were growing up near industries at important crossroads, providing goods and services for the surrounding farms. Today many of the old houses, taverns, shops, churches and other public building still stand in these centers.

The opening of the Champlain Canal in 1823 and a tariff encouraging American manufacture and trade had a major effect on the region. Traffic on the lake escalated and the ferry landings on the shore became important centers of commerce. The remains of ferry landings and several stone warehouses along the shore are evidence of the once bustling lakeshore traffic.

In the 1830s, the region gained renown for its Merino sheep and by 1840 Census there were more than 260,000 sheep in grazing in fields throughout the region. A number of mills were constructed to make cloth from local wool. Proceeds from the sheep and other agricultural products paid for many of the fine Greek and Gothic Revival style farmhouses and associated barns and outbuildings still standing in the region.

In 1849, the railroad cut its way through the Addison Region, opening new markets for farm and manufactured products. The rise of the railroad also shifted the focus of trade and commerce away from the lakeshore communities into the center of the region. Agricultural practices also shifted away from sheep to dairying – making butter and cheese to ship by rail to cities in southern New England – raising beef cattle and breeding Morgan horses. Today, a handful of railroad stations and other rail-related structures remain along the tracks still in used by freight trains. In rural areas, larger cow and horse barns were built to make specialized agriculture more efficient.

During the last decades of the 1800s, the mountain towns boomed as logging operations proliferated and fueled associated wood products manufacturing. The growing lumber industry resulted in the development of villages in the hill towns and the construction of new buildings, many in the Queen Anne style. While the hill towns boomed, most of the agricultural towns in the region had steadily declining populations as residents moved westward to newly opened lands. The population decline continued into the first half of the 1900s. The drop in population can be seen by the absence of residential construction, except for a small number of homes – including bungalows – built in the larger villages.

The final shift in transportation away from rail and towards the automobile led to construction of garages, gas stations and roadside commercial buildings. The automobile also encouraged construction of lakeside summer camps and further development another industry in the region – tourism. Changing dairying practices due to electrification, refrigeration and

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bulk milk tanks led to construction of large ground level barns, silos and milk houses – many of which are still in use today.

The long history of the Addison Region is vividly reflected in its architecture. There is an abundance of historic evidence in the buildings of every community. The region's historic architecture and resources provide residents and visitors with a rich cultural environment in which to live, work and play.

Historic Resources

There are a wide range of historic sites and structures in the Addison Region, several thousand of which are listed on the Vermont Register of Historic Places. These sites and structures include military sites and covered bridges, churches and community buildings, grand mansions and one-room schoolhouses, farmhouses and their outbuildings, as well as industrial and commercial buildings. There are approximately 60 buildings or sites listed on the National Register of Historic Places and three historic districts in Bristol, Middlebury and Vergennes are also nationally recognized. More detailed information on these historic resources is available at ACRPC's office and from the Vermont Division for Historic Preservation.

The Vermont Register is used in the division's legally mandated reviews of projects requiring Act 250 permits and those involving state or federal funds, licenses, or permits. Sites listed in or determined eligible for the Vermont Register are considered under criterion 8 of Act 250 for projects that require land use permits. Permits may be denied for projects that have an undue adverse effect on archaeological or historic resources. Properties that are listed in or eligible for the National Register of Historic Places are further protected from adverse impact by projects that are federally funded, licensed, or permitted.

However, Act 250 only applies to larger developments and many potential sites may be located in small private fields. Under the Vermont Historic Preservation Act the state archaeologist may designate archaeological landmarks. However, on private land this must have the consent of the landowner. For the most part, preservation of these sites may be the responsibility of the landowner. Identification of sites may be difficult for the landowner and specialists may be necessary to confirm pre-contact sites. The Vermont State Archaeologist can provide a list of qualified consultants and also provides a useful publication entitled *"Stonewalls & Cellarholes – A Guide for Landowners on Historic Features and Landscapes in Vermont's Forests"* As with any conservation project, purchase of land or development easements are important methods for preserving archeological sites.

A number of Addison Region communities have active Historical Societies that work to protect these resources, maintain collections, do research and promote greater awareness of local history and historic resources. Several have also developed walking tours that highlight their historic resources. While most of the region's historic resources are privately owned and not open to the public, some are public structures still used for a civic purpose, a few are open as museums, and others have been converted to inns and restaurants.



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Libraries

There are nearly 35 libraries currently operating in the Addison Region, many of which are school libraries. However, most communities in the region continue to have a public library. These libraries range in size with the larger municipalities – Bristol, Middlebury and Vergennes – having the largest facilities. However, even in small communities the local libraries provide a range of services and activities such as children’s programs, reading groups, literacy education, use of public computers and internet access, community meeting space and more. In addition to their own collections, patrons of libraries throughout the region have access to materials from libraries throughout Vermont via interlibrary loan.

Museums

There are more than ten museums currently operating in the region ranging from large attractions like the Lake Champlain Maritime Museum to small local history museums like the Bristol Historical Society Museum. There are two state historic sites in the region, Mount Independence and Chimney Point. There are several historic house museums in the region including the John Strong DAR Museum, the Henry Sheldon Museum of Vermont History and the Rokeby Museum.

Galleries and Exhibits

The Addison Region is home to a number of artists and craftspeople that exhibit and sell their work from their home or studio. There are also galleries and shops that market art and craft items from a number of local artists. Middlebury College has a Museum of Art that hosts traveling shows, as well as displaying items from its permanent collection.

Performances and Events

There are numerous venues for performances throughout the region ranging from informal concerts held on summer evenings on town greens to professional theatrical productions at the Vergennes Opera House. Many communities have local festivals, parades or similar events on holidays or other specially designated week or day. While there seems to be more activity in the summer, events like coffeehouse performances and barn dances occur regularly during the winter as well. Some of the highlights include performances of the Bristol Band on the Bristol Green, Middlebury’s weeklong Festival-on-the-Green and the annual Addison County Fair and Field Days in New Haven.

Culture and Community

The cultural, artistic and historic resources described above play an important role in the culture of and way of life for residents of the Addison Region. However, there is a wide range of other components that woven together form the character of the region’s communities. These components are numerous and diverse, ranging from the qualities of the land itself and the economic forces that have shaped the region’s communities to the influence of local gathering places and events that create and maintain a sense of community among residents.



This culture is greatly valued by the region's residents. Some of these things – such as citizens discussing current events while sitting on a bench at their general store or going to a pancake supper at the firehouse, are difficult to characterize but they are important nonetheless. These and many other components of local culture and community character contribute to the quality of life in the Addison Region.

Governmental and Administrative Facilities

Municipal Offices

Each of the 21 municipalities in the Addison Region has a municipal office and a clerk who, among other duties, maintains the records stored in each office's vault. The municipal offices are the repositories for all land records, vital records like birth, marriage and death certificates, and voter registration lists. The clerk and municipal office serve as the basic unit of local government in most of the rural towns in the Addison Region. In the smallest towns, the office is essentially the only public building and serves a number of community and civic functions. In addition to office space, many municipal offices are used as community meeting spaces.

A number of offices in the region are in historic buildings originally constructed for civic purposes – some as town halls, churches or schools – in the mid-1800s. Many of these buildings, which have served their function as town office well for a half-century or more, are beginning to encounter difficulties. A number of offices in the region lack adequate vault space for additional records, a problem that has been exacerbated in recent years as the amount of paperwork to be recorded has increased exponentially. Others do not have sufficient space for regular board or committee meetings, or for office use as the number of employees working for the town has increased. Additionally, a few buildings have issues such as lack of handicap accessibility, or insufficient wastewater or drinking water infrastructure.

Community Buildings

In addition to the municipal office, most communities have a larger hall-type building that is used for town meeting and other large community events. Sometimes this is a separate building, other times it and the municipal office are part of the same structure. While a few town halls were constructed for civic use as a meeting hall, many are former schools, churches, granges or other similar structures.

In recent years, a number of communities throughout the region have constructed or are planning projects to develop community buildings that can serve multiple functions. Some towns are considering reuse of existing historic structures in their village centers, while others have plans for new construction. A common theme of most of these projects is to revitalize a community center by having a building with space that can serve multiple purposes ranging from town offices, library, meeting rooms, childcare or preschool, medical clinic and recreation. Many of these projects began from the town recognizing a specific need – such as additional vault space or expansion room for a library – and realizing that several problems could be addressed through a broader project.



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Highway Garages

Most of the municipalities in the region also have a building for storing highway equipment and materials. Several communities have a shared garage facility with the fire department and a couple share space with state highway maintenance facilities. Many towns are also facing a lack of space for equipment storage, as towns have needed to house more and larger equipment. Additionally, changes to federal and state law related to stormwater are currently being implement that will require all salt and salted sand piles to be covered. A number of municipalities in the region will need to construct a storage shed for road salt and sand in the near future to meet these requirements.

Cemeteries

There are a large number of historic cemeteries throughout the Addison Region and a smaller number still in use. These cemeteries are administered either by municipalities through a Cemetery Commission with appointed representatives or by private, nonprofit Cemetery Associations. These commissions and associations are responsible for laying out the cemeteries, selling lots, and maintaining the grounds and records.

Finding funds to maintain historic cemeteries, no longer actively used and with no income stream is an ongoing struggle for the commissions and associations. The Vermont Old Cemetery Association works to encourage the restoration and preservation of neglected and abandoned cemeteries throughout the state and supports the work of local organizations. Volunteer labor, local fundraising and philanthropic donations are used to maintain and repair cemeteries throughout the region. The difficulty of funding and maintaining old cemeteries is evidenced by the 19th century family cemetery that has been eroding into the Otter Creek in Weybridge. The problem has worsened in recent years leading to graves being washed out into the creek. However, at this point no funding has been found for the needed bank stabilization project.

Other Municipal Facilities

Municipalities in the Addison Region also own a variety of other lands and facilities such as tax sale lands, old school lots, town forests, housing facilities like Weathervane West in Lincoln, and old road rights-of-way. Many municipal plans provide a detailed inventory of municipally owned structures, land and rights-of-way.

Recreation Resources and Facilities

The Addison Region, bounded on the west by Lake Champlain and on the east by the Green Mountains, is rich in recreation resources. The region's year-round recreation opportunities attract visitors and contribute to the quality of life for residents.

Public Trails

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There are a number of trails or trail systems within the Addison Region. In addition to the trails on state or federal land, there are trails on municipal and private land. There are trails in the region for a variety of activities and many trails are shared among different users.

1. *The Trail Around Middlebury*

The Trail Around Middlebury (TAM) is an 18-mile multi-use trail system surrounding downtown Middlebury. The TAM provides access to wooded and open recreation paths, connecting residential areas, the town center and the Middlebury College campus to each other and to surrounding natural areas. The Middlebury Area Land Trust (MALT) has developed and maintains the trail system with the assistance of many volunteers. The TAM is funded mainly through grants and private donors and most of the trail is on private land. Now that the trail fully encircles downtown, MALT is working to connect to East Middlebury and perhaps eventually to trail systems coming out of Bristol and Vergennes.

2. *VAST Trail System*

There are eight VAST (Vermont Association of Snow Travelers) clubs with hundreds of miles of trails in the Addison Region. While VAST is a statewide organization, the local clubs are responsible for clearing trails of brush and debris, securing permission from landowners and grooming the trails once the snow falls. These trails, generally located in the more rural parts of the region are used primarily by snowmobiles, but they also support other activities like cross-country skiing and snowshoeing. The trails are enjoyed by region residents and are also heavily used by visitors to the region, offering a source of revenue for tourism-based businesses in the winter months. This existing network of winter trails offers potential for developing into year-round multi-use paths in some locations.

3. *The Long Trail*

The Long Trail corridor passes through the Addison Region on a combination of public and private lands. There are a number of connecting trails that link the Long Trail to other resources in the region such as Silver Lake and the Moosalamoo area. An especially popular section of the Long Trail runs between Breadloaf and the Appalachian Gap.

4. *Other Trails*

Other communities in the Addison Region have begun developing trails or trail systems in their communities, while others are just starting to plan for possible corridors. Vergennes has plans for and is seeking funding to construct trails around the city. Bristol has a number of town-owned parks and has begun thinking about connecting those, its downtown and other near-by natural areas with a trail system. Many of the smaller village centers have begun thinking about sidewalks and trails that would provide recreation for residents and a safer way for children to walk and bike to community facilities. Leicester and Whiting have considered the abandoned rail bed running from Leicester Depot west to Lake Champlain as a potential trail corridor. Snake Mountain, located primarily in the towns of Addison and Weybridge, is popular hiking area in the region and additional trails there have also been identified as desirable. The cross-country ski trails located at Middlebury College's Snow Bowl are another winter trail resource in the region.



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5. Trail Use Conflicts

All these trails and trail systems in the region have had to resolve issues related to conflicts between users – be they snowmobilers and cross-country skiers or mountain bikers and horseback riders. Most of the trails are successfully used by a variety of users. In recent years, two user groups, ATV riders and horse riders, have raised additional issues with shared use.

Currently, ATVs are the most pressing issue for trail providers and users throughout the region. All-terrain vehicles are increasing in popularity. However, areas and trails have not been identified as appropriate for ATV use. In fact, ATVs are prohibited on state and federal land, thus pushing them onto private land. This has led to conflict between ATV enthusiasts, other recreation users and landowners. ATV enthusiasts are beginning to form an organization, similar to VAST, that will work to ensure that trails are available for their use and to educate users about responsible and safe riding.

Trail riding on horseback is also increasing in popularity in the region, as the number of people in the region with horses rises. Horse riders have not yet become organized, but as more people become interested in trail riding another user group will likely form. In addition to the potential conflicts with other users, horse riders need amenities, such as access points that can accommodate a horse trailer and truck.

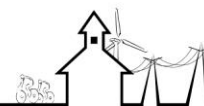
6. Trail Connections

The state and federal lands in the Addison Region offer a great recreation resource for trail users. Continuing to connect local trails to the larger trail systems, especially those in the Green Mountains, would benefit all users. The Moosalamoo area, located largely in the Addison Region with its miles of trails and backcountry roads connecting Green Mountain Forest land with surrounding privately owned tracts, provides an excellent example of such a public-private partnership. The Long Trail and its associated connecting trails provide another.

Bicycle Facilities

Bicycling is one of the most popular outdoor recreation activities in the region. Bicycles also serve as a mode of transportation for region residents. In many of the region's communities, children use bicycles to ride to school and to other activities in and around the village centers. State routes with heavy traffic and large trucks are often the main roads in these centers, making bicycling on the road unsafe for children. There are few places within the Addison Region with bicycle or multi-use paths; in most of the region cyclists must share the road with vehicular traffic. The Addison County Regional Bicycle and Pedestrian Plan recommends specific projects throughout the region to enhance infrastructure and amenities for bicyclists, including constructing sidewalks or paths that would connect schools, sports fields and other community facilities.

The geography and scenic qualities of the region has made it a popular destination for bicycle tourists as well. The Addison Region offers cycling opportunities for those who want to peddle around the gently rolling terrain of the Champlain Valley, to test their endurance



biking up one of the mountain gaps or careen down a wooded trail on a mountain bike. Much of the focus of bicycle tourism in the region has been in the Champlain Valley. The two Lake Champlain Bikeways loops in the region are among the most popular of all their loops and six additional loops are in the planning stages for the region. However, the steeper terrain in the eastern part of the region has the potential to attract mountain bikers.

Water-Based Recreation

The Addison Region has miles of shoreline on Lake Champlain, Lake Dunmore, Otter Creek, the Middlebury River and the New Haven River, as well as numerous smaller ponds and streams. These water bodies are used for a range of recreation activities including boating of all types, swimming, year-round fishing, hunting and wildlife viewing. Summer camps and second homes line some areas of shoreline, bringing seasonal residents and visitors to the region.

1. Lake Champlain

There are three state parks on Lake Champlain in the Addison Region. There are a number of state-owned boat launches and fishing access points on the lake in the towns of Shoreham, Addison, Panton and Ferrisburgh.

In addition to state facilities, there are private campgrounds along or in the vicinity of the lake in several towns. There are private marinas in the towns of Orwell, Addison and Ferrisburgh. As the number of boat travelers using Lake Champlain continues to increase, additional facilities and amenities to serve those visitors and means of getting them from the lake into the region's communities will likely be needed.

Some of the region's lakeshore towns have local lake access, but for the most part these have not been formally developed. Most of the towns along Lake Champlain have identified a need for a local beach. The towns of Addison and Panton have potential beach locations, but have not yet implemented their plans. The issues associated with developing a site – parking, public restrooms, managing aquatic nuisance plants, etc. – make construction and maintenance of a beach a complicated and costly project. As the lakeshore continues to transition from agricultural to residential use, ensuring public access to Lake Champlain is becoming more challenging, since much of the access has been on private land.

2. Other Water Bodies

Beyond the “big lake” there are a number of water bodies – such as Lake Dunmore, Fern Lake, Cedar Lake, Sunset Lake, Bristol Pond, Otter Creek, the Middlebury River and the New Haven River – currently providing recreation opportunities in the region. The towns in which some of these smaller lakes are located have also identified public access as an important issue. Public access on these lakes is more difficult to secure than on Lake Champlain, since many are ringed by residential development. The issue for public access on streams is similar to that on Lake Champlain. As land leaves agriculture and is developed for other uses, traditional access points can be lost.



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3. *Water Quality and Non-Native Aquatic Nuisance Species*

Improving water quality and controlling nonnative aquatic nuisance species plants and animals is an issue shared by all water users. Algal blooms caused by excess nutrient loading threaten people's enjoyment of water bodies throughout the region. Pathogenic bacteria from natural and human sources also threaten the safe enjoyment of existing beaches and swimming holes. Nuisance species are often spread from water body to water body by recreational boaters. Facilities for cleaning boats as they are removed from the water and continued education for boaters are needed to combat the spread of these unwanted plants and animals.

4. *Water Use Conflicts*

Water-based recreation users also face the issue of resolving conflicts between user groups. The use of non-motorized boats in the Addison Region's lakes and streams is increasing. At the same time, the number of motorized boats, especially personal watercraft, is rapidly increasing. With smaller, faster and more powerful boats and personal watercraft, motorized boats are now being used in places that used to be accessible only to non-motorized craft. Additionally, there has been conflict over use of the state's boat accesses by non-motorized boaters, which are partially funded motorized boat registration fees. In the water near congested access areas, the speed and power of motorized boats can lead to additional conflicts. Also, as more of the region's shorelines become developed, conflict can occur because new owners are not aware that public use of the shore is allowed under state law between the water and the mean high waterline, if accessed legally.

Wildlife-Based Recreation

All forms of wildlife-based recreation including hunting, fishing and bird watching have a long history in the Addison Region. These are traditional outdoor activities and are evidence of the region's historic strong land connection and ethic. This wildlife-based sporting community, through years of license purchases, has provided the funding for much of the current outdoor recreation infrastructure, such as fishing and boat accesses. In addition to the state-owned access points, there are also 11 state-owned Wildlife Management Areas in the region.

Hunting has traditionally relied on private landowners allowing the use of their property. As land ownership patterns in the region change and large parcels are developed, areas that have been open to use by hunters are being posted and closed. With less private land to hunt on, increased numbers of hunters on the remaining land removes much of the solitude and wild land experience most hunters seek. A private hunting preserve has been developed on property in the Town of Shoreham, illustrating the demand for and continuing decline in land available for hunting.

Shooting sports as a recreation are increasing in popularity in the Addison Region. At the same time, traditional use of the "back forty" for shooting becomes more problematic as the amount of development in those former fields increases. Shooting ranges have increasingly come under criticism for their noise and safety concerns. Due to local opposition and the



difficulty of starting up any new facilities, fish and game clubs have closed their ranges. Currently, no ranges open to the public exist within the Addison Region.

The fishing resource of the Addison Region is well known to the areas residents. Native trout abound in the upland streams and the lakes are home to both warm water and cold-water species. Ice fishing is becoming increasingly popular, making the region a year-round fishing destination. Access to the water is becoming increasingly difficult in some areas and many shoreline fishing opportunities have been eliminated due to changing patterns of land ownership.

The Addison Region's bird watching resource includes a variety of habitats including alpine tundra, wetland and forest. As with the fishing and hunting communities, wildlife viewing depends on suitable habitat to support the varied animal communities. Access to suitable viewing areas is limited by many of the same constraints as faced by hunting and fishing enthusiasts.

Campgrounds

In addition to campgrounds on or near Lake Champlain, there a number of additional private campgrounds in the region. There is also an additional state park, Branbury on Lake Dunmore in Salisbury.

Public Parks

Many communities throughout the region have local greens, parks and sports fields. These municipal facilities range in size, amenities and activities supported.

Municipal Recreation and Organized Sports

In the Addison Region, the municipalities of Bristol, Middlebury, Monkton and Vergennes have active, organized recreation departments or committees. Other communities have groups focused on town greens or ball fields, which could grow into recreation committees. Several Addison Region towns have had recreation committees that were active for a couple of years or formed around a specific issue and then fizzled when volunteer interest declined.

A sign of the demand for municipal recreation is the rapid growth of Bristol's Recreation Department, which serves residents of the five towns of Bristol, Lincoln, Starksboro, Monkton and New Haven. Middlebury and Vergennes similarly provide recreation opportunities for residents of surrounding communities. For these larger centers, there are concerns on how non-residents can share the cost and whether residents should have priority use of the facilities or programs.

Several of the town plans of smaller communities in the region note their dependence on another community to provide recreation facilities, but also point out the importance of having local recreation opportunities more conveniently located for residents. Some plans also point



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to the use of state parks and facilities located in their community and the fact that while those are a valued resource, community facilities are still desirable.

Smaller towns also rely on their schools to provide recreation facilities, especially sports fields and playgrounds. Often the school and associated fields, form a community center for recreation. The region also has a number of organized sports leagues for both youth and adults.



Endnotes

¹ In Title 10 VSA Chapter 56, Vermont statute defines a public water supply as any system that provides drinking water through pipes or other constructed conveyances to the public and that has at least 15 service connections or serves an average of at least 25 individuals for at least 60 days a year.

² The Vermont Water Supply Division breaks public water supplies into three categories: Community systems, which regularly serve at least 25 year-round residents; Non-Transient Non-Community systems, which serve at least 25 of the same people daily for more than six months of the year (ex. schools); and (3) Transient Non-Community systems, which serve at least 25 people for 60 days out of the year (ex. campgrounds and restaurants).

³ Figure based on number of residential connections reported by each water system to ACRPC in 2002.

⁴ The 2000 Census did not ask about household water source.

⁵ This information was obtained from a conversation with Daniel Werner and the 2000 Middlebury Town Plan.

⁶ This figure represents number of connections, not households served. An apartment house may only have one water connection that serves multiple households.

⁷ This information was obtained from a conversation with Mike Sullivan and the 1997 Vergennes City Plan.

⁸ This information was obtained from a conversation with Charles Bemis.

⁹ This information was obtained from a conversation with Scott Powell.

¹⁰ This information was obtained from a conversation with Peter Dempewolf and the 2000 Middlebury Town Plan.

¹¹ This information was obtained from the draft 2002 Starksboro Town Plan and conversations with Hugh Johnson.

¹² This information was obtained from the 2001 Whiting Town Plan and a conversation with Robert Wadsworth.

¹³ There are 48 connections within the park and approximately six single-family residences outside the park that are served by the public system.

¹⁴ This information was obtained from a conversation with Kevin Crosgrove of Addison County Community Trust.

¹⁵ This information was obtained from a conversation with Mary Cheney of the Long Point Association and the state Water Supply Division.

¹⁶ The number of users was obtained from state's 2002 data on public water supply systems.

¹⁷ The 2000 Census did not ask about water supply.

¹⁸ Additional discussion of groundwater resources in the region can be found in the Natural Resources section of this plan beginning on page 4.4-13.

¹⁹ Wastewater treatment facilities are classified in the DEC's Water Pollution Abatement Facility Operation Certification Regulations.

²⁰ Figure based on number of residential connections reported by each facility to ACRPC in 2002.

²¹ This figure represents number of connections, not households served. An apartment house may only have one connection that serves multiple households. Figures obtained from a conversation with Ann Filion, Billing Clerk.

²² 1 metric ton per year is equivalent to about 6 pounds per day.

²³ Figures obtained from the table labeled "Comparison of actual flows and phosphorus loading rates for Vermont wastewater treatment facilities during 2001 with permitted flows and TMDL wasteload allocations," in the 2002 Lake Champlain Phosphorus TMDL.

²⁴ Figures obtained from a conversation with Joan Devine, City Clerk.

²⁵ Figures obtained from the table labeled "Comparison of actual flows and phosphorus loading rates for Vermont wastewater treatment facilities during 2001 with permitted flows and TMDL wasteload allocations," in the 2002 Lake Champlain Phosphorus TMDL.

²⁶ Figures obtained from the table labeled "Comparison of actual flows and phosphorus loading rates for Vermont wastewater treatment facilities during 2001 with permitted flows and TMDL wasteload allocations," in the 2002 Lake Champlain Phosphorus TMDL.



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- ²⁷ Figures obtained from a conversation with Ruth James, Facility Operator.
- ²⁸ Figures obtained from the table labeled “Comparison of actual flows and phosphorus loading rates for Vermont wastewater treatment facilities during 2001 with permitted flows and TMDL wasteload allocations,” in the 2002 Lake Champlain Phosphorus TMDL.
- ²⁹ Information taken from Middlebury Town Report 2000.
- ³⁰ Information obtained from the February 14, 2003 draft of the Addison County Solid Waste District’s Solid Waste Implementation Plan.
- ³¹ Information taken from Bristol’s 2003 Solid Waste Implementation Plan.
- ³² Information taken from Salisbury’s 2003 Solid Waste Implementation Plan.
- ³³ Much of the information on healthcare in the region was taken from the *Addison County Community Assessment*, which was researched and written in the fall of 1998 by Alison Parker and Susan Shepard, graduate students in the Community Health Program at the University of Vermont’s School of Nursing.
- ³⁴ Information taken from the Porter website, <http://www.portermedical.org>, in March 2003.
- ³⁵ Information from a February 3, 2003 *Addison Independent* article, “Porter loses \$750K; several factors cited; permit application on hold,” written by Peter Conlon.
- ³⁶ The U.S. Department of Health and Human Services Bureau of Health Professions designates Medically Underserved Areas based on the following criteria: ratio of primary medical care physicians to population, infant mortality rate, percentage of the population with incomes below the poverty level, and percentage of the population age 65 or over. Orwell and Shoreham were first designated in 1981 and that designation was renewed in 1994.
- ³⁷ Information from a conversation with Larry Goetschius, Executive Director of Addison County Home Healthcare Agency.
- ³⁸ Information obtained from the Porter website, http://www.portermedical.org/nursing_home.html, in March 2003.
- ³⁹ Information from the State of Vermont Agency of Human Services Department of Aging and Disabilities Residential Care Information website in March 2003.
- ⁴⁰ Information about ACTR from the VT Public Transportation Association’s website, <http://www.vpta.net/ACTR.html>, in April 2003 and communication with Jim Moulton, Executive Director.
- ⁴¹ Information on the number of rental units from the Vermont State Housing Authority’s online Directory of Affordable Housing, <http://www.vsha.org/housedir.cfm>, in April 2003.
- ⁴² Information from Angus Chaney of CVOEO in April 2003.
- ⁴³ Information from the State of Vermont Agency of Human Services Department of Social and Rehabilitation Services Childcare Services Division’s online childcare provider listings, <http://www.state.vt.us/srs/childcare/daycare/daycare.htm>, in April 2003.
- ⁴⁴ Information about PCC from their website, <http://www.sover.net/~thepcc/index.html>, in May 2003.
- ⁴⁵ Information about CVAA from their website, <http://www.cvaa.com>, in April 2003.
- ⁴⁶ Information from a March 31, 2003 *Addison Independent* article, “Elderly Services project earns \$1.1 million boost” written by John Flowers.
- ⁴⁷ Information from an April 15, 2002 *Addison Independent* article, “Sheriff, Middlebury schools coordinate safety plans in wake of escape” written by John Flowers.
- ⁴⁸ Information from the 2000 Middlebury Town Plan.
- ⁴⁹ Information from the 1997 Vergennes City Plan.
- ⁵⁰ Part I crimes include the following: homicide, rape, robbery, aggravated assault, burglary, larceny, auto theft and arson. Part II crimes include the following: forgery, fraud, embezzlement, stolen property, vandalism, sex offense, drugs, family/child, liquor violations, disorderly conduct, simple assault, weapons, prostitution, gambling, vagrancy and driving under the influence.
- ⁵¹ The only crime statistics available for comparison between 1990 and 2000 were crime rates, not actual numbers of crimes.
- ⁵² Information on rescue calls from the *Addison County Community Assessment*, which was researched and written in the fall of 1998 by Alison Parker and Susan Shepard, graduate students in the Community Health Program at the University of Vermont’s School of Nursing.

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⁵³ Information in this section taken from *Understanding Act 60 and Education Finance: An Objective Look at the Content, Context, and Implications of Vermont's Current Education Finance Legislation* researched and written by Robin Lane in 2002 as an independent study project at Vermont College.

⁵⁴ Much of the history that follows was taken from the introduction of *The Historic Architecture of Addison County* prepared for the Vermont Division for Historic Preservation in 1992. Elsa Gilbertson wrote the historical introduction.



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8. FUTURE LAND USE

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8.1 Introduction

The Future Land Use element establishes overall land use policy for the Region. It is composed of a narrative describing ACRPC's plan philosophy, existing conditions and proposed future conditions supported by Goals and Recommended Actions and illustrated in four planning maps.

The future land use narrative discusses the Plan's philosophical underpinnings, general and desired use categories and limitations within each type of land use region. It divides the region into six types of use areas and contains goals and recommendations to maintain or improve future conditions in each type of region.

Four maps illustrate and support The Future Land Use Section narrative. The first map shows generalized land use regions. This composite map stems from each of the land use maps from local town plans. The Future Land Use Map is updated annually to reflect changes made in municipal plans to honor local land use designations as the basis for the generalized future land use regions depicted in this map.

The second map, which is divided into Map A depicting land based resources and Map B, depicting water based resources, provides an overlay of regionally significant resources. Regionally significant resources have a physical or service continuum beyond one town. They are of regional, statewide or national importance, or are publicly owned natural resources and are designated of regional significance in this plan. The third map depicts towns with adopted and regionally approved town plans, generally depicting the level of planning occurring in the Region. The fourth map depicts State designated downtowns, villages and growth centers.

8.2 Future Land Use

The Commission intends to annually update this Future Land Use section to reflect Town Plans adopted during the prior year.

A. Land Uses

ACRPC believes that the best plans stem from the people with the greatest stake in the outcome of the plan developed. In this case, those people constitute the citizens of each of the Region's respective municipalities. Therefore, ACRPC has based its Regional Land Use Plan upon the foundation of the adopted planning areas of its member municipalities. The Regional Future Land Use Plan constitutes a composite of the municipal land use maps from every municipality in the Region. Because the land use regions identified in municipal plans are described in many different ways, the discussion below amalgamates the various planning areas in all municipalities into six generalized land use regions, clustered together based upon density and functional uses proposed. ACRPC strongly believes that tying its regional plan to the plans of its local municipalities constitutes the best way to successfully plan for and implement the Region's vision. It reduces potentially confusing or duplicative processes and significantly reduces the potential for conflicting jurisdictional visions.

1. Regional Centers with Mixed Residential and Commercial Uses

The Addison Region includes three municipalities that serve as its regional centers: the Town of Middlebury, the shire town of the County; the City of Vergennes and the Town of Bristol. These three regional centers constitute the historic industrial areas of the Region, starting with the mills that sprang up along the rivers and falls within each community. Those mills drove densely constructed villages to house their workforces. The development pattern created survives to this day and explains the characteristics that set these regional centers apart from the Region's other municipalities. These include:

- Generally larger population bases;
- Denser population development;
- Downtowns with retail, service and manufacturing businesses that draw and support consumers from each of the municipalities that surround them;
- Infrastructure to support denser population and commercial development; and
- Qualification for the state designated downtown program.

Because of the availability of infrastructure to support and promote existing settlement patterns, this plan encourages major commercial or industrial development to locate in appropriately designated areas of Middlebury, Vergennes and Bristol. It also encourages the creative reuse or redevelopment of "brownfields" or other existing commercial or industrial facilities or infrastructure. This plan supports cluster development within the regional centers that perpetuate their historic development patterns.

2. Villages, With Mixed Commercial and Residential Uses

Nearly every town in the region has designated a village or mixed-use planning region in their future land use plans. This plan consistently encourages supporting and revitalizing the region's villages with a mix of uses by adopting and incorporating these locally designated downtowns and villages. To a significant degree, the downtowns and villages identified in local plans and incorporated herein coincide with areas of existing commercial development and the historic village centers. These areas typically have a mix of development and the highest density of residential development within each municipality. Support of these existing village areas re-enforces the land use pattern of denser villages surrounded by the rural working landscape and countryside, thus reinforcing the State's planning goals. This plan supports further development of these village areas. It also supports investment in key infrastructure necessary to support development in these village areas. In the Addison Region, water and/or wastewater systems are the most important infrastructure elements necessary to encourage future growth within the region's villages. High-speed digital communications infrastructure and energy infrastructure should also be deployed strategically to support economic development within the region's locally designated villages and downtowns. Although most of the region's towns do not have the infrastructure necessary for large industrial development, this plan supports smaller scale mixed residential, commercial and industrial growth in the areas designated by each town. Another tool available for the Region's villages constitutes the State's village center designation. The State Village Center designation aims to revitalize historic centers by providing tax credits that can be used to restore historic commercial structures. Those structures then serve as a catalyst for additional local economic development. Village center designation also gives the municipality an advantage in other state grant programs. Any municipality with a village or hamlet containing at least one commercial building may apply.

3. Industrial Regions

The Addison Region hosts two types of industrial areas that it has separated out from its Regional and Village Centers. These consist of:

- a. Areas specifically designated for industrial uses, adjacent to regional centers; and
- b. Industrial areas based upon the natural resources that spurred their development.

Middlebury and Vergennes/Ferrisburgh have reserved planning areas on the outskirts of their village as areas for industrial uses. Proximity to the Vermont Railway line constituted one of the major factors driving these locations. While certain light industrial uses are compatible with mixed use downtown areas, other heavier industrial uses are not. These industrial areas constitute ways to provide for those, still important, economic development opportunities.

The second type of industrial area stems from the resources extracted within that area. These types of more rural industrial areas generally follow the veins of gravel or limestone available for commercial extraction in the Region. This plan supports the continued reasonable and appropriate use of these mineral resources as discussed in more detail in the Natural Resources Section of this plan.

4. Residential Use Regions

This region includes areas designated for residential uses on lots two-acres or less in size. Residential uses are permitted uses in most towns, subject to the requirements of locating on-site sewage disposal facilities. Most towns have identified some area of higher density residential use (characterized for the purposes of this plan as two-acres or less). Many areas planned for higher density development lie in the village regions and are depicted in the regional center or village areas for the purposes of this map. Many others are defined by some other variable, ranging from pre-existing development patterns, especially along the shores of Lake Champlain and Lake Dunmore, to available soils with easy access to major roadways. ACRPC chose the two acre density as a defining point for distinguishing its residential regions. Without centralized water or wastewater systems, multiple residences clustered together will typically require approximately two acres to provide sufficient setbacks to allow for the siting of individual wells and septic systems on each lot.

Residential Regions are most likely to allow or encourage Planned Unit Developments. The Regional Plan supports residential use as permitted in town bylaws. It encourages the use of cluster/PUD developments particularly to preserve agricultural and forest lands, and/or to protect regionally significant resources. As the Regional Commission works with towns in updating plans, zoning bylaws, and subdivision regulations, the Commission will encourage towns to adopt policies which encourage cluster/PUD development to protect these same resources, other locally significant resources and to educate towns about the benefits of steering more development into their village and/or regional centers.

Home occupations, home-based businesses and cottage industries are permitted uses in most municipal planning regions that allow for higher and lower density residential development. This is consistent with this plan's economic base policies that encourage smaller, community-based businesses. However, the Commission is aware of problems with administering home occupation/home-based businesses/cottage industry bylaws. It will continue to work with towns to balance the benefits of these uses (bolstering local economies by providing business opportunities) against the burdens they can place on neighboring properties (i.e. large or inappropriate activities).

As noted above, several towns have shoreland districts that fall within this use region. The Regional Commission will continue to work with towns to encourage updating of existing districts to provide for reasonable uses in these areas acknowledging the pre-existing settlement patterns, but also with the intent of focusing on mitigating stormwater or lakeshore habitat impacts.

5. Rural and Agricultural Planning Regions

Agriculture constitutes the primary land use in this region. The region also allows for the density of housing generally less than two units per acre. This plan adopts and incorporates the vision contained in most municipal plans encouraging the continuation of agriculture as a primary land use within this region. Agriculture and forestry are exempt from local bylaws (after filing a notice of activity and demonstrating that they constitute a legitimate agricultural use as defined by the Secretary of the Agency of Agriculture Food and Markets) and as such, are permitted throughout the region. This is consistent with Regional Plan policy's supporting continuation of local resource based business and encouraging both land uses. The Regional Plan specifically encourages the use of Required Management Practices ("RMPs"), Required Agricultural Practices ("RAPs") and Best Management Practices ("BMPs"). This plan also supports the work of land trusts to conserve large usable blocks of prime farmland. To date, many of the Region's towns lying closest to Lake Champlain boast some of the highest percentages of conserved farmland in the state, including up to 20% of the total acreage within the town.

Single-family residences are usually permitted uses on larger lot sizes in this region. Increasingly municipalities are switching to density based zoning to control housing density in rural areas. Density based zones, as opposed to zones requiring large lots, provide more flexibility in design and encourage open space protecting the functionality of natural resources. Towns are moving away from zoning that encourages a string of development along a road by encouraging the use of PUDs with clusters of housing units to provide housing in rural areas and to limit the impacts of that housing on natural areas. ACRPC will continue to work with its member municipalities to explain PUD and density based zoning concepts and to encourage their use on appropriate sites.

Some towns include outdoor recreation as either a permitted or conditional use in their rural and agricultural planning regions and in Forestry, Conservation regions discussed below. This plan also encourages agricultural and forestry related service businesses and appropriately scaled valued added manufacturing business to locate near the resources they need and support. The Utilities, Facilities and Services section of the plan addresses recreation and includes appropriate recreational policies and data.

Several towns also have mineral extraction bylaws. This plan's policies reflect the intent of these bylaws and reinforce the importance of the wise use of these resources (sand, gravel and limestone), given their uneven distribution in the Region and the economic ramifications of continuing mineral resource extraction in the Region. Many of the larger extraction operations are included as industrial areas. However, smaller operations exist throughout the Region.

6. Forestry, Conservation and Floodplain Regions

This constitutes the last composite of land uses within most plans in the Region. Forestry is recognized, with agriculture, as one of the most important resources in the Region. Many municipalities have set up districts to preserve and support it. In addition, maps created based upon work by the Soil Conservation Service located in the agricultural and forestry lands sections of this plan show those lands which are of prime importance under Criterion 9B and those lands rated as secondary agricultural and forest soils under Criteria 9C of Act 250.

Conservation areas are distributed throughout the Region. Much of the higher elevation land on the eastern border of the Region is located in the Green Mountain National Forest and permanently conserved. Other land in this area is designated in 25-acre conservation districts. Land along many rivers and abutting several major wetlands and marshes is also designated conservation. Because of the abundance of rural landscape, the public and quasi-public opportunities for outdoor recreation and the proximity of the Green Mountains National Forest, most towns generally utilize these lands to promote the working landscape and rural economy driven by farming and forestry or for open space to promote recreational opportunities and/or preserve significant natural features.

As noted above, many towns have planning regions that protect floodplains or other significant wetlands (Class I and II wetlands). The best examples of this are in the vicinity of the both the Otter Creek and the Dead Creek, which are identified as regionally significant resources on Map 8-2 of this plan and which play a major role in providing habitat, improving water quality and protecting many other areas of the Region from flooding.

Aquifer areas are shown in the water resources section of this plan. Most aquifers are within the town that they serve and so are of local concern. The Addison County Regional Planning Commission will provide towns with examples of aquifer protection districts from other regions and encourage their adoption here.

B. Goals and Recommended Actions

Goal A. To Plan Development so as to maintain the historic settlement pattern of compact villages and urban centers separated by rural countryside.

Implementation regional centers and villages:

1. Work with the Region's municipalities to structure their land use areas and regulations implementing them to clearly define and articulate village areas surrounded by rural areas.
2. Encourage residential development primarily in community centers and villages;
3. Work with Addison County Economic Development Corporation to provide incentives encouraging businesses to locate in downtowns and village centers;
4. Promote, plan for and construct public infrastructure like water and wastewater systems, sidewalks, bike lanes, stormwater, energy and communication systems that make locating in a regional center or village desirable; and
5. Support value added agricultural/wood products manufacturing in villages and downtowns to provide markets for products from the working landscape.

Implementation working lands and conservation areas:

1. Support the efforts of the Vermont Land Trust to conserve appropriately located agricultural and forestry lands;
2. Support the delineation boundary of the Green Mountain National Forest;
3. Work with the Region's municipalities to structure their land use areas and regulations implementing them to clearly define and articulate regulations protecting rural and conservation areas;
4. Promote Freedom to Farm policies within this plan and municipal plans in the Region;
5. Support taxation and other state policies that provide incentives to preserve working blocks of agricultural and forestry land; and
6. Work with Addison County Economic Development Corporation to encourage value added farm and forest product production in areas close to production.

C. Maps

1. Future Land Use Map

The Future Land Use Map for the Addison Region consists of a composite of all municipally adopted municipal plans as of the effective date of this plan. The map included herein depicts the Land Use regions adopted by each municipality in six broad categories:

1. Regional Centers with Mixed Residential Commercial development;
2. Villages with mixed residential and commercial development;
3. Industrial Areas;
4. Residential Regions of 2 acres or less;
5. Rural and Agricultural Regions of greater than 2 acre density; and
6. Forestry, Conservation and Floodplain Regions.

Planning areas from expired municipal plans are also included in the Future Land Use Map. While expired plans have no standing, they constitute the best indication of the regulations governing the area, since zoning cannot be changed without an adopted town plan. ACRPC's future land use map constitutes one of the major pieces of information ACRPC's Commission will review should it decide to file testimony in a land use case.

2. Regionally Significant Resources Map

The Regionally Significant Resources Map serves as an overlay to the Regional Future Land Use Map. It identifies regionally significant resources or facilities to which the Regional Plan policies should apply. The Commission should use the largest scale map available to review the actual boundaries of the significant regional resource should the Commission choose to participate in a regulatory proceeding to respond to impacts on, or benefits to, the significant regional resources depicted on the map. Should a conflict arise between municipal land use plans and the regional plan, it will stem from land use impacts on an identified significant regional resource. Should that occur, ACRPC will look to work with the applicant and affected municipality and determine whether the project can be changed to eliminate or reasonably mitigate the impact on the significant regional resource.

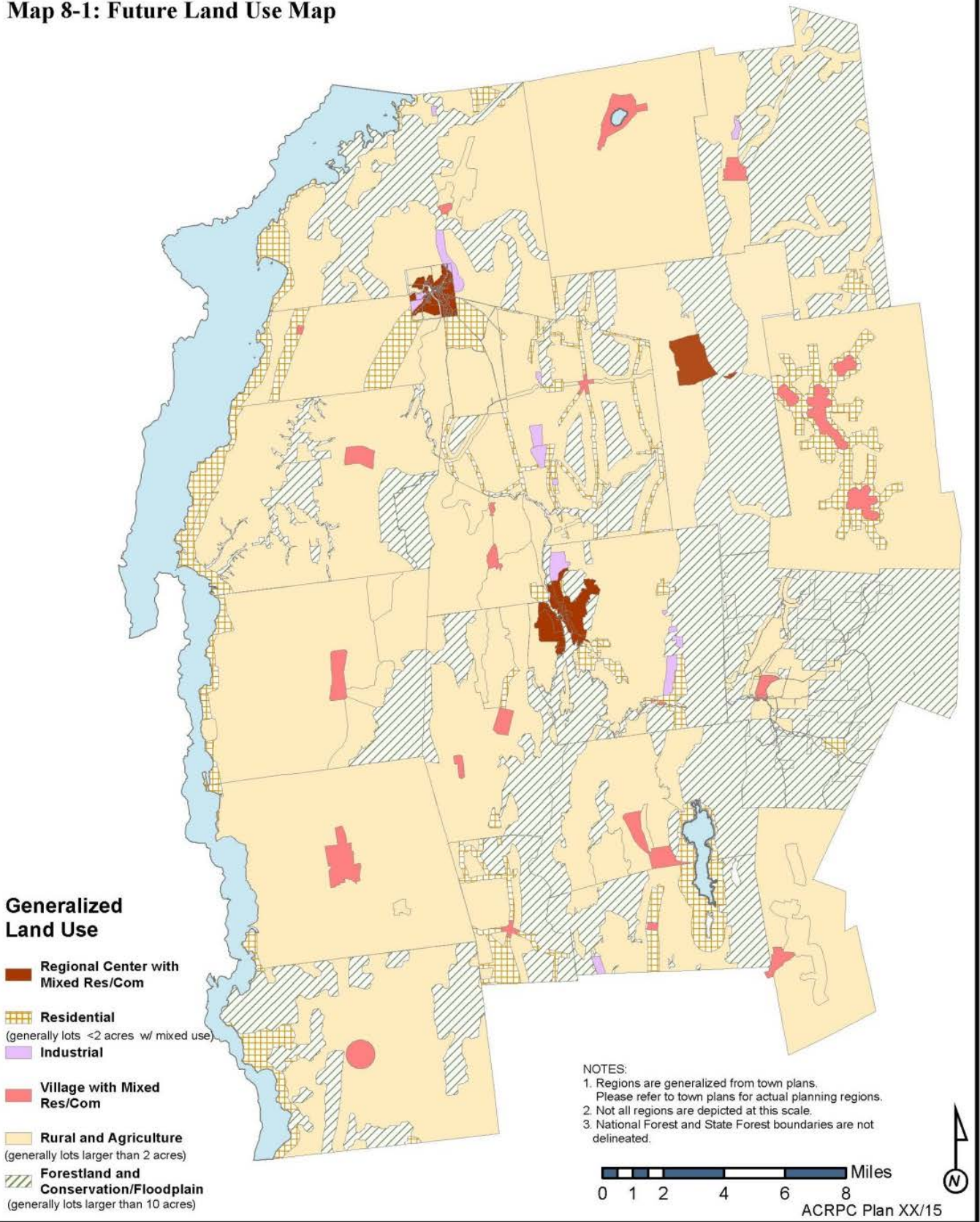
3. Map of Approved Municipal Plans

This map shows those municipalities that have current locally adopted plans approved by the Addison County Regional Planning Commission under the directives of 24 V.S.A. § 4350. The map also includes the date of the plans local adoption and regional approval. The map illustrates that generally Addison County's municipalities support the work of their planning commissions and keep their plans and supporting regulations up to date.

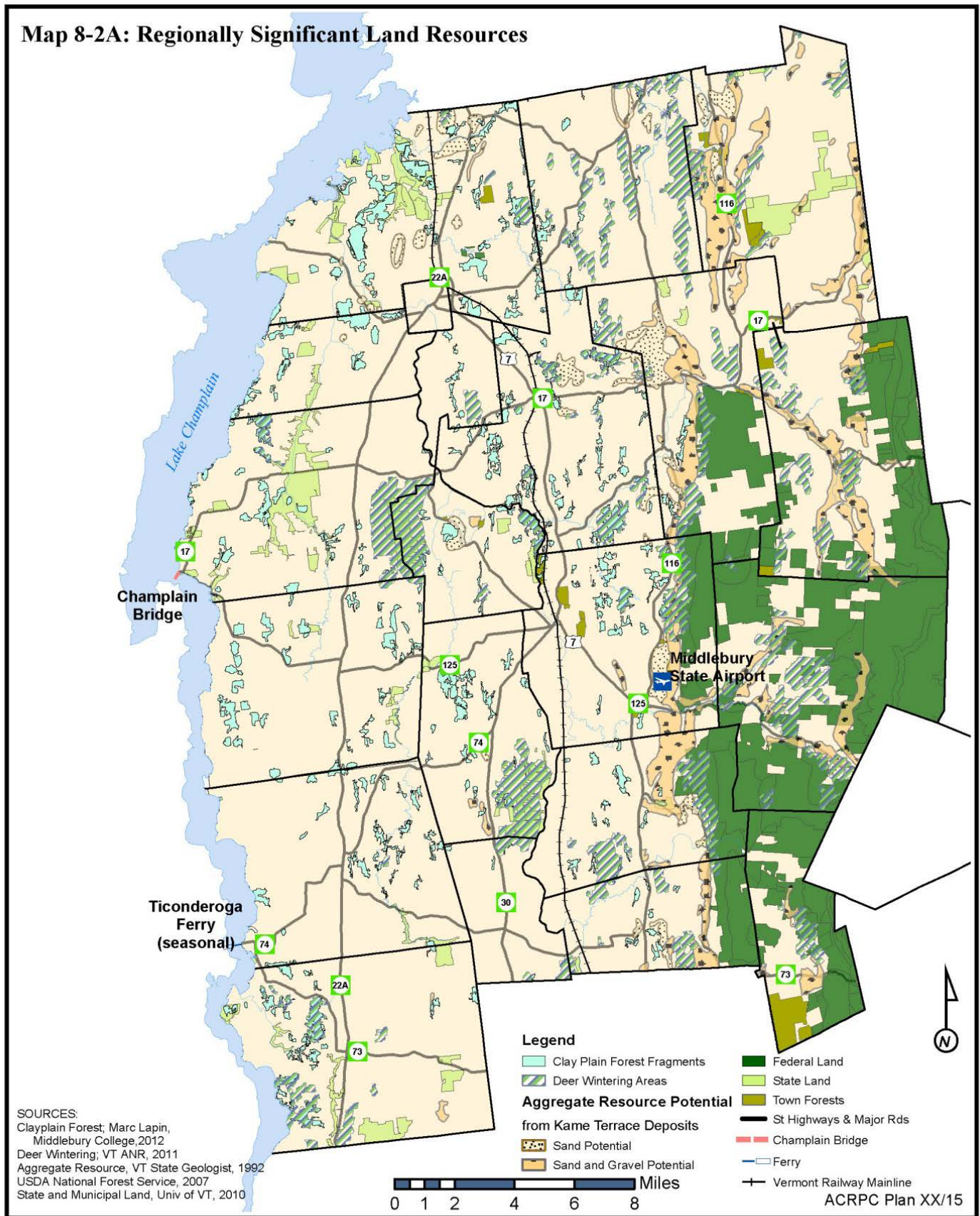
4. Map of State Designated Growth Centers, Downtowns and Villages

In addition to the village or mixed-use districts created by each municipality, the State also has several programs intended to revitalize historic centers and encourage downtown, village or "growth-center" development. Map 8-4 depicts the state designated downtowns and village centers in the Region.

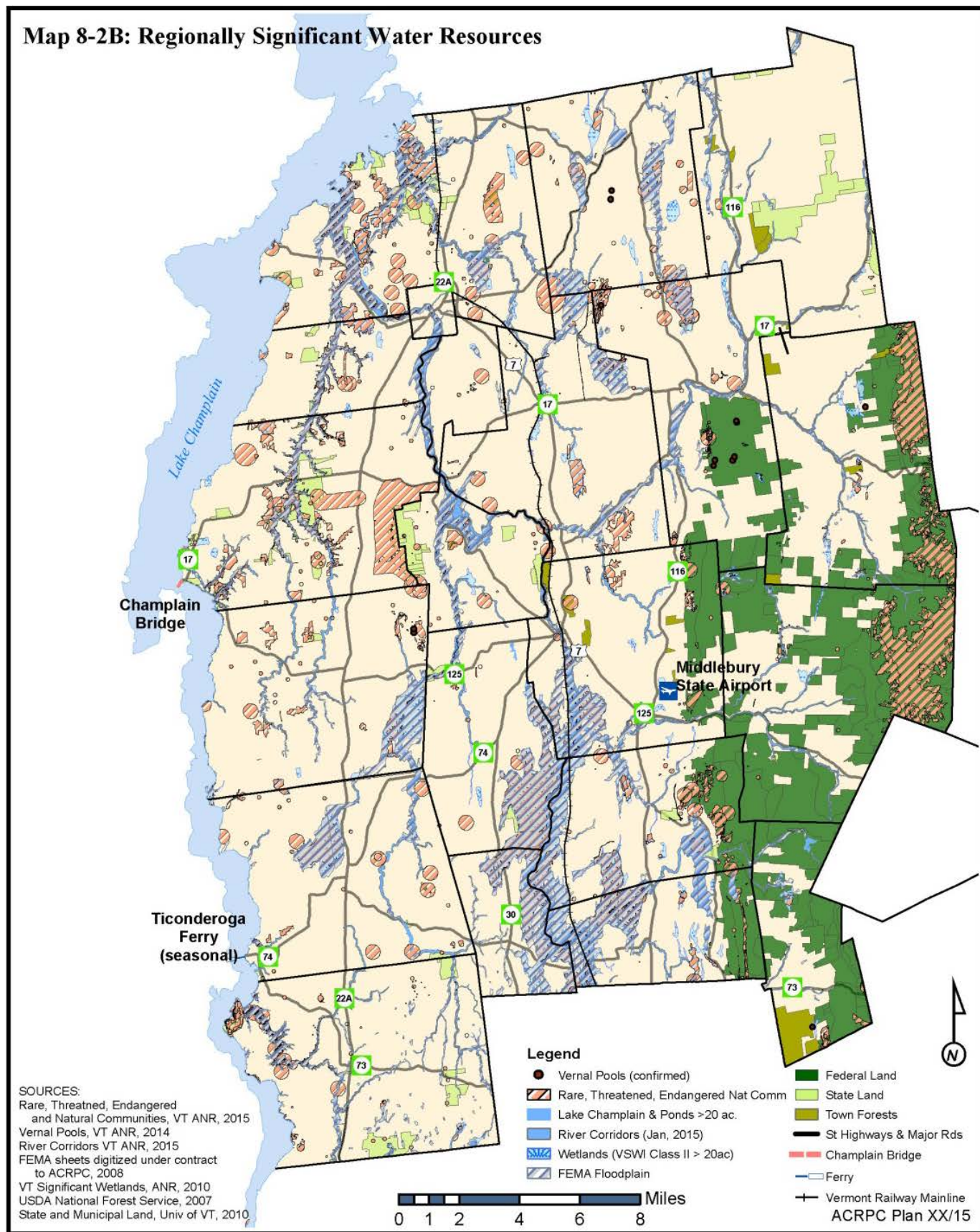
Map 8-1: Future Land Use Map



Map 8-2A: Regionally Significant Land Resources

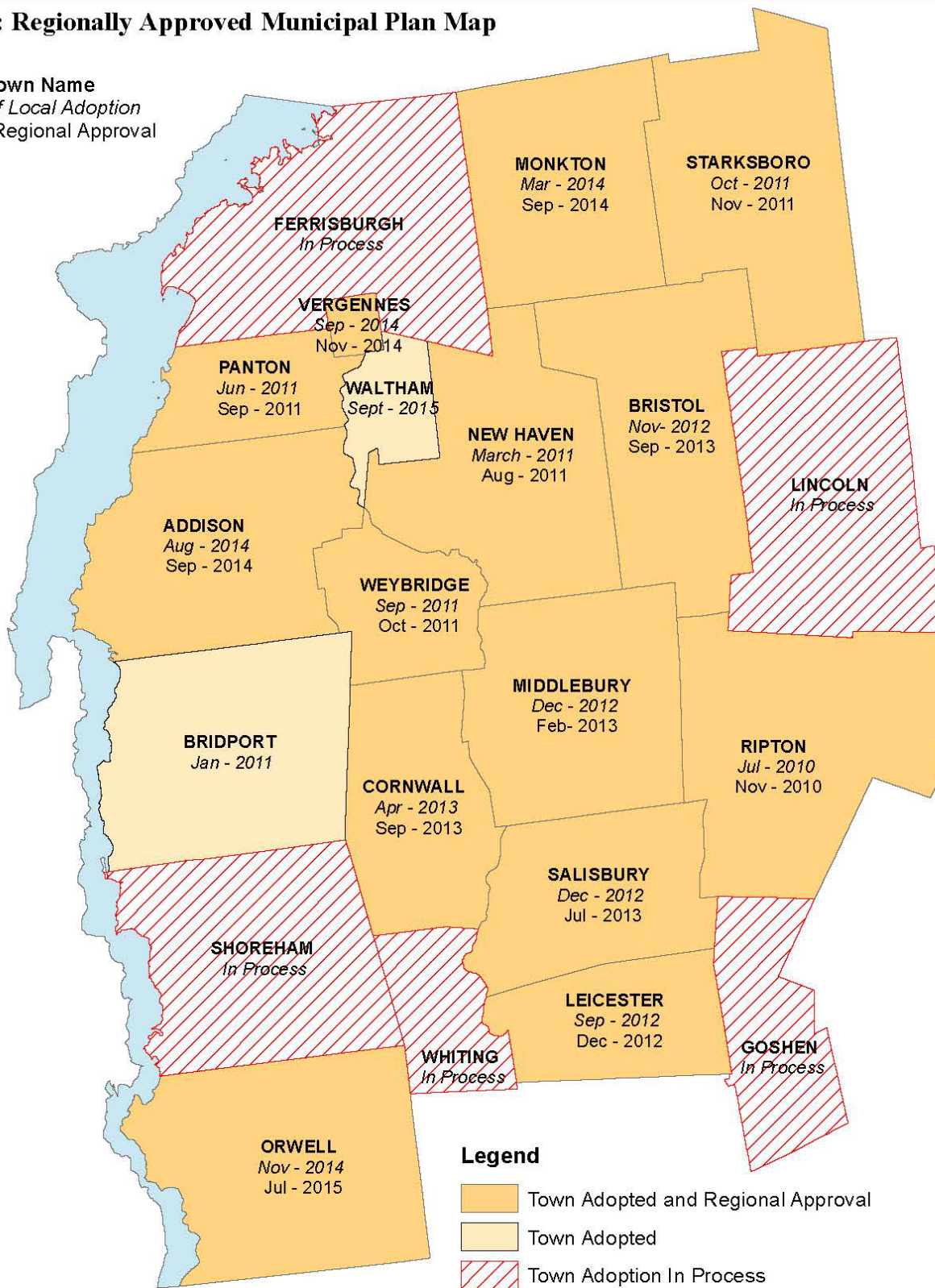


Map 8-2B: Regionally Significant Water Resources



Map 8-3: Regionally Approved Municipal Plan Map

Town Name
Date of Local Adoption
Date of Regional Approval



NOTES:

1. Adopted town plans are in effect for 5 years.
2. Town plans are approved by regional planning commissions according to Title 24 Chapter 117 Paragraph 4350(c) of the Vermont Statutes.

0 1 2 4 6 8 Miles

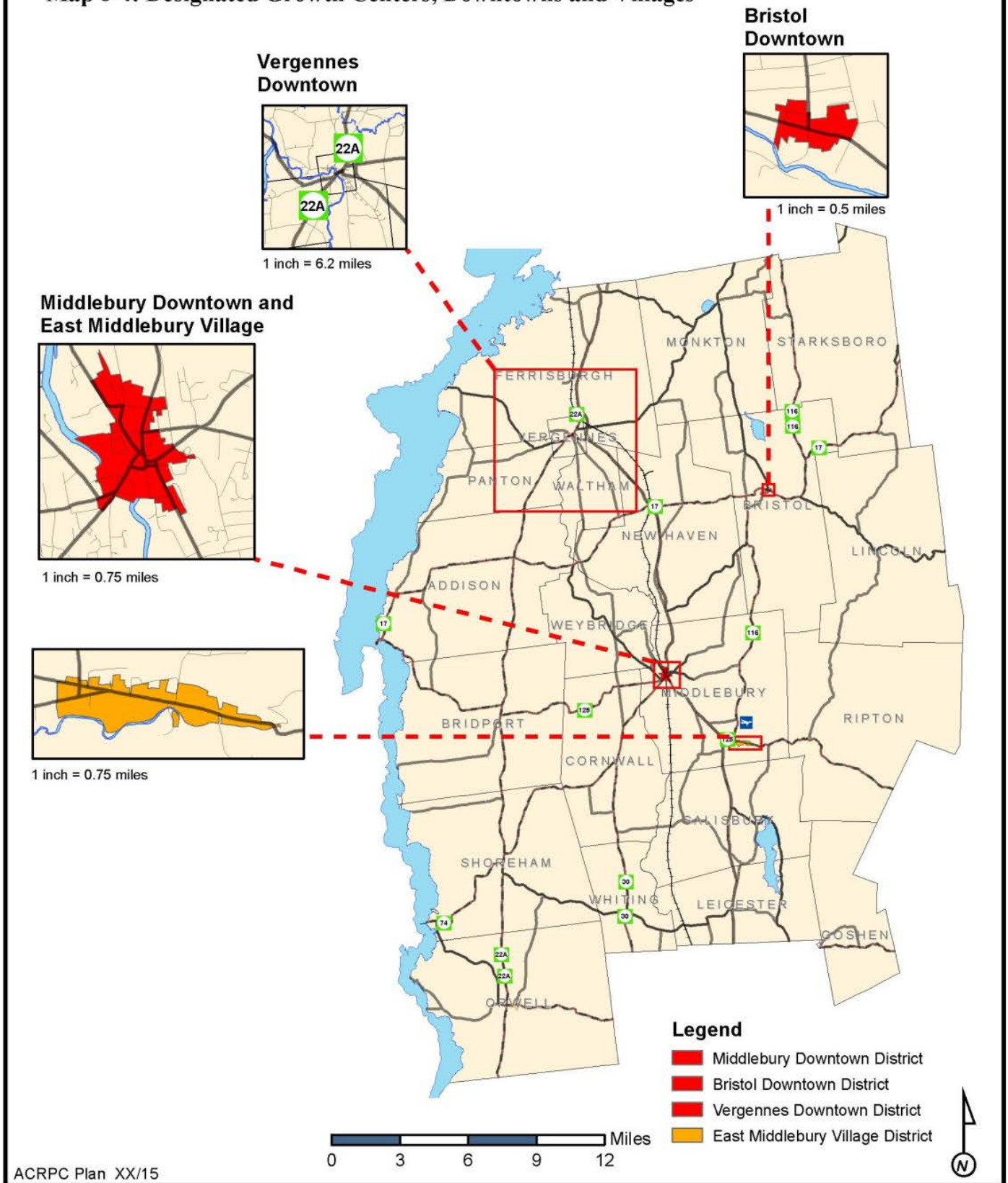
Legend

- Town Adopted and Regional Approval
- Town Adopted
- Town Adoption In Process

ACRPC Plan XX/15



Map 8-4: Designated Growth Centers, Downtowns and Villages



9. CONSISTENCY

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1.1. Abutting Regional Planning Commissions

Introduction

As required by 24 V.S.A. § 4348a(8), regional plans must contain a statement indicating how the regional plan relates to development trends, needs and plans, and regional plans for adjacent municipalities and regions.

This section provides an initial look at how the Addison Region fits into a wider network. The section is complemented by the ongoing work each RPC does in the areas of town planning, transportation planning and emergency management and by the communications the organizations engage in with each other at the Vermont Planning and Development Agency (VAPDA) and other professional organizations.

Chittenden County Regional Planning Commission

Chittenden County Regional Planning Commission (CCRPC) abuts ACRPC to the north. In many ways, the northernmost ACRPC towns of Ferrisburgh and Monkton, and to a lesser extent Starksboro, already function partially as bedroom communities for the greater Burlington area. Because of this, all three towns are quite concerned about patterns of growth, and the costs associated with development, especially residential development.

Future land uses in Buels Gore, Huntington, Hinesburg, and Charlotte as shown on the Chittenden RPC future land use plan map, indicate that all areas abutting Addison County fall in the rural planning area. The Chittenden County Regional Plan calls for land in this area to remain primarily in the working landscape. Goals for this area include: Promoting uses in the area including recreation, conservation, agriculture, silviculture and resource extraction industries; Encourage small scale residential clustered development through the use of PRDs; Providing opportunities for commercial services designed in concert with the overall characteristics of the Rural Planning Area and Promoting and supporting efforts to develop more dynamic methods for providing financial support to landowner conservation efforts.

The ACRPC plan map depicts mostly forest district in the mountains and medium density residential agricultural districts in Monkton and Ferrisburgh. Accordingly, the Addison County Plan allows somewhat more residential density in the area than does the Chittenden Plan. However, the ACRPC plan recognizes that agriculture is still an important industry and way of life in the Addison Region and promotes the use of clustered development in these areas to preserve farmland. Development will also be limited by clay soils in areas west of Route 7, which will keep densities lower.

The Lewis Creek watershed forms much of the boundary of the two planning areas. While neither plan recognizes the entire watershed as a significant regional resource, the ACRPC plan supports riparian buffers along streams for use as wildlife corridors and to prevent erosion. ACRPC works regularly with the Lewis Creek Association and urges a

cooperative effort between the towns, the Lewis Creek Conservation Commission and both RPCs in planning for the watershed.

The RPCs, the affected municipalities and the Agency of Transportation are working together on an access management/corridor management plan for the Route 7 corridor.

Rutland Regional Commission

Rutland Regional Commission (RRC), located to the south of the Addison Region, classifies nearly all land abutting the Addison Region in the towns of Chittenden, Brandon and Sudbury as within its Rural Planning Area. The Rutland Plan notes that the Rural Planning Area consists of a mixed land use pattern of residential development, small commercial enterprises, outdoor recreation, forestry and agricultural uses. Goals for the Rural Planning Area include: Maintaining agricultural, forestry and extraction uses; low density, but clustered residential development, encouraging small scale businesses that do not conflict with forestry uses; discouraging major retail or service uses and supporting the right to farm.

In Addison County, the future land use map depicts forestry conservation uses in the east and low-density residential agricultural districts in the west, thus roughly corresponding with the uses allowed in Rutland's rural districts.

Both regions share Otter Creek, which is a regionally significant water resource in the ACRPC plan. Both regions and the riparian towns are working jointly to create a Basin Plan for the entire Otter Creek Basin.

Two-Rivers Ottaquechee and Central Vermont RPCs

To the east, ACRPC abuts both the Two-Rivers Ottaquechee RPC and the Central Vermont RPC along the ridge of the Green Mountains. Land use policies in all three plans support forest and conservation uses with limited residential use in these areas due to their steep terrain, existing forest resources (both public and private), and to the limited and difficult vehicular access to much of the area.

1.2. Consistency with Title 24 VSA § 4302

A. Introduction

This final section of the Regional Plan is required by 24 VSA § 4345a(5)(G). This section of the law requires regional planning commissions, as part of preparation of a regional plan, to prepare a report explaining how the regional plan is consistent with the goals in 24 VSA § 4302. Section 4302 was amended in 2003 to include a thirteenth statewide planning goal regarding affordable childcare.

This section is written on a goal-by-goal basis responding to the 13 goals of Section 4302(c). The goal as written in the law is printed first, and then a statement describing how the Addison Region's plan is consistent with that goal follows. Page numbers are given to assist those reading this section in finding the pertinent parts of the plan for additional information.

B. Consistency with Title 24 VSA § 4302

Goal 1

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

- A. Intensive residential development should be encouraged primarily in areas related to community centers, and strip development along highways should be discouraged.
- B. Economic growth should be encouraged in locally designated growth areas, or employed to revitalize existing village and urban centers, or both.
- C. Public investments, including the construction or expansion of infrastructure, should reinforce the general character and planned growth patterns of the area.

ACRPC Plan Consistency

The Regional Plan for the Addison Region “supports development patterns that will maintain the historic character of the region, namely urban centers and villages separated by rural countryside.” (Overall Goal A, page 1-10). The Future Land Use Map, a composite of local future land use maps (Map 9.1-1, page 9.1-3), shows commercial uses concentrated in village and urban centers with small amounts of strip development limited to the area south of Middlebury and in Ferrisburgh. Several towns still have an unusual residential pattern allowing small lots fronting directly on roads in order to preserve large tracts of agricultural lands located to the rear of the small lots.

The Regional Plan calls for commercial development to be encouraged in locally designated village centers (Economy Goal D, Objective 1, page 5-5). The Utilities, Facilities and Services section of the plan contains a number of objectives that further this goal by calling for community facilities to be located in existing settlement areas including:

healthcare facilities (Health and Safety Goal A, Objective J, page 7-57), law enforcement and criminal justice facilities (Health and Safety Goal C, Objective F, page 7-58), fire and rescue facilities (Health and Safety Goal D, Objective J, page 7-59), education facilities (Education Goal C, Objective E, page 7-80), and municipal facilities (Municipal and Administrative Facilities Goal B, Objective A, page 7-93). The plan also calls for wastewater infrastructure to be used to support a development pattern of village centers surrounded by agricultural land (Wastewater Goal B, Objective 3.d, page 7-7).

Goal 2

To provide a strong and diverse economy that provides satisfying and rewarding job opportunities and that maintains high environmental standards, and to expand economic opportunities in areas with high unemployment or low per capita incomes.

ACRPC Plan Consistency

Goal A of the Economy section (page 5-4) calls for the Addison Region to “be an attractive place to live, work, vacation and conduct business.” Goal B supports small- and medium-sized, locally owned businesses. Goal C speaks to the importance of the agriculture and forest product industries in the Addison Region. Goal D calls for the provision of “adequate infrastructure and services to support a strong and diverse economy.”

Goal 3

To broaden access to educational and vocational training opportunities sufficient to ensure the full realization of the abilities of all Vermonters.

ACRPC Plan Consistency

Overall Goal C (page 1-10) states that the Regional Commission will assist in providing access to educational and vocational training opportunities that will foster full realization of the abilities of the population in the region. The Economy section (Goal D, Objective 7, page 5-6) calls for continuing education to be available to support a productive, employable workforce. Within the Utilities, Facilities and Services section, the Education section speaks to supporting life-long learning for the region’s residents including access to early childhood, vocational, technical and continuing education opportunities (pages 7-79 – 7-80).

Goal 4

To provide for safe, convenient, economic and energy efficient transportation systems that respect the integrity of the natural environment, including public transit options and paths for pedestrians and bicyclers.

- A. Highway, air, rail and other means of transportation should be mutually supportive, balanced and integrated.

ACRPC Plan Consistency

ACRPC, like other regional commissions, is working with the Agency of Transportation and member municipalities to provide transportation planning on a regional basis under the federal TEA-21 program. In addition, ACRPC was instrumental in the formation of Addison County Transit Resources, a non-profit public transportation provider.

Transportation goals and objectives include:

- A. Support growth centers (Goal B, page 6.1-6).
- B. Work to improve travel safety (Goal A, Objective 1, page 6.1-5).
- C. Plan for efficient functioning of the transportation network by reducing congestion. (Goal A, Objectives 1 & 2, starting on page 6.1-5).
- D. Promote the development of transportation services for disadvantaged persons, and of alternative transportation systems, i.e. bicycle, carpool, rail, etc. (Goal A, Objective 4, page 6.1-6).

The Energy subsection contained in the Utilities, Facilities and Services section contains several objectives related to energy conservation and transportation. This plan section provides support for public transportation, carpooling, and bicycle and pedestrian paths to reduce energy consumed for transportation in the region (Energy Goal B, page 7-27).

Goal 5

To identify, protect and preserve important natural and historic features of the Vermont landscape including:

- A. Significant natural and fragile areas
- B. Outstanding water resources, including lakes, rivers, aquifers, shorelands and wetlands
- C. Significant scenic roads, waterways and views
- D. Important historic structures, sites or districts, archeological sites and archaeologically sensitive areas.

ACRPC Plan Consistency

a. Significant Natural and Fragile Areas

Significant natural and fragile areas are identified on the Natural Heritage Sites Map, (Map 4.2-1, page 4.2-7) and in the listing starting on page 4.2-10. Privately owned resources are listed starting on page 4.2-12 with the provision that more work needs to be done with the state, with landowners and the public to determine which resources are regionally significant and which are better protected at the local level. As noted in Natural Heritage documentation, not all identified sites are of equal importance. Natural and fragile area policies (page 4.1-3) encourage identification, protection and conservation of natural and fragile areas in a form commensurate with their importance, and the degree to which protection and conservation is necessary. The policies also encourage the maintenance and perpetuation of a diversity of

biological habitats in Addison County, and establishment and maintenance of interconnecting wildlife corridors, including riparian buffer zones.

b. Outstanding Water Resources

Water resources policies (page 4.1-5) include policies on lakes and ponds (including shorelands), rivers and streams, aquifers and wetlands. These policies recognize the multiple uses of these resources, encourage the maintenance and protection of the quality of these resources, including where they might be incrementally degraded, improvement and monitoring of water quality, reduction in activities which cause significant impacts on the resource, and maintenance of diverse areas of vegetation along water resources sufficient to protect the viability of the resource.

The wetlands policies support the protection of each wetland commensurate with its importance and the type of benefits provided, both system-wide and long-term, and also encourage the use of AMPs, AAPs and BMPs. The policies also support a definition of wetlands with a hydrological base. This policy is partly in response to the problem with existing rules that include many acres of farmland in the Addison Region that have been, and continue to be in agricultural use, but are not planted in commodity crops. Under those rules, such land reverts to wetland status if not planted to a commodity crop during a five-year cycle.

c. Scenic Roads, Waterways and Views

The Scenic Resources subsection, (page 4.8-1) identifies the general landscape as an integral part of the scenic character of the region and supports continuation of working agriculture and managed forestry practices as the most essential ingredient in maintaining the scenic quality of the Addison Region. This would include stream and shoreland buffers as part of riparian wildlife corridors supported in the natural areas and wildlife policies. Ridgeline protection measures are also supported. No recommendations for Outstanding Resource Waters or Wild and Scenic Rivers have been made in this plan.

d. Historic and Archeological Resources

We are indeed fortunate in the Addison Region to have excellent background documentation of both historic and archeological resources. The Cultural Resources section of the plan recognizes the importance of *The Historic Architecture of Addison County* as a resource to document the historic values of structures should a municipality wish to establish an historic district or in other ways recognize and preserve their historic heritage (page 4.7-1). Policy 7 (page 4.1-13) encourages the conservation of historic resources, including the adaptive reuse of historic structures and townscapes. Policy 3 supports a regional consortium of local historical societies to promote regional efforts at preservation. Policy 9 encourages responsible ownership and protection of historic resources and Policy 10 directs the commission to assist municipalities in their efforts to establish local strategies and tools to protect historic resources.

Policies 12 and 13 recognize the work done by Jack Rossen, together with the Division of Historic Preservation and the Middlebury District of the USDA Soil Conservation Service, to identify areas rich in archeological resources and to prepare archeological sensitivity maps to aid property owners and municipalities in making decisions related to archeological preservation.

The Historic and Cultural subsection of the Utilities, Facilities and Services section of the plan calls for the historic and cultural resources of the region to continue to be preserved while remaining vital components of their communities. Objectives in this section speak to supporting locally designated historic districts, initiatives like Downtown/Village Center programs, protection and research of archaeological resources, and adaptive reuse of historic structures (Historic and Cultural Resources Goal A, page 7-92).

Goal 6

To maintain and improve the quality of air, water, wildlife and land resources.

- A. Vermont's air, water, wildlife, mineral and land resources should be planned for use and development according to the principles set forth in 10 VSA § 6086(a).

ACRPC Plan Consistency

Air quality is not extensively addressed in the plan due to the fact that it is perceived to be a less serious problem in the Addison Region than other problems. The plan's Overall Vision Statement and Overall Goal F support maintenance of a high quality of air, water and soil. The Economy section supports smaller and home-based industries rather than larger, heavy industry that may have more processing byproducts that impact air and water (Goal B, page 5-4).

Water quality protection is addressed in Policies 1, 3, 4, 6, 8, 9 and 12 starting on page 4.1-5 of the plan. These policies all support maintenance and protection of water resources and of water quality by various means and techniques. The Economy section promotes the provision of infrastructure including water, sewer and transportation facilities to support industry. (Goal D, page 5-5).

Wildlife and mineral resources are included in the Natural Resources Section of the plan. The Wildlife subsection (starting on page 4.3-1) provides considerable information about major wildlife species in the region such as deer, bear, fisheries, and re-introduced species such as the peregrine falcon. The wildlife policies (page 4.1-4) support protection and conservation of significant habitat and the siting of development to protect and conserve adjoining areas of significant wildlife habitat (Policy 2). Policy 5 supports the establishment of interconnecting wildlife corridors, including riparian buffer zones.

The Minerals subsection identifies existing and potential sources of sand and gravel, supports assisting municipalities in making provisions for local sources to reduce costs and transportation impacts, discusses problems with permitting these resources and offers

suggestions to aid municipalities in their review. The element also recognizes conflicts existing with streambed deposits of sand and gravel. Marble is recognized as the only other economic resources in the region.

Goal 7

To encourage the efficient use of energy and the development of renewable energy resources.

ACRPC Plan Consistency

The Energy subsection of the Utilities, Facilities and Services section of the plan (starting on page 7-25) provides information about the energy infrastructure, supply, demand, generation and transmission within the region. The Energy subsection contains goals and objectives that speak both to energy conservation and to utilizing local resources for local energy generation and distributed transmission (pages 7-27 – 7-28). Goal A, Objective D supports efforts to reduce energy costs for the region's farms through development of farm-based energy sources such as biogas and biodiesel. Goal B, Objective 2.C encourages municipalities to adopt and enforce building codes to increase energy efficiency to the Vermont Energy Star Homes program standard. The plan also calls for local businesses to utilize the resources available through Efficiency Vermont to reduce their energy consumption (Goal B, Objective 1.E).

Goal 8

To maintain and enhance recreational opportunities for Vermont residents and visitors.

- A. Growth should not significantly diminish the value and availability of outdoor recreational activities.
- B. Public access to noncommercial outdoor recreational opportunities, such as lakes and hiking trails, should be identified, provided and protected wherever appropriate.

ACRPC Plan Consistency

The Utilities, Facilities and Services section of the plan contains a Recreation subsection (Recreation Goal C, page 7-93). The objectives of that section include supporting public access to the region's navigable waterways, and safe access for walking and biking on main roads. The plan also calls for municipalities to retain control over unused road and rail right-of-ways, Class 4 roads and similar resources to provide opportunities for trail systems throughout the region.

The Natural Resources section of the plan contains references to recreational opportunities in the region as well.

Goal 9

To encourage and strengthen agricultural and forest industries.

- A. Strategies to protect long-term viability of agricultural and forest lands should be encouraged and should include maintaining low overall density.
- B. The manufacture and marketing of value-added agricultural and forest products should be encouraged.
- C. The use of locally grown food products should be encouraged.
- D. Sound forest and agricultural management practices should be encouraged.
- E. Public investment should be planned so as to minimize development pressure on agricultural and forestland.

ACRPC Plan Consistency

The Agricultural subsection of the plan addresses the importance of agriculture as part of the culture, the landscape and the economy of the region. It acknowledges interfaces and conflicts with other resources and supports programs such as AAPs, BMPs, Integrated Crop and Integrated Pest Management. Agricultural policies encourage the protection of the quality and quantity of agricultural lands as a critical mass in tracts of sustainable size (Policy 2, page 4.1-9). Municipalities are encouraged to plan carefully to maintain agricultural lands, including the use of a LESA rating system if appropriate. Protection from nuisance suits is supported, as is clustered development and the placement of development so as to avoid negative impacts on farmland and farm management. Recognizing that agriculture exists only as long as the economics work, the plan encourages use value taxation, support of value-added processing of local products, diversification of agriculture, and research and development of better science and technology, while maintaining the biodiversity within agricultural lands.

The Forest Resources Section of the plan (starting on page 4.6-1) includes the same or similar policies that encourage the maintenance of the forest industry in the Addison Region. While less broadly spread over the region, forested lands form the backdrop of the region's landscape and are also important economically as timber producers. The Future Land Use Map shows forestlands primarily designated as Forest Conservation or low-density (10+ acres) Residential, except for Lincoln which has 1 acre zoning. Lincoln also has a sewage ordinance that is very strictly enforced, providing a limited number of large lots for residential uses.

Agricultural lands in Weybridge, Panton, Shoreham, Whiting, Starksboro, Ripton and Goshen are primarily designated for large lots (over 10 acres). Most municipalities have a provision for Planned Unit Development in their bylaws, although it is not commonly used. To date septic considerations have effectively controlled intensive development, but have resulted in piecemeal fragmentation of agricultural lands. The changes in the Wastewater Rules may have an impact on this in the future and the impact of the changes to the Wastewater Rules should be monitored and reported.

Policies in both Forestry (5) and agriculture (6) support local processing of value added products. Goal C of the Economy section (page 5-5) also supports local use of local products and of value added products. Both forestry and agricultural lands sections support AAPs, AMPs and BMPs (Policy 4, page 4.1-11; Policy 7, page 4.1-9).

Both forest and agricultural policies support retention of critical mass and of sustainable tracts of resource land. The Economy section supports the location of economic growth in areas where infrastructure is available, which, in the Addison Region is generally in the larger village centers. Overall Goal A, page 1-10 of the plan, supports development patterns that will maintain the historic character of the region, namely urban centers and villages separated by rural countryside. Goal B (page 6.1-6) of the Transportation section is to ensure that the regional transportation system furthers the region's objectives regarding land use, particularly that it implements the growth areas concept and discourage sprawl. The Utilities and Facilities Section, calls for wastewater treatment infrastructure to be used to support the regional goal of encouraging development that follows the traditional pattern of village centers surrounded by agricultural land (Goal B, Objective 3.d, page 7-7). This policy taken together with the urban center/rural countryside Goal A on page 1-10 of the plan, Policies 2 and 8 in the Agricultural Lands section, and Policies 3 and 9 in the Forestry Section direct major public investment in infrastructure away from agricultural and forest lands.

Goal 10

To provide for the wise and efficient use of Vermont's natural resources and to facilitate the appropriate extraction of earth resources and the proper restoration and preservation of the aesthetic qualities of the area.

ACRPC Plan Consistency

The commission has examples of materials that municipalities may use as part of their review process for mineral extraction. Reclamation materials, including a resource for vegetative covers, are included in the Mineral Resources Section.

Goal 11

To ensure the availability of safe and affordable housing for all Vermonters.

- A. Housing should be encouraged to meet the needs of a diversity of social and income groups in each Vermont community, particularly for those citizens of low and moderate income.
- B. New and rehabilitated housing should be safe, sanitary, located conveniently to employment and commercial centers, and coordinated with the provisions of necessary public facilities and utilities.
- C. Sites for multi-family and manufactured housing should be readily available in locations similar to those generally used for single-family conventional dwellings.

ACRPC Plan Consistency

The Housing section (beginning on page 3-20) relies on current data documenting the continuing need for low and moderate-income housing. Its goals and policies support the provision of safe, affordable and decent housing for all present and future residents of the region (Goal A page 3-21). Goal A, Policy 2 focuses on safe housing, including the upgrading of substandard housing and of failing on-site sewage systems. Goal A, Policy 3 discusses energy efficiency and promotes housing located near employment, commercial and service centers. Goal A, Policy 5 encourages housing that is compatible with existing community character and that follows traditional settlement patterns.

Goal 12

To plan for, finance and provide an efficient system of public facilities and services to meet future needs.

- A. Public facilities and services should include fire and police protection, emergency medical services, schools, water supply and sewage and solid waste disposal.
- B. The rate of growth should not exceed the ability of the community and the area to provide facilities and services.

ACRPC Plan Consistency

The Regional Plan provides information on all the community facilities and services listed in Goal 12(A) in its Utilities, Facilities and Services section. This section of the plan provides factual information about a broad range of community resources as well as associated policy statements. The goals and objectives of each subsection frequently call for local planning or capital budgeting for and cost-effective and efficient provision of needed facilities and services including: water supply (Goal A, Objective 3.A and 3.F, page 7-6), wastewater (Goal B, Objective 3.A through 3.F, page 7-7), solid waste (Goal C, Objective 3.A and 3.E, page 7-8), fire and rescue (Goal D, Objective E, page 7-58), education (Goal A, page 7-79), and municipal facilities (Goal B, Objectives C and E, page 7-93).

Goal 13

To ensure the availability of safe and affordable child care and to integrate child care issues into the planning process, including child care financing, infrastructure, business assistance for child care providers, and child care work force development.

ACRPC Plan Consistency

This is a new statewide planning goal as of July 2003. With the 2004 revision to the Economy section and the 2005 revision to the Utilities, Facilities and Services section, ACRPC began the process of integrating this goal into its Regional Plan. The Economy section calls for the provision of high-quality, affordable childcare to meet the needs of the region's working parents (Goal D, Objective 6, page 5-6). Within the Human Services

subsection of the Utilities, Facilities and Services section, the plan speaks to the need for quality, affordable childcare and encourages the region's employers to work together to improve access to childcare for their employees (Goal B, Objectives D and E, page 7-57). The plan also supports provision of early childhood education opportunities in Education Goal B, Objective A on page 7-79.